# Improving Tool Support for Personal Task Management (PTM)

Amirrudin Kamsin

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

University College London

September 2014

# Declaration of originality

I, Amirrudin Kamsin, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

# Abstract

Personal Task Management (PTM) describes the planning, prioritising and list-making of tasks employed by an individual user. There are hundreds of commercial electronic PTM tools available on the market which users can choose from. There appears to be little attempt to develop a framework for describing people's task management behaviour, making it difficult to determine the extent to which these tools meet users' needs. The aims of this thesis were therefore to understand how academics manage their tasks, to identify the conceptual gaps between them and the existing electronic tools, and to establish requirements for guiding the design and evaluation of PTM tools.

The research adopts a user-centred design methodology. This includes both empirical and analytical approaches, conducted through four different studies. Firstly, a semi-structured interview study develops a PTM framework, describing the components of PTM (i.e. the underlying activities and contextual factors). Secondly, a member-checking study tests the accuracy of the framework. Thirdly, a video-diary study examines the inconsistencies discovered between the interview and member-checking studies. The findings extend the PTM framework to include other aspects of users (e.g. challenges, context awareness, etc.), broadening the understanding of the complexity of PTM behaviours. The data gathered in the user studies was analysed using a grounded theory (GT) approach, and the findings were then used to build personas of academics. Finally, an in-depth expert analytical evaluation of a set of existing tools using CASSM identifies the conceptual misfits between users and the existing tools.

The contributions of this thesis are a development of the PTM framework, describing the key factors that influence academics in managing their tasks; a development of personas, explaining characteristics of different groups of academics and PTM strategies that they employ over time; and an evaluation of existing PTM tools, determining their strengths and limitations and providing recommendations.

# Publication/Award

Kamsin, A., Blandford, A. and Cox, A.L. (2012). 'Personal Task Management: My Tools Fall Apart When I'm Very Busy!' *Proceedings of the 2012 ACM Annual Conference Extended Abstracts on Human Factors in Computing Systems Extended Abstracts*. Austin, Texas, USA: ACM, pp. 1369-1374. (The poster presentation won the third place in the CHI 2012 Student Research Competition Finalist (Graduate Category) – See Appendix P)

# Table of Contents

# List of Figures

# List of Tables

# Acknowledgements

I would like to thank my supervisors, Prof Ann Blandford and Dr Anna L. Cox for their excellent and supportive supervision as well as their critical and valuable thoughts given throughout my studies. Thanks to Prof Angela Sasse and Prof Yvonne Rogers for their constructive comments given during the first year and transfer vivas. I would like to thank Dr. Suzanne Beeke and Dr. Hale Cuss from the UCL Division of Psychology and Language Sciences and UCL Language Centre respectively, for their valuable support and training given in terms of developing literature review and writing a thesis. Also thanks to both current and former members of UCLIC, in particular, Dr. Stephann Makri, Dr. Stephen Hassard, Aneesha Singh, Dr. Charlene Jennett and Dr. Abdigani Diriye, and also to my colleague, Dr. Nor Badrul Anuar Juma'at for their friendly support. Special thanks also go to all the participants for their generosity and kindness for sharing their valuable experiences and showing their time management tools during the interview as well as for checking and acknowledging the transcripts. Also, to my beloved family members, in particular, my wife, Hanisah and my sister, Normah, and friends for their unconditional support, advice and help throughout this challenging period. Special thanks to Emily Blandford for providing consultation hours regarding thesis writing. Also, many thanks to my friends Justin Franklin, Justin Axelberg and Hal Thompson for proofreading this thesis. Last but not least, I want to thank God for His grace and mercy that makes it possible for me to produce this thesis.

This research project was financed with the aid of scholarship from Ministry of Higher Education in Malaysia and the University of Malaya.

*This thesis is dedicated to the memory of my beloved mum, dad and elder sister*

# Chapter 1: Introduction

There are over one hundred PTM tools currently available on the market, offering a wide range of functions and features (Priacta, 2009; Haraty *et al.*, 2012). However, according to Haraty *et al.*, the acceptance of these tools has been low. Many people instead prefer to use paper-based tools to manage their tasks (Blandford and Green, 2001; Bernstein *et al.*, 2008; Haraty *et al.*, 2012). There has been little research to explain this phenomenon. Nevertheless, previous literature has highlighted the limitations of existing tools. Blandford and Green (2001) have identified that there have been some ambiguities or inconsistencies between the concepts perceived by users and those represented by existing time management tools (e.g. event priority). Bank *et al.* (2012) have pointed out that existing tools, in particular calendars, fail to act as an active repository. Haraty *et al.* (2012) have discovered that people prefer to use tools which they can easily personalise to suit their individual needs, which tend to evolve over time. They have further noticed that the existing tools have not been adequately equipped with such capability. These examples highlight some of the limitations of the existing PTM tools, making it difficult for the users to use them. In this thesis, we have investigated what people really do and why they do not like current tools. The thesis also explains what tools are adequate and what are not adequate currently, and how to improve them. This chapter highlights the motivation for this thesis as well as explaining the objectives and the contributions made, and providing a scope to this body of knowledge. The chapter ends with an overview of the structure of this thesis. This chapter is divided into the following subsections:

- **Research motivation** – discussing the issues regarding current PTM task management tools and the particular behaviours that are not addressed by existing literature.
- **Thesis goals** – explaining the aims and contributions of this thesis.
- **Research questions** – explaining the questions that the thesis aims to address.
- **Contribution** – highlighting the key contribution of this research.
- **Research roadmap –** summarising the components of this thesis.
- **Thesis scope** – describing the areas/aspects that the thesis will focus on.
- **Description of participants** – explaining the rationale for the choice of participants.
- **Description of key terms** – defining the key terms used in this thesis.
- **Thesis outline** – providing a summary of the remaining chapters.

## 1.1 Research motivation

### 1.1.1 The abundance and variety of electronic PTM tools

This work is motivated by understanding Personal Task Management (PTM) tools, their target users, and bridging the documented gaps between them. As mentioned earlier, there are hundreds of electronic PTM tools available on the market, but the adoption of these tools is still low (Haraty *et al.*, 2012). People instead, still tend to use paper-based tools or rely on their heads to manage their tasks (Blandford and Green, 2001; Bellotti *et al.*, 2004; Jones *et al.*, 2006). This is perhaps due to limitations of these tools. Haraty *et al.* (2012) have pointed out two reasons for such low adoption of existing electronic tools: the mismatch between users' needs and existing tools, and PTM tools' steep learning curve. Blandford and Green (2001) have highlighted that some of the features (i.e. concepts) represented by existing tools seem ambiguous, making them difficult for users to interpret and use.

To illustrate, Figure 1.1 and Figure 1.2 show typical examples of PTM tools: Achieve Planner (Effexis, 2010b) and Gtdagenda (Gtdagenda, 2009). Both represent a '*priority*' concept (which is highlighted by the red circles) but in a slightly different implementation. Achieve Planner provides four different levels of priority to show the degree of importance of tasks: A, B, C or D. Alongside these, users can assign any number to further vary them. Gtdagenda, on the other hand, allows users to assign a number (between 1 and 5) to represent priority. The Intelligent Time Manager (Bank *et al.*, 2012) (see Figure 1.3), another example of a PTM tool, by contrast does not require users to assign values to priority. Instead, it only allows users to check a box for '*important*'. There are important conceptual differences between these tools. The former tools represent priority as a scale, whereas the latter tool represents it as a factor.

However, there is still a lack of evidence to show the adequacy of existing tools (Haraty *et al.*, 2012). Therefore, it cannot be ascertained which of them is designed in accordance to users' needs, making it challenging to assess how well they can support users in their situated context of use. To address these issues, it is essential to develop a detailed understanding of target users in a particular context of use first, and to describe the similarities or differences between them. This allows the author to establish criteria for evaluating the suitability of the existing tools and defining more concrete requirements for designing future PTM tools.

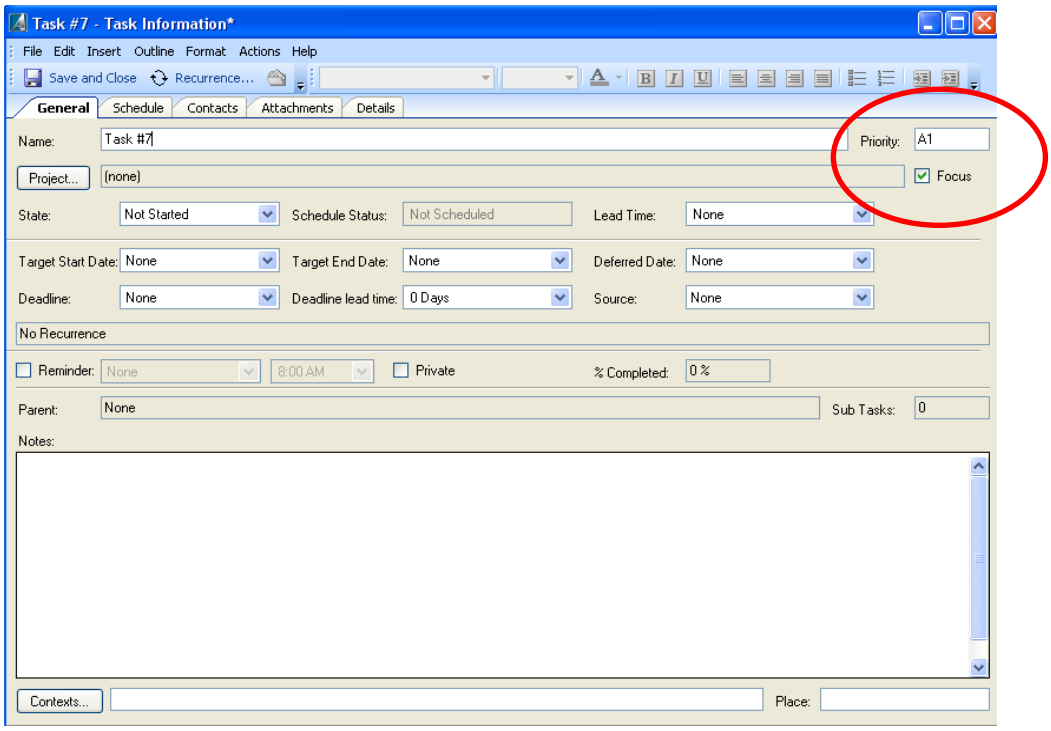



Figure 1.1 Achieve Planner – Task creation menu.

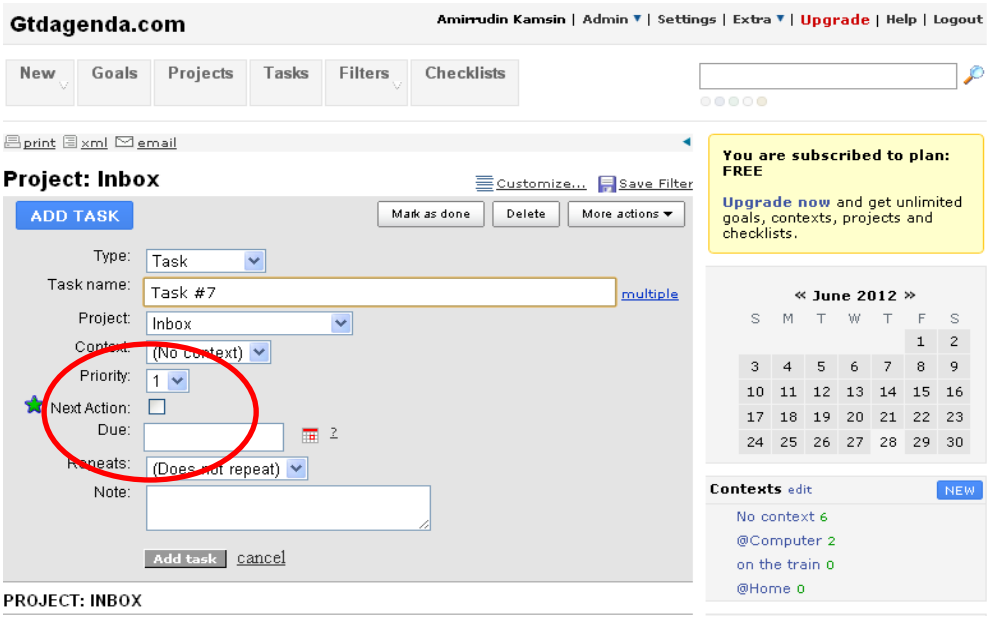



Figure 1.2. Gtdagenda – Task creation menu.

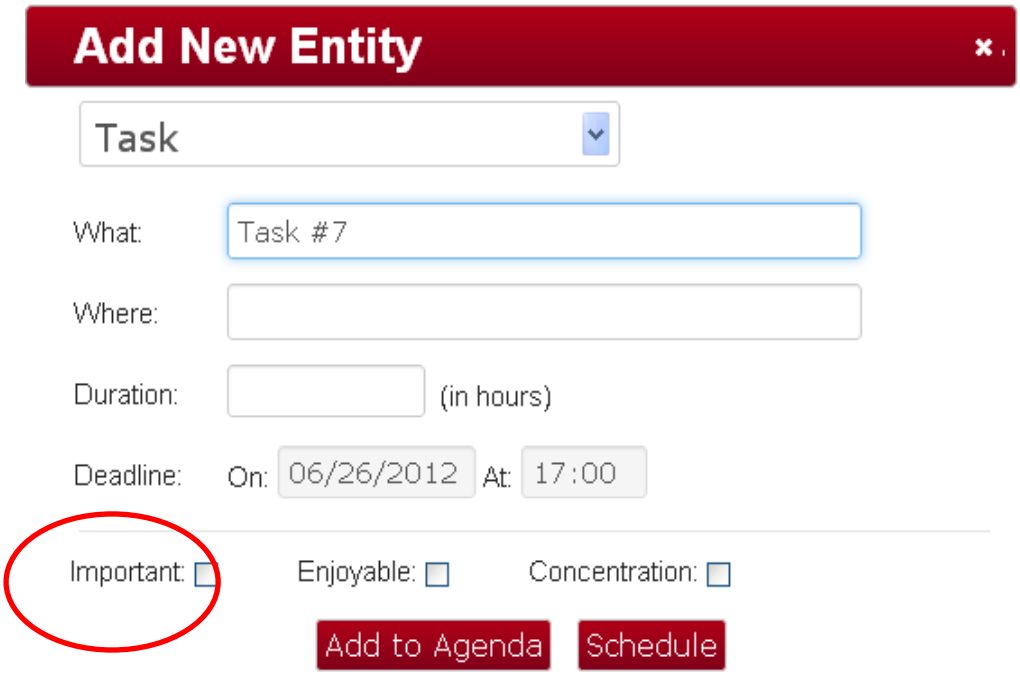



Figure 1.3. The Intelligent Time Manager – Task creation menu.

### 1.1.2 The limited frameworks and contradicting concepts

PTM is context-dependent and may vary from one context/situation to another. Different categories of domains or fields of work may have different contexts (e.g. job responsibility, work environment or the nature of work), needs, and approaches to managing tasks. Even if we were to compare within a similar domain, users are at different stages of their career paths and therefore face different challenges and thus have different needs. For example, academics include a range of potential users: PhD students or post-docs, lecturers, senior lecturers, associate professors/readers, professors and so on. As they move along their career paths, they are likely to experience different levels of busyness and types of commitments/responsibilities that they have to deal with. Previous research has shown that it is a challenge for academics to manage their personal tasks (Houston *et al.*, 2006; Vardi, 2009; Egbewole, 2013) and balance between their work and personal needs (Blandford and Green, 2001). Their PTM strategies and issues they implement and face respectively, are different from one to another (Haraty *et al.*, 2012). This will be further explained in Sections 1.6 and 2.7.1.

There are some possible factors that contribute to such differences. These may include working style, personality, type or nature of job, career stages or level of busyness, etc. In this thesis, the author has focused on investigating the development of PTM strategies

employed by academics over time, as their career stages progress. For example, a tool might be adequate and easy for a PhD student or post-doc due to the fact that they may only have one project to manage, and have plenty of big time-gaps in which to do it. On the other hand, a professor has to manage a huge number of contrasting commitments (teaching, research and administration) within limited periods of time. Therefore, they may need a far more sophisticated and intelligent tool to address this challenge. It is therefore vital to determine the different goals and PTM needs of a wide range of user groups in order to design appropriate PTM tools.

A number of studies have explained PTM concepts and behaviours. Gonzalez *et al.* (2008) have proposed a model of Personal Activity Management (PAM) that consists of five important elements: capture, classification, focalisation, management and revision. These elements inform the possible actions that users might take when managing their tasks. The model, however, was synthesised based on both previous literature and commercial task/time management methods (or prescriptions), rather than based on the descriptions of users in a particular context (i.e., what activities people actually do in order to manage their tasks and how they do them). Thus, it is unclear to what extent this model matches with users.

There appear to be some inconsistencies with the definitions/descriptions of factors that influence PTM behaviours. Claessens *et al.* (2010) have explored the relationships between task completion (in short time periods) and the following three underlying factors:

a) Task attributes (importance, attractiveness, priority and urgency).
b) Job attributes (workload and autonomy).
c) Personality (conscientiousness and emotional stability).

Claessens *et al.* have identified that the completion of tasks is directly related to the assigned priority (the sequence of the activities in time) and urgency (the extent to which it is relevant to engage in these activities as soon as possible) rather than other factors (in particular, importance). Explanations of how users represent priority are limited. Bellotti et *al.* (2004) identified that participants did not used any explicit representation (e.g. scale, factor, asterisk) to represent their priority. Instead they found two participants, in particular, used small scraps of paper to jot down near-term execution of priority actions and carried the list in their pockets. Bellotti *et al.* (2004) have also identified essential factors that contribute to the completion of tasks (e.g. deadlines, importance, personal relationships, etc.), and suggested

that priority (i.e. the order in which tasks are completed) is determined only by the importance of the task.

However, Blandford and Green (2001) highlight that people face a challenge to perform their tasks due to a tension in determining their urgency and importance. Little attempt has been put forward to describe these factors and relationships between them in detail. Some of these factors/concepts tend to be used interchangeably; for example, priority, importance and urgency. It is not clear the differences between them and how they relate to each other.

Many existing tools enable users to reschedule tasks based on these preconceived notions (e.g. urgency and importance), but fail to go beyond this by, for example, giving guidance to users about which of these two factors they should give more weight to. It is therefore important to clarify this, explain what these concepts mean and suggest how they should be adequately implemented. This also determines whether the features represented by existing tools match users' descriptions.

In the previous section, the author highlighted the inconsistencies of PTM concepts based on the previous literature and the existing PTM tools. Later in section 2.7.1 (p.48), the author will further explain issues that academics in particular experience in managing their personal tasks. The section provides a rationale for the author to focus the research finding on improving our understanding of how academics manage their personal tasks and to develop requirements for PTM tools to facilitate them. The following section will describe key research questions related to this group of users.

## 1.2 Research questions

The research problem described in Section 1.1 has led to a formulation of three research questions for this thesis, which will be addressed in four interrelated chapters. Each of these questions can be divided into a set of objectives, as follows (see Table 1.1):

**Question 1:** *How do academics manage their personal tasks?*

This question is addressed in interview and video-diary studies presented in Chapters 4 and 5 respectively. The objectives are:

- To explore and compare PTM strategies employed by academics.

- To identify the relationship between their strategies and career development (or seniority).
- To investigate factors (Chapter 4) and aspects that can influence their PTM strategies.

**Question 2:** *Do existing tools provide adequate support/features?*

The second question will further investigate the problems facing academics. This is to identify to what extent their existing PTM strategies or tools address the problems encountered. This question is addressed in both the interview and video-diary studies explained in Chapters 4 and 5 respectively. In practice, the video-diary study was found to be more fruitful in answering the question. The question also aims to evaluate the adequacy of existing tools and recommend future improvements that can be made (Chapter 6). The objectives of this question are as follows:

- To investigate the challenges that academics experience in manage their personal tasks.
- To identify the relationship between the challenges that they experience and the stage they are at in their career (i.e. seniority).
- To evaluate/demonstrate the state of the art of existing tools and provide design recommendations.

**Question 3:** *What support or features do academics need?*

This final question is answered in Chapter 7. It describes different groups of potential users. The description includes the nature of their job, type of busyness, the issues that they face and strategies/tactics they employ, as well as their needs or preferences. The objective is to inform designers or developers of the variations of users and their key characteristics that they must understand. It is related to the findings presented in Chapters 4 and 5 in the sense that the development of the personas is based on the PTM strategies, the factors and the challenges identified.

## 1.3 Contribution

The main contributions of this thesis are as follows:

1. **A description of PTM strategies employed by different groups of academics.** This explains the diversity of ways which academics use to manage their personal tasks. This contribution also compares the strategies within and across different career development/stages, highlighting the similarities or differences between them.

2. **A description of factors and aspects that influence their PTM strategies**. The factors are divided into two main categories: internal and external. Other aspects that can influence academics' behaviour include the nature of the job and the individual's perception. These factors and aspects inform a set of criteria that academics consider when managing their tasks.

3. **A set of PTM challenges**. This contribution identifies the reasons that contribute to the difficulties that academics face in managing their tasks.

4. **A demonstration of expert evaluations of existing PTM tools**. This contribution shows an approach to evaluate whether the tools are fit for purpose (i.e. designed in accordance with the strategies employed by academics). This contribution also provides design improvements that can be made to these tools.

5. **A set of personas of different groups of academics.** This contribution describes the real characteristics of PTM target users, which explain their background, type and level of busyness, strategies, problems and needs. These users are divided into four categories: senior academics (e.g. professors), junior academics (e.g. lecturers), post doc researchers and PhD students.

## 1.4 Research roadmap

Table 1.1 shows a roadmap for this research project. The aims are to summarise its underlying components (as explained previously) and map between them.

## 1.5 Thesis scope

It is important to be clear of the scope of this thesis, highlighting the aspects that the author aims to focus on. Firstly, it is not the aim of the thesis to solely investigate text book strategies or popular strategies (e.g. Getting Things Done (GTD) or Put First Thing First (PFTF)), other than to the extent that they inform personal strategies. The thesis rather **aims**

**to explore a wide range of PTM strategies that academics practise which they may have developed over time on their own or adapted from the aforementioned strategies.** This will provide a better understanding of all related PTM strategies to inform the requirements for designing and evaluating PTM tools for academics. Also to **identify how well they are supported by existing tools.**

Secondly, the research is not aimed at understanding how people do their job but rather **how they manage it**. Their job may include doing research projects or administrative tasks, teaching, supervision of students, etc., which may involve or affect other people. In particular, **the research seeks to investigate what factors they consider in deciding what to do now or later**. This can be used to design a feature that can provide appropriate task recommendations for a certain time frame. The aim of the research is to understand the use of PTM tools that participants use to manage their personal tasks. To broaden our understanding, the investigation will also investigate tools that they may use to organise their personal activities and to coordinate other peoples' tasks or activities (e.g. shared family diaries).

Finally, it is not the aim of the thesis to generalise its findings across different work professions, but rather **to build a richer theoretical understanding of the time management strategies of a specific population of target users (i.e. academics and academic managers)**. By taking this focus, has enabled the author to discover the development of PTM strategies over time (i.e. maturity within academic profession). This required the author to recruit target participants who agreed to spend significant time and effort (e.g. through interviews and video-diary observations) to explain their behaviour in detail. Due to this constraint, the recruitment of the participants for the studies was based on convenience/opportunity sampling which involved academic staff situated in a university in the UK. And within the university, the participants involved in the user studies came from three departments: Computer Science, Psychology and Language Sciences, and Information Studies. Although the participants were from three departments, they represented three disciplines in the university: social sciences, engineering and humanities. They represent different categories of academics involved in higher education institutions: professors, readers, senior lecturers, post-docs, PhD researchers and support staff.

## 1.6 Description of participants

The participants recruited in this research project consisted of academics from one university in the UK. This will be further described in Sections 4.2.2 and 5.2.1. The selection of the participants was based on the following reasons:

***Thesis objective.*** One of the objectives of this research project is to compare the similarities and differences of PTM strategies between different groups of academics over time i.e. according to their seniority (rather than between different departments: see Section 1.3). The participants recruited included senior academics, junior academics, post-doctoral researchers and PhD students (see Tables 4.1 and 5.1).

***Number of participants***. The number of participants interviewed (31) was above the average number of participants in similar studies (see Table 2.8). For example, the studies conducted by Haraty *et al*. (2012) and Blandford and Green (2001) involved 19 and 16 participants from one university respectively. In contrast, both studies recruited one group of academics (i.e. lecturers) whereas, as described above, this thesis seeks to investigate a range of groups of academics.

***Saturation point.*** The Saturation Point is a stopping point in Grounded Theory (GT) (see Section 3.6.2) that can be applied by researchers. According to Strauss and Corbin (1998), researchers can stop gathering new data by recruiting new participants at the point where they could no longer discover any new concepts to explain a particular theme. Following participants 27 onwards, the author gradually discovered less new concepts. Starting from participant 29, the author identified very little new concepts. The concepts informed by them were already known, adding no new concepts to the existing PTM framework. For example, none of the participants mentioned additional factors that influenced their PTM behaviours or novel challenges that they faced in order to manage their personal tasks. Hence, the author decided that it was appropriate to stop recruiting new participants and making conclusions following participant 31.

***Important issue.*** Previous literature has highlighted that there is a need to focus research on PTM amongst academics, as various studies have revealed that it is a challenge for academics to both manage and undertake their work. There is a lack of research that seeks to improve understanding of the nature of the tasks that academics must perform and of the problems that they face in managing them (Davidson, 2006) in order to achieve a balance between their

work and life, and their personal needs (Blandford and Green, 2001). It is also unclear which PTM strategies academics employ (Haraty *et al.*, 2012) and which factors influence them (Blandford and Green, 2001). Previous research has suggested strategies that academics might employ (Oliver, 2006) and highlighted that it is important to implement such strategies at all stages of their careers (Gibson, 1998). This issue will be explored further in Section 2.7.1.

## 1.7 Description of key terms

The key terms used frequently throughout this thesis are defined as follows:

***Personal tasks*** refers to a range of personal activities that a person has to undertake in their own time in order to achieve a particular goal/outcome. Examples may range from a fairly simple or well-defined/specific activity such as 'make a phone call' or 'read a paper' to a more abstract, complex or larger activity such as 'conduct a research project' or 'write/prepare a proposal'. The latter is usually broken down into other smaller tasks or sub-tasks.

***Personal task management (PTM)*** refers to a set of strategies (or steps) that a person has to do in order to get their personal tasks done, or made manageable/achievable. These may include specific methods (e.g. Getting Things Done (GTD)) (Allen, 2009), individual strategies (e.g. conducting a daily assessment of their current tasks and conditions, or mapping between time constraints and tasks) or tactics (e.g. working from home). The term also refers to factors or aspects that the person has to consider before embarking on their tasks.

Table 1.1 Research roadmap

| **Thesis title** | **Improving Tool Support for Personal Task Management (PTM)** | | | |
|---|---|---|---|---|
| **Research problem** | The lack of explanation to describe diverse PTM strategies employed by academics and how they evolve throughout their career development.<br><br>There is also no consensus on factors/aspects that influence these strategies.<br><br>The lack of explanation to distinguish between different levels or types of busyness and challenges experienced by academics . | | | |
| **Aim/motivation** | identifying requirements for PTM tool support/features for facilitating busy academics in managing their tasks. | | | |
| **Research questions -RQ** | RQ1:<br>*How do academics manage their personal tasks?* | RQ2:<br>*Do existing tools provide adequate support/features?* | | RQ3:<br>*What support or features do academics need?* |
| **Thesis objectives-TO** | TO1: To identify and compare the PTM strategies employed by academics.<br><br>TO2: To identify the relationship between their career development/seniority/stages (i.e. type of commitments or level of busyness) and their PTM strategies.<br><br>TO3: To investigate the factors or aspects that influence these PTM strategies? | TO4: To investigate PTM challenges faced by academics.<br><br>TO5: To identify the relationship between their career development and the challenges that they face.<br><br>TO6: To evaluate/demonstrate the state of the art of existing tools and provide design recommendations. | | TO7: To describe personas of different groups of target users and their needs. |
| **Thesis chapters** | Chapter 4:<br>Interview study | Chapter 5: Video-diary study | Chapter 6: CASSM evaluation | Chapter 7: Individual differences in PTM behaviours |
| **Chapter objectives** | Identifies and compares strategies adopted by academics.<br><br>Investigates the importance of the strategies and the relationship between these and career development.<br><br>Describes the factors that influence these | Validates the findings from the interview study (i.e. PTM strategies and factors).<br><br>Describes other strategies and aspects that influence these strategies.<br><br>Explores challenges encountered by academics.<br><br>Identifies usability aspects and requirements raised by users. | Evaluates the conceptual misfits between users and tools and investigates how well existing tools match people's conceptual structures for managing their tasks.<br><br>Highlights the strengths and limitations of existing tools.<br><br>Provides recommendations that can be made of existing tools and users. | Identifies and describes the development of PTM strategies employed by academics as their career stages progress.<br><br>Develops the characteristics of personas of different groups (that are grounded in the findings gathered from the interview and video-diary studies) and their underlying requirements. |

| | | | | |
|---|---|---|---|---|
| | strategies. | | | |
| **Thesis contribution (thesis objective)** | **C1: Personal task management (PTM) strategies (TO1 and TO2):** descriptions of how different groups of academics manage their tasks, explaining what they do and how they do it and comparing their strategies within and across their career development.<br><br>**C2: Description of factors or aspects that influence these strategies (TO3):**<br><br>a. The internal factors: emotion, motivation, mental/physical strength, interest and effective use of time.<br>b. The external factors: tasks, environment, social, tools and time.<br>c. Individuals' perceptions.<br>d. The nature of job. | **C3: Description of PTM challenges (TO4 and TO5):**<br><br>a. Management.<br>b. Performance.<br><br>**C5: Strengths and limitations of existing tools and design recommendations that can be made (TO6)** | | **C4: Description of characteristics of personas of target users (TO7)**:<br><br>a. Senior academics.<br>b. Junior academics.<br>c. Post doc researchers.<br>d. PhD students. |

## 1.8 Thesis outline

Figure 1.4 summarises the structure of the thesis, highlighting the key activities involved and their respective chapters, as follows.

**Chapter 2** – reviews literature that is relevant to this thesis. It begins with a broader perspective of personal task management behaviour and explains the underlying aspects of it. The chapter reviews personal task management techniques and tools to support the behaviour and identifies the gaps in current research. The chapter also discusses personal task management issues surrounding academia. The chapter ends with a review of similar studies and discusses their limitations, highlighting the gap that the thesis aims to bridge.

**Chapter 3** – describes the methodology undertaken to investigate personal task management behaviour. This includes discussion of the appropriateness of data gathering and analysis approaches chosen and other important considerations made.

**Chapter 4** – presents the findings of the Personal Task Management (PTM) framework to describe behaviour, which includes its components and the relationships between them: the strategies, internal and external factors. The chapter continues with a discussion of important findings in relation to previous studies, highlighting the similarities and differences between them.

**Chapter 5** – presents the findings from the video-diary study, extending the PTM framework (described in Chapter 4) with an additional five emergent themes: sources of tasks, challenges, context awareness (i.e. the nature of job and individuals' perceptions and the nature of job), usability aspects and design suggestions. The chapter compares the similarities and differences gathered from this study with the previous interview study as well as other research, validating the previous PTM framework.

**Chapter 6** – explains CASSM evaluation guidelines and justification of the selection of tools to be evaluated. The findings from the evaluation reveal conceptual misfits between the users and the tools, highlighting two opportunities: concepts that can be redesigned or implemented by the tools and concepts that users might benefit from. The chapter identifies the strengths and limitations of the analysed tools.

**Chapter 7** – identifies a list of important PTM strategies implemented by academics and describes the development of those strategies over time as their career stages progress. The chapter introduces the development personas of different groups of target users and their underlying strategies and needs,

which is grounded in data gathered from the interview and video-diary studies described in Chapters 4 and 5 respectively. The chapter explains the characteristics of each group (e.g. the nature of their job, the type of busyness, etc.). It also explains the similarities and differences of strategies within and across the groups and discusses the key reasons that contribute to these variations.

**Chapter 8** – summarises the thesis and its main contributions, and addresses its limitations. The chapter also discusses the implications of this thesis for research, and suggests potential future work.

To recap, in this chapter, the author has explained the important issues of PTM behaviours among academics. The chapter highlights the research questions and objectives of this thesis. It also includes the overall structure of this thesis, explaining its key components and the relationship between them. This is to give an overview of the thesis before reading it further. The next chapter describes further the issues highlighted in Chapter 1 and explains related studies that investigated them, and identifies a research gap.

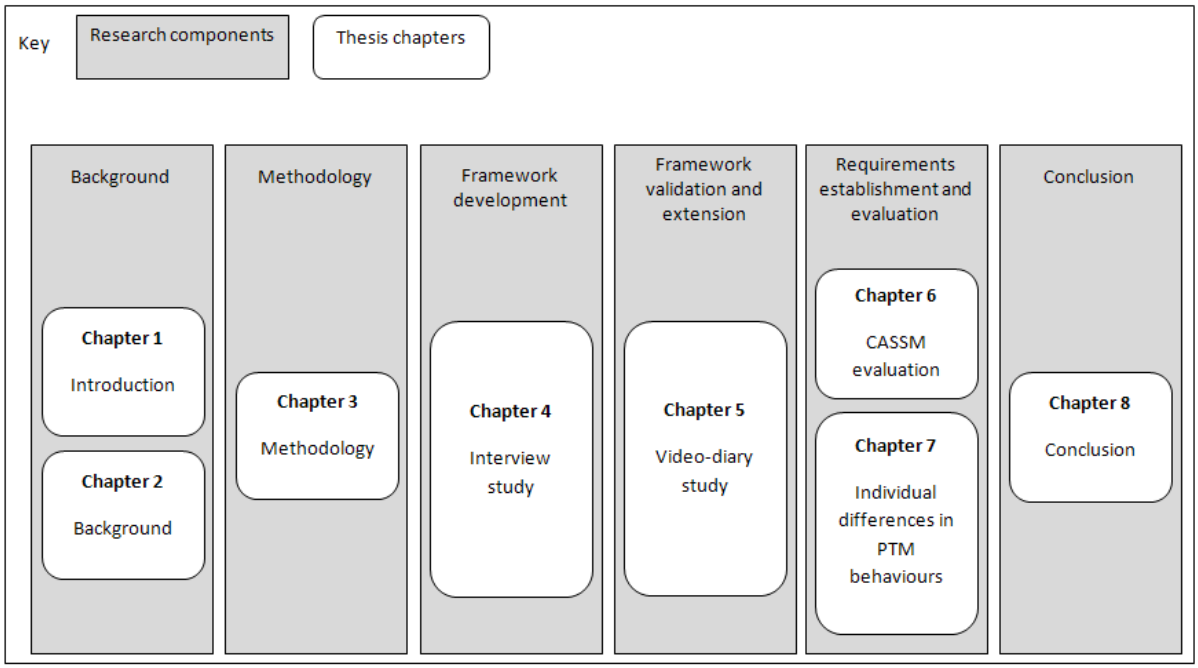



Figure 1.4 Thesis structure.

# Chapter 2: Background

The previous chapter highlights the important issues that this research aims to investigate. The aims of this chapter are to set the context of the research and identify the extent to which existing literature address the issues. This is to reveal important aspects that need attention. This chapter provides an introduction to personal task management (PTM). It will identify previous definitions of PTM and describe concepts that are associated with it. The chapter will further discuss the consistency among them (as highlighted in Chapter 1). The chapter reviews PTM tools and frameworks/techniques that are aimed at assisting people in managing their tasks. It also discusses the issues academics face when managing their tasks, highlighting the importance of investigating people who are situated in this context. The chapter continues with a detailed review of most similar studies in PTM and highlights their key findings. This is to identify the gap and inform the contribution of this research. This chapter is divided into the following sections:

- **Introduction to personal task management (PTM)** – describing previous definitions of PTM and the underlying concepts associated with it.
- **Review of existing PTM tools** (e.g. physical or electronic artefacts) – discussing the tools explained by previous studies aimed at assisting people to manage their tasks.
- **Tools requirements** – determining the requirements for designing PTM tools.
- **Review of existing PTM frameworks/techniques** (i.e. steps) – reviewing existing techniques for managing tasks and PTM tools designed based on them.
- **Review of related/similar studies** – providing an understanding of challenges that academics face in managing their tasks, and explaining similar studies that have investigated PTM and their key contributions and limitations of their findings.
- **Summary** – summarising the understanding gathered from the literature.

## 2.1 Overview context of research

Due to a scarcity of time, it has become a challenge for busy people to manage and complete their tasks. People struggle to cope with their busy lives and control their emotions (e.g. anxiety, guilt and loss of control) due to their experiences with managing competing priorities within a limited amount of time that they have (Leshed and Sengers, 2011). Personal task management (PTM) appears to be one of the vital aspects of life.

Table 2.1 summarises the previous definitions of the key work. From the previous definitions, it can be summarised that:

***Personal task management (PTM)*** describes steps that support people in ***managing their personal tasks*** i.e. identifying what needs to be done, organising them into goals, projects, tasks, sub-tasks, deadlines, and how to complete them, using designated tools such as task/to-do lists, calendars and emails (Bellotti *et al.*, 2003; Gonzales *et al.*, 2008; Allen, 2009; Haraty *et al.*, 2012). The steps include recording/collecting, processing, remembering, reviewing, doing and delegating tasks as well as maintaining, organising and revising task lists (Gonzales *et al.*, 2008; Allen, 2009).

***Time management*** *(TM)* refers to the process of supporting people in ***scheduling their time to attend meetings, conferences or undertake their personal tasks*** such as thinking about research and writing a research grant proposal (Blandford and Green, 2001; Ailamaki and Gehre, 2003). The term also refers to activities of making daily or specific plans, prioritising goals or tasks and emails (Mackay, 1988b; Covey, 2004). People tend to use calendars or diaries, PDAs, clocks, human memory and objects to record these activities.

***Personal information management*** *(PIM)* refers to processes that assist people in ***managing a collection of their personal information resources and include tools that they use to manage their personal tasks or time*** in order to support them in managing or undertaking their work or other personal activities (Lansdale, 1988; Bergman *et al.*, 2004; Boardman, 2004). The processes involve acquiring, organising, filing, categorizing, sorting, retrieving, assessing, remembering and archiving personal information resources (Lansdale, 1988; Bergman *et al.*, 2004; Boardman, 2004). These processes include tools that contain information about their tasks, work and time, as well as other important resources such as files, folders, bookmarks and contacts.).

Figure 2.1 summarises the previous definitions of the key work, which shows the overlaps between them.

Table 2.1 Description of related terms.

| **Key terms** | **Description** (describes the term as the steps/processes by which people: ) | **Tools/ Resources** | **Shared definition (i.e. key elements/ processes)** |
|---|---|---|---|
| Personal information management (PIM) | **File**, **organise**, **retrieve** and **assess** information (e.g. files, emails and bookmarks) (Bergman *et al.*, 2004). | | Acquire, File/Organise, Categorise, Retrieve, Assess, Remember, Archive, Sort personal information resources. |
| | **Store**, **organise**, **categorise**, **retrieve**, **remember** personal information resources (e.g. email, contacts, bookmarks, appointments, reminders) (Lansdale, 1988). | | |
| | **Acquire**, **organise** and **retrieve** their collections of digital items (Boardman, 2004). | Digital items (e.g. email, contacts, bookmarks, calendar, etc.) | |
| | **Archive**, **categorise** and **sort** email messages (Mackay, 1988b). | Email | |
| Time management (TM) | **Schedule appointments** or **set reminders**, **react to immediate or short-term requests/demands** and **undertake/complete solo/personal tasks/activities** (e.g. reviewing, writing articles or research proposals, etc.), **prioritise** and **restructure** them (Blandford and Green, 2001). | Paper diaries, PDA, meeting marker, human memory, objects as reminders, etc. | Schedule time (e.g. for appointments, tasks, thinking time, leisure activities) and undertake them, react to requests/ demands, prioritise and restructure them. |
| | **Schedule time** (for meetings, individual tasks, physical exercise, thinking about research, etc.), assessing current situations (e.g. current commitments or deadlines, time constraints) (Ailamaki and Gehrke, 2003). | Corporate Time, Outlook, paper, clock, etc. | |
| | **Organise** and **execute** around priorities, **set goals** and **make a specific or daily plan**. (Covey, 2004) | Calendar | |
| | **Prioritise** email to be read/acted upon (e.g. now or later) (Mackay, 1988b). | | |
| Personal task management management (PTM) | **Record**, **remember**, **maintain** and **organise** task lists (Haraty *et al.*, 2012). | Task lists | Record/collect/ capture, process, remember and delegate tasks, maintain and organise task lists, classify, focus, manage and revise/review and do commitments. |
| | **Record**, **organise** (e.g. sort and filter) and **prioritise** tasks (Bellotti *et al.*, 2003). | Digital task manager (integrated with email applications/ functions) as their to-do list collections. | |
| | **Capture**, **classify**, **focus**, **manage** and **revise** commitments that people have to do/complete (e.g. tasks, projects, work, etc.) (Gonzalez *et al.*, 2008). | Digital tool (e.g. personal activity management tool) | |
| | **Delegate** tasks (by email) (Mackay, 1988b) | Email | |
| | **Collect** things that seek our attention, **process** what they mean and what to do about them (e.g. do, delegate or defer), **organise** the results (in project or task lists, calendar, files, folders, etc.), **review** them as options for what we choose to do and **do** them (based on current situations, the nature of work and its goals) (Allen, 2009). | Physical in-basket (e.g. mail, notes, receipts, etc.), paper-based note-taking devices (e.g. writing paper and pads), electronic note taking devices (e.g. PDA), voice-recording devices (e.g. digital recorders), email. | |

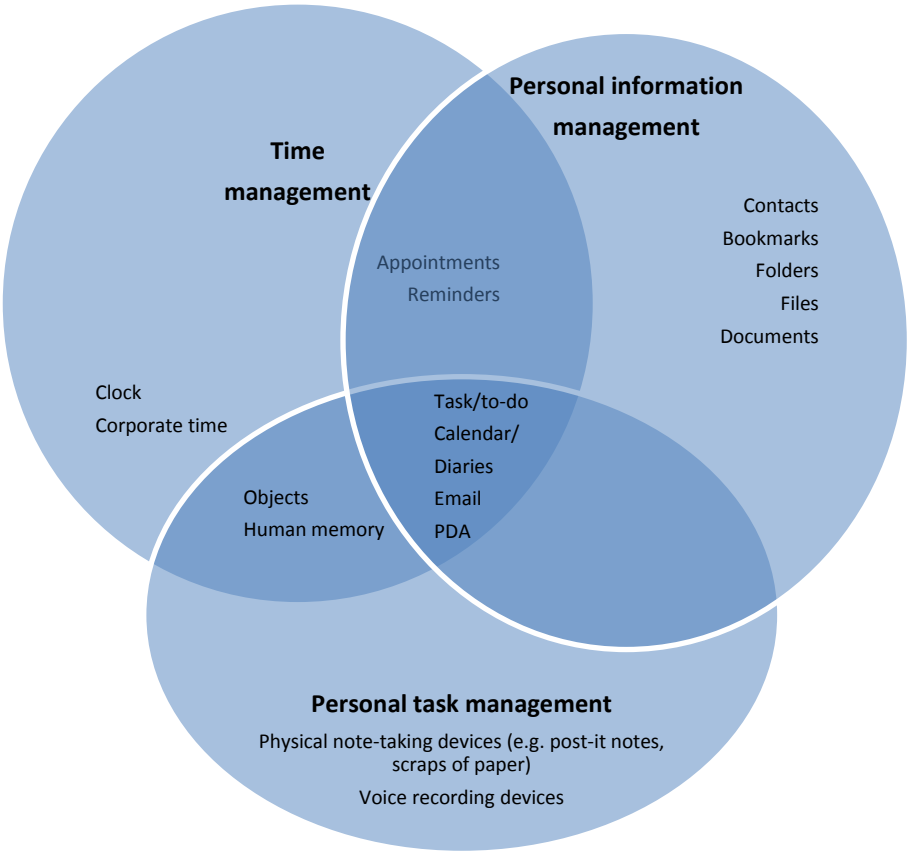



Figure 2.1 The related tools described/included in previous key work.

## 2.2 Introduction to PTM research area

Personal task management is associated with managing non-scheduled items, such as solo activities (for example preparing teaching modules, writing journal articles, marking examination scripts) and work related information (Fleet and Blandford, 2005). These solo activities usually represent diverse personal commitments that people have. They might include multiple tasks or projects which have different and competing goals, deadlines and constraints (Czerwinski *et al.*, 2004; González and Mark, 2004). Each of them has contrasting characteristics but nonetheless should be handled simultaneously (Czerwinski *et al.*, 2004) along with unexpected things that will have to be done in the future.

The non-scheduled items mentioned earlier are usually not time-based activities (i.e. do not necessarily have to be done within exact time periods but they often have a deadline when they have to be finished by). They also do not often involve face-to-face contact with other people in order to undertake them. For example, the day or time when a recommendation letter for a particular student would be written/prepared were not necessarily specified explicitly in participants' diaries nor how much time they would allocate to writing

the letter nor where they intended to undertake the task. Therefore, they tend to be managed these non-scheduled separately from scheduled items (e.g. appointments, meetings, events) which, in contrast, usually occur at a specific time and date. The items are usually externalised using various media types, such as sticky notes, electronic task lists, calendars (Czerwinski *et al.*, 2004).

Previous studies have shown that there are four interrelated activities associated with PTM:

1. Planning.
2. Prioritisation.
3. Scheduling.
4. Cognitive off-loading/list-making.

Each of these activities will be discussed in the following section.

## 2.3 Introduction to PTM concepts

### 2.3.1 Planning

Several researchers have provided a definition of planning. According to Newman (2004) and Hazzan and Dubinsky (2007), planning is an activity of determining a portion of time to do a particular activity, while Taylor and Swan (2004) further suggest that planning involves an activity of identifying where and how to do a particular task as well as who is going to do it. This is in line with Egger and Wagner (1992), who mention that planning also includes an activity of identifying what resources are required, and constraints for doing a particular task. Palen (1999) refers scheduling as an activity of advance planning. Francis-Smythe (1999) however, perceives that planning and scheduling are separate activities, but both are essential for matching tasks to time and available resources, which requires the ability to estimate duration to complete a task. Claessens *et al.* (2010) refer to planning as an activity of setting personal goals, rather than scheduling tasks. They have suggested that people tend to make a plan to accomplish sub-goals and focus on them.

Previous studies suggest that planning is essential for several reasons. Taylor and Swan (2004) explain that people tend to plan when they feel overwhelmed by multiple tasks at the same time. This activity can support people to feel in control and increase their job satisfaction (Macan, 1994; Claessens *et al.*, 2010). Planning can also support people to externalise and elaborate their intentions (Blandford and Green, 2001; Jones *et al.*, 2008).

Claessens *et al.* (2010) have pointed out that by planning, people can clearly identify their overall tasks and their respective deadlines and priorities, and hence increase their level of perceived control of time.

In contrast, some studies have highlighted that planning has its limitations as well. This is perhaps due to its temporal ambiguity (Egger and Wagner, 1992). Eldridge and Newman (1996) elaborated that planned tasks may not necessarily be achieved due to poor time estimation and other unexpected circumstances or overlooked conditions. According Eldridge and Newman, there are two types of unexpected event during the working day. The first type of events can cause immediate and simple changes in plans whereas the second type of events can create a period of uncertainty and indecision in which any existing plans are discontinued. Hence, re-planning may become challenging. In another study, Newman (2004) further asserts that people tend to take more time to complete tasks that they have planned earlier. This is also in line with Hazzan and Dubinsky (2007), who identified that users in their study found it difficult to estimate a time required to accomplish a particular project as well as to stick to their initial plan. This phenomenon is known as the planning fallacy (Buehler *et al.*, 2010). According to Buehler *et al.*, it refers to a prediction phenomenon wherein people underestimate the amount of time that they require to do a future task. In general, previous studies have shown that planning is beneficial in assisting people in managing their tasks but it is a challenge to perform it (e.g. estimating task duration) or stick to it. The previous literature has shown that people use the term 'Planning' to define a wide range of tasks or activities. Based on the findings from this research project, the author has provided a more focused definition of 'Planning' in Chapter 4 (see Section 2.3.3.1).

### 2.3.2 Prioritisation

In order to manage personal tasks concurrently, people need to prioritise them according to their limited resources, in particular: time (Mark *et al.*, 2005). According to Yli-Kauhaluoma (2009), prioritising is an activity whereby people make a reasonable judgment of deciding the importance of a particular task over others. With regard to this, Hazzan and Dubinsky (2007) have suggested that people should focus on doing tasks which are considered to be important.

Similar to planning, prioritisation does not ensure that one can successfully manage one's overall personal tasks (Mackay, 1988b). Given that email is considered a tool to support prioritisation, she has suggested that to better help people to prioritise their tasks, it is essential to identify better methods that show the relative importance of incoming messages (that represent a variety of tasks to be done) and how to better sequence them.

Previous researchers have pointed out that prioritisation is vital due to the fact that people often face multiple tasks and are interrupted by new or unexpected tasks (Newman, 2004; Mark *et al.*, 2005). It enables people to identify and re-evaluate their priorities as a whole (Mark *et al.*, 2005; Yli-Kauhaluoma, 2009). However, the definitions/implementations of prioritisation and priority have been inconsistent. This will be further explained in the following section.

Jones *et al.* (2008) developed a prototype (see Figure 2.2) that allows the users to create multiple projects and their respective subtasks as well as re-order them according to their priority. For instance, the higher priority tasks should come first and be re-ordered at the top. There is no explicit representation of priority.

By contrast, Ailamaki and Gehrke (2003) suggest that in order to support prioritisation, it is essential for people to create a list with priorities. In this case, the list should include a few properties, namely task description, importance and due date. They assert that the importance property represents priority. This means that the more important the task is, the higher the priority it holds and hence is urgent to complete. Ailamaki and Gehrke further explain that people should give higher priority to long-term tasks (for example, writing a paper that is due next month) as compared to non-important or other short-term tasks (such as doing an administrative report that is due next week).

Figure 2.2. A Screenshot of the Personal Planner Project (Jones *et al.*, 2008) (reproduced with permission).

Gil and Chklovski (2007) developed a task management tool, 'BEAM' based on natural language (NL) to organise and monitor a list of personal tasks. In this tool, the list

entries are organised with different threads of activities of which each can be prioritised based on a particular deadline. Additionally, users can assign other properties such as task importance, task change, cost and task priority separately. This, however, contradicts the previous concept suggested by Ailamaki and Gehrke (2003) which associates the importance property with a priority of a particular task. However, in 'BEAM', task importance and task priority are two different properties which can be assigned separate values. This highlights that the definition of priority and importance is still inconsistent; they appear to be inadequately described or implemented.

Rebenich and Gravell (2008) developed an adaptive time management for students to support planning and scheduling which includes the priority concept explicitly. They explained that the priority of a particular task can be determined by three elements. The first is a mixture of urgency and importance property. Secondly, a complexity level, and thirdly, it can be determined by a task sequence which implies a task position of a particular task over the other tasks. Unfortunately, these were not further described in detail and grounded in data. It seems unclear what each of those concepts represent and how they can support people in prioritising their tasks better.

Blandford and Green (2001) have recommended that it is important to support the prioritisation feature. Many commercial tools have implemented a fixed (or absolute) priority feature, as highlighted in Chapter 1. For instance, Achieve Planner (Effexis, 2010a), as shown in Figure 2.3, introduces four categories of priority which a user can assign to their tasks: A, B, C or D. Each of these priorities is given an interpretation as follows:

- *A: Very Important to get done.*
- *B: Important items but not as important as A.*
- *C: Items that might be done at some point but not now.*
- *D: Items which are not important enough to do at all.*

The tool also provides a concept of '*rank*', which allows the user to assign any number (1-2499) to represent the rank of each task or sub task alongside their priority. The user can automatically change the priority and its respective rank by shifting the project or task up and down. In contrast, *MS Outlook* provides three levels of priority: high, normal or low (see Figure 2.4).

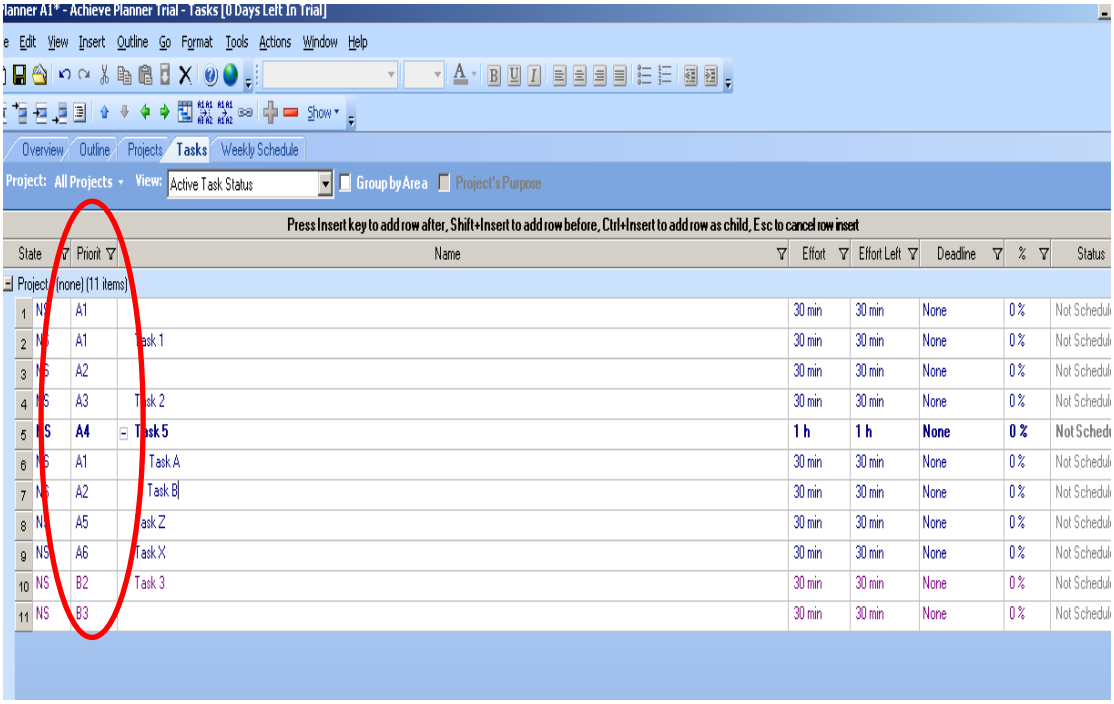



Figure 2.3. A screenshot of Achieve Planner.

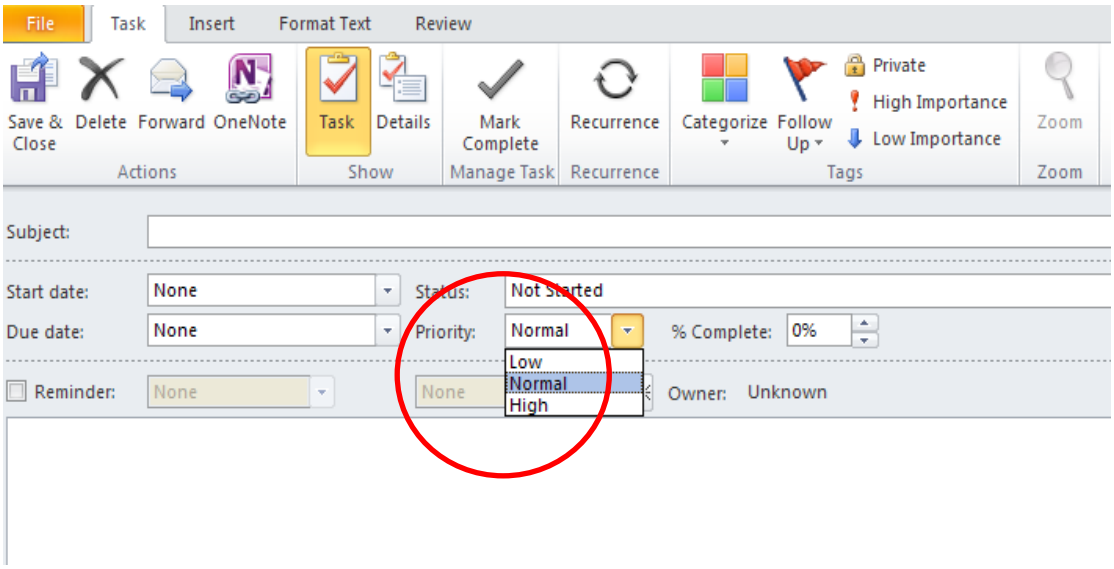



Figure 2.4. A screenshot of MS Outlook.

The previous section has provided an overview of a range of prioritisation concepts/features in the literature. There seems to be no consensus on the implementation of the concepts among commercial tools either. It is a challenge to determine whether they are implemented adequately and in accordance with users' actual experiences with managing their tasks. It appears that there are also several other common concepts that are associated with prioritisation; for example, importance, urgency, and deadline/due date. However, again,

it cannot be ascertained whether they are the only dimensions used by people in order to prioritise their tasks. Chapter 4 classifies and explains factors (which inform a wide range of properties and attributes) that influence prioritisation in detail. The following sections will identify two more important activities that support people in managing their tasks: scheduling and cognitive off-loading/list-making.

### 2.3.3 Scheduling

According to Egger (1992), scheduling is defined as an activity of allocating time for a particular activity that has been planned. This definition is in line with Ailamaki dan Gehrke (2003) who suggest that scheduling does not necessarily only apply to specified activities such as appointments, but also includes non-face-to-face activities such as spare time for people to read a paper or think about a particular project. Palen (1999) however, explicitly relates scheduling to planning, believing that scheduling itself is part of advanced planning. She explains that scheduling is a complex activity which involves managing competing requirements and balancing multiple constraints and priorities at the same time in advance.

### 2.3.4 Cognitive off-loading/list-making

As mentioned earlier, in order to support planning, people tend to externalise tasks using a range of devices, which can trigger an action (i.e. what needs to be done) (Dix *et al.*, 1998). The activity of externalising plans is usually translated to an activity of what the author refers to as cognitive off-loading or list-making. According to Macan (1994) and Taylor and Swan (2004), it is necessary for people to make lists in order to support planning and coordinate their multiple tasks. Bernstein *et al.* (2008) found that people tend to scribble some ideas, sketches, reminders on post-it notes, scraps of paper, email messages, in digital and text files for temporary storage, future reminders or personal archiving. However, little is known about the different types of task lists (or list-making strategies) used by people and how they support them in managing their tasks.

Harrison *et al*. (2005) found that the level of description of tasks varies from simple lightweight to highly detailed labels. According to the authors, users prefer a simple and quick way to label a task as a future reminder. They added that users are inclined to implement this strategy particularly to represent either simple and straightforward tasks (for example, 'Call person X'), or a task that involves other subtasks. They have also identified that users do not fully specify a lot of information about a particular task but prefer to jot it down quickly. People prefer to use scraps of paper or paper-based artefacts which provide

freeform entry rather than be restricted by rigid entry so that they can easily sketch out their tasks (Taylor and Swan, 2004).

To conclude, the author has identified four concepts that are associated with personal task management: planning, prioritising, scheduling, and cognitive off-loading/list-making. These concepts are apparently interrelated and essential in helping people in managing their personal tasks effectively and efficiently. They can support people to be aware of tasks that they intend to do in the future, as well as at the same time allow them to remain in control of their current tasks. In the next section, examples of the existing techniques (methodological steps/prescription) or tools for facilitating people to manage their personal tasks will be explained.

## 2.4 Review of existing PTM tools

### 2.4.1 Introduction

Previous studies have shown that there is a wide range of tools including both formal and informal artefacts to support personal task management. These include diaries/calendars, task lists/managers, sticky/post-it notes, scraps of paper, email inbox, text files, etc. (Dey and Abowd, 2000; Blandford and Green, 2001; Campbell and Maglio, 2003; Bergman *et al.*, 2004; González and Mark, 2004; Fleet and Blandford, 2005). People also tend to rely on other implicit mechanisms such as a human assistant (Dey and Abowd, 2000) and internal memories, or physical cues, (Malone, 1983; Blandford and Green, 2001) to remind them of tasks that they intend to do in the future.

Previous studies explain several reasons for the uses of multiple tools. For example, each tool offers different useful properties and therefore people prefer to use them interchangeably (Blandford and Green, 2001; Fleet and Blandford, 2005). Also, the limitations of certain tools can become strengths for other tools, and hence, can complement each other. Fertig *et al.* (1996) suggest that existing time management applications, in particular task lists, are inadequate in reminding people of their tasks. Additionally, Whittaker and Hirschberg (2001) assert that existing electronics applications fail to make data available. To overcome these limitations, people are inclined to rely on physical paper copies or documents, which are more available to remind them of their tasks (Whittaker and Hirschberg, 2001).

The nature of information of a particular task to be done also influences people to use multiple tools. According to Gwizdka (2000), different tools are used for different types of

information which can be divided into: prospective (future), ephemeral (current short-lived), working (current medium span) and retrospective (past). Although the relationship between these types of information and the uses of tools is not very clear, Gwizdka provides an example of how prospective information is characterised by its own reference to a specific time in the future such as a meeting or appointment. To accommodate this, diaries or calendars might be useful to record and manage this information. In contrast, other tools like 'task' lists, notepads, and memos are useful for short term purpose (Barreau and Nardi, 1995). In order to manage their long term tasks, people tend to keep personal reference documents, which contain their personal annotations (Whittaker and Hirschberg, 2001).

Previous research has shown how diaries or calendars are used to support appointment, meetings or activity scheduling for individuals or groups, and on the other hand, task management tools are used to support personal task lists (Payne, 1993; Blandford and Green, 2001; Bellotti *et al.*, 2004). Blandford and Green (2001) have highlighted the strengths and weaknesses of existing tools and the importance of integrating them. Leshed and Sengers (2011) have identified that people tend to use tools differently due to the fact that each tool provides a certain purpose, value, function, and materiality. Even so, there is little description to explain what it is about these or other tools that make them particularly useful for task management or how they are related to each other.

According to Dix *et al.* (1998), in order to design both a physical and electronic representation to assist people to manage their tasks, it is vital to understand the multiple roles of artefacts. In Chapter 6, based on the findings of the video-diary study conducted, this will be discussed further. The next section will explain the previous literature on tools or mechanisms that people use to manage their personal tasks.

### 2.4.2 Ubiquitous tools

Tools to support personal task management are ubiquitous, suggesting that the information that triggers people to do a particular task is scattered in various locations, including both physical and virtual workspaces (Bernstein *et al.*, 2008; Jones *et al.*, 2008). Handhelds, organisers, desktops as well as paper-based lists of tasks either on papers or post-it notes all serve as personal task lists (Gil and Ratnakar, 2008). This shows that people might be reminded of what to do next not only based on their designated task management tools themselves, but rather on a wide range of other explicit or implicit mechanisms. Dix *et al.* (1995) assert that such triggers can be divided into the following categories:

- **Communication mode** – This might be a telephone call, face-to-face request or the receipt of a letter or a fax.
- **Environmental cues** – Things in our environment which remind us of things that should be done such as diary entries (explicit) or a half written letter in the typewriter (implicit).
- **Temporal gaps** – The expectation of receiving a response by a certain date or the generic task of reminding people based on some temporal interval.
- **Completion of previous activity** – This is when one activity begins immediately after the previous activity reaches completion.
- **External events** – This might be from a wristwatch or automatic calendar set to give a reminder at a specific time.
- **Memory (Sporadic actions)** – Frequent activities may occur simply when the responsible individual remembers that they must be done. It is often the case that when a request is made verbally, the recipient has to remember that the request is outstanding until either it can be performed or some record is made of the commitment.
- **Periodic actions** – Things which happen at regular intervals – for example, reading mail every morning.

These triggers have different properties and inform people of certain things: which tasks to do, how and when to do them, as well as who is involved or affected by those tasks. In the next section, the author identifies important tools that are significantly used by people in managing their tasks as follows:

- Diaries/Calendars.
- Emails.
- Task lists.
- Physical cues.

### 2.4.3 Diaries/Calendars

Previous studies have shown that calendars or diaries have been used to remind people of personal tasks. These include non-scheduled activities such as personal task lists and relevant or non-appointment information (Palen, 1999; Blandford and Green, 2001; Kleek *et al.*, 2009), which contain details such as future planning, personal notes, deadlines, meeting minutes, etc. Blandford and Green also found that some people use different diaries to separate these items from diaries which contain fixed scheduled items (e.g. appointments, meetings, events). This shows that some people are inclined to have two different diaries

which divide their fixed scheduled events or activities from their personal task items (i.e. solo activities and their related information or details). Palen (1999) suggests that calendars are indeed useful for reminding people of their intentions at some point in the future and for reference purposes as well.

### 2.4.4 Emails

Many studies have found that email applications which were designed to support communications, instead have also been used to support personal task management (Mackay, 1988b; Whittaker and Sidner, 1996; Ducheneaut and Bellotti, 2001). Many users have considered their email inbox as their task list which reminds them of what they are supposed to do either on a short or long-term basis (Mackay, 1988a; Whittaker and Sidner, 1996; Gwizdka, 2002). Mackay has suggested that email has also been used to support time management as well as task and information management.

Gwizdka (2004) suggests that there are two types of email users who use email as their task management tool. The first type of users (cleaners) prefers to transfer the relevant messages which contain future tasks or events from their email to their task management tools. On the other hand, the second type of users (keepers) prefers to retain their relevant messages in their inbox as reminders of their personal tasks as well as to refer back to.

There are many reasons that explain the significant uses of emails as personal task management tools. According to Whittaker and Sidner (1996), most people's tasks come through their email. These include a range of tasks of which some are complex or urgent. For example, some tasks require more time to process or deal with and hence people tend to keep the message pertaining to this task in their inbox (Whittaker and Sidner, 1996; Ailamaki and Gehrke, 2003). They further suggest that doing this can remind people of tasks which are in progress and therefore the emails associated with them cannot be deleted. Whittaker and Sidner (1996) also found that people prefer to keep these emails in their inbox rather than file them away because this allows the relevant message to always be visible and remind them of their pending tasks. Bernstein *et al.* (2008) explains that unread or unfiled emails on the desktop themselves can remind people of tasks that they should act on. Bellotti and Smith (2000a) improved an email application with 'sticky notes', which remind people of what their particular message is about or of future actions (i.e. emails that they have no time to act on immediately). They believe that this supports people in quickly deciding what to do while going through a long list of email messages.

### 2.4.5 Task lists

There are various forms of task lists used by people, including physical and electronic task lists. Similar to paper diaries, people tend to create their task lists on post-it notes, scraps of paper, notepads, etc. (Campbell and Maglio, 2003). Paper-based task lists are significant to people because they allow them to sketch their tasks or activities easily (Taylor and Swan, 2004). According to them, they provide quick and freeform entry rather than be constrained by any particular structured or fixed format as required by digital task list applications. They have further suggested that there are three types of paper-based task lists:

**Sequential**: These enable users to identify tasks and an estimated duration to accomplish them. These lists are usually represented as a timeline sequence which draws a sequence of tasks to be done (i.e. an order of tasks).

**Spatial maps** (see Figure 2.5): Spatial maps are a particular kind of 'flow through' list of tasks which enables users to identify their tasks in coordination with the spatial-temporal constraints that they find themselves operating within. The list is ordered using a numbering scheme to incorporate users' sequential movements through their solo tasks and to enable them to do other tasks which involve contact with other people at a certain time or location (e.g. picking up their children on time at nursery). This ordered list guides the user's progress in relation to their geography, time and the tasks they have to do. The list not only informs what tasks are to be done but also reminds the user how and where those tasks should be undertaken. The list reminds the user of a sequence of different locations/places that he/she would have to visit and what to do there. For example, before picking her children up from school, the user would go to the bank first to withdraw some money. Then she might go to the post office to post some letters or buy some stamps. And from there, she might go to nearby shops to do some groceries shopping before heading to school to pick up her children on time.

**Wish lists** (see Figure 2.6): These refer to lists that allow users to identify a list of ongoing 'to-do' tasks, shopping lists, and similar tasks. The lists can be kept in a communal notebook, shared either between the entire household or between specific members, and authored collaboratively. Any of the members can add items to be bought to the list. For example, if an item of food is finished or the children need something, e.g. Plasticene and toothpicks to make some more models, they will add those things to the list. This gives other members of the household the responsibility of deciding what items they need and to be specific about

their needs. However, the parents in this study affirmed their overriding right to decide whether to buy the items added to the list by other members of the household.

Alongside these physical task lists, previous research has proposed examples of electronic task list applications. Conley and Carpenter (2007) developed a task management application called TOWEL, which was built upon task management principles. It allows users to hide or collapse their task items and add tags and deadline properties for filtering purposes. Gil and Ratnakar (2008) implemented a system called BEAM to manage task list items. The tool allows the users to manage their personal task lists by reporting their progress, editing new entries for subtasks, prioritising and coordinating them with other people.

Richard and Yamada (2007) suggested that in order to support and remind people of what they should do, there are other properties which need to be identified aside from the trivial properties such as deadline, importance tags, etc. (Richard and Yamada, 2007). For example, they have explained that it is essential for a personal task manager to keep track of a range of relevant information throughout timescales. They have also pointed out that the task management tool also needs to be aware of user's current context of activity, availability, location as well as their emotional state. In Chapter 4, the author will explain these further.

### 2.4.6 Physical cues

Previous literature has shown that people use explicit tools such as diaries/calendars, email, physical and electronic task list applications to support personal task management. It has also identified that people tend to use physical objects to remind them of what they need to do. For example, by looking at piles of documents or objects that are located in a particular location (for example on their desk or by the door), they will be aware of what tasks need to be done (Malone, 1983; Bellotti and Smith, 2000a). According to Bernstein (2008), these physical objects are usually put in a location where users might encounter them in future activities or occasions, hence automatically reminding them of what needs to be done. However, it is not clear how, when and why these physical objects are used to support personal task management. Previous research has shown that physicality and location attributes do play an important role as visible cues to support future reminders (Malone, 1983; Dix *et al.*, 1998). Nonetheless, there is little empirical evidence to show what types of tasks influence people to rely on physical cues and when they tend to do so.

So far, the author has explained existing PTM tools that people use in order to manage their personal tasks. The following section will further summarise the strengths and limitations of some of the key tools which were identified by Blandford and Green (2001).

## 2.5 Requirements for PTM tools

Previous researchers have further recommended some key usability requirements that these tools must achieve. To develop personal task management, it is important to ensure that the tools are flexible, adaptable, visible, portable and not constrained by content or rigid requirements (Bernstein *et al.*, 2008). These usability criteria can be categorised as follows:

1. Flexibility.
2. Visibility.
3. Availability and Physicality.
4. Speed.
5. Personalisation.

### 2.5.1 Flexibility

According to Boardman and Sasse (2004), the strategies used for managing personal information vary across users, and thus, it is essential for designers to consider those distinct strategies in their future design by providing a wide range of flexibility to suit users' needs or preferences. For example, it can be useful for users if the tools provide mechanisms that allow them to be able to easily enter their task items either by typing, writing/annotating or drawing them down, and manipulate (or schedule) their tasks and time around. This will be described further in Chapter 7, which explains both the functional and non-functional requirements for personal task management tools.

### 2.5.2 Visibility

Visibility is another important aspect of personal task management tools required by users. They prefer notable information to remind them about their tasks, which should be always or highly visible rather than hidden somewhere (Campbell and Maglio, 2003). Bernstein *et al.* (2008) observed that the participants in their study intentionally put scraps of paper which contained some information of their task in places where they could easily refer to or get reminded of in the future. However, this behaviour is difficult to be implemented in digital tools unless the information represented by the tools can be printed and situated in the easily

accessible places (Bernstein *et al.*, 2008). Therefore, even though there is a wide range of task management tools, users found that the tools are not useful (González and Mark, 2004). They have suggested that this is due to the fact that the lists of current tasks kept in those tools are not always visible to the users. Thus, future task management tools should seek to explore which details of a particular task should remain visible and how this requirement could be better supported. Again, concepts/properties that should be potentially made visible will be explained in Chapters 6 and 8.

### 2.5.3 Availability and physicality

Previous studies have shown that availability and physicality are also part of the requirement criteria that tools need to address. For instance, compared to physical and electronic tools, Whittaker and Hirschberg (2001) highlight that paper-based tools are more available, and hence better support reminding. This supports the earlier study by Bellotti and Smith (2000a) who found that it was far more convenient for users to create task or other lists using physical tools (e.g. scraps of paper or notepads) as reminders, which they can easily sketch or scribble on.

Paper-based tools enable users to easily feel the physical nature and location of them. Users also suffer fewer restrictions in entering/recording their tasks down as required by digital tools. These physical diaries and task lists, moreover, can also be situated at a particular location which they prefer, in their physical environment. This allows users to be easily and immediately reminded by looking at these physical artefacts (Dix *et al.*, 1998). In relation to this, Harrison *et al.* (2005) suggest that future tools should provide undefined or ill-specified activities with simple labels so that the users can sensibly use them to create their task lists.

### 2.5.4 Speed

Previous research has identified some important criteria that make tools useful to users: flexibility, visibility, availability and physicality. Speed is another important aspect of users' concern in managing their personal tasks. In order to capture and externalise their task lists without forgetting any relevant details, users tend to write them quickly and briefly on paper-based tools (Kleek *et al.*, 2009). Thus, they tend to compress the information by removing all redundancies and excluding any irrelevant semantic content, saving their time while trying to capture their possible task lists (Kleek *et al.*, 2009).

This behaviour is however not always the case. For example, Harrison *et al.* (2005) found that the level of abstraction of users' tasks varied from succinct or quick labels to detailed descriptions which include sub-activities or extraneous information. Harrison *et al.* (2005) further identified that the former type is often a simple and quick task such as 'Call X' whereas, the latter is more complex which further defines sub-tasks that need to be done.

People are concerned about time required to interact with a particular tool, and hence it is desirable to ensure that future tools requirements should minimise the time (i.e. effort) required to use the system (Kutar *et al.*, 2001). Gonzales *et al.* (2008) however, assert that the only way to be aware of overall tasks to do is by investing some entry cost to create task lists. Newman (2004) asserts that the future tools should allow people to save time and improve the way they manage their current strategies, as compared to their previous strategies. Thus, it is imperative to provide personal task management tools that provide lightweight entry (Bernstein *et al.*, 2008).

### 2.5.5 Personalisation

Finally, it appears that personalisation is another important requirement that future tools must provide. It refers to the ability to allow users to create and manipulate the representations of their task management tools that match with their personal preferences and understanding of doing them. Taylor and Swan (2004) suggest that future tools should allow people to personally organise and manage information in their task management tools using their own strategies. At present, this capability is well supported by paper-based tools which provide freeform structure for users to personalise their tasks.

Haraty *et al.* (2012) have identified three types of PTM users based on their uses of PTM tools (see Figure 2.5). The study has shown that the majority of them are classified as DIYers, tend to use more personalised task management tools (e.g. pen and paper-based tools or electronic documents such as Word and Notepad). This allows people to use and manage those tools using their own rules or needs which tend to evolve over time (Haraty *et al.*, 2012). Unfortunately, according to the authors, existing electronic PTM tools have not adequately provided the personalisation feature that users need. It should be noted that these three types of PTM users will be further explained in Section 2.7.2.5.

Figure 2.5. Three approaches to PTM (Haraty *et al.*, 2012) (reproduced with permission).

It seems to be a challenge to address the differences between users and represent various properties that may be important or meaningful only for certain individuals (Barreau, 1995), rather than for all users. Previous studies have shown the diversity of users and their needs for personal task management tools. Payne (1993) has found that people employ different strategies (e.g. list-making) and types of task-lists, making it a challenge to generalise. It is essential to further understand these aspects in order to ensure that future tools match diverse users. These aspects will be further explained in Chapters 4, 6 and 8. The following section will explain studies that are closely related to this thesis to highlight their main contributions and limitations.

## 2.6 Review of existing PTM frameworks/techniques

Although there are a range of personal task management techniques (Bellotti *et al.*, 2004; Galicia *et al.*, 2007; Dodd and Sundheim, 2010), there have been two techniques widely known so far: Getting Things Done (GTD) and 'Put First Things First' introduced by Allen (2009) and Covey (2004) respectively. These two techniques have also been widely used to design commercial electronic time management tools (Priacta, 2009).

Before describing both GTD and PFTF methods in detail, it is important to reiterate that the objective of this thesis is to develop a PTM framework which allows us to understand how academics in real settings and contexts manage their personal tasks. In contrast, both PFTF/GTD (which were not tailored/specifically designed for academics), refer to generic steps for the management of tasks, regardless of profession and background.

### 2.6.1 Getting Things Done (GTD)

#### 2.6.1.1 Overview

Getting things done (GTD) is a work-life time management system introduced by David Allen (Allen, 2009). The technique highlights a few steps for people to manage their time. For instance, the system suggests that people capture, process, and manage their identified things-to-do as well as the respective outcomes. In order to make the things do-able, the system also recommends that people break down the things into smaller or actionable steps. The author also suggests that people organise the information regarding their things-to-do in suitable categories or appropriate folders. Additionally, the techniques also encourage people to keep reviewing their tasks in terms of their purpose, goals, targets, projects, and actions. All these steps are recommended in order to allow people to be more focused and in control of what they want to do at a certain time.

#### 2.6.1.2 Concepts

There are five underlying concepts that underpin GTD (see Figure 2.6, as follows):

1. collect possible things to do.
2. define the things and how to do them.
3. organise the results of things-to-do.
4. review options to choose what things to do.
5. do the things.

Each of these concepts is summarised in Table 2.2.

Figure 2.6 GTD workflow diagram (Allen, 2009).

Table 2.2 A verbatim summary of core concepts of GTD (Allen, 2009, p.31).

| **Step** | **Description** |
|---|---|
| Collect | Capture possible things-to-do using appropriate tools such as physical basket, paper or electronic note-taking device, voice recording, or email. |
| Process | Once things have been captured, they have to be processed (i.e. determine what is to be done, including possible subtasks, how to do them and what they are going to be used for).<br><br>The things will be identified in two possible ways:<br>1. Non-actionable means:<br>a. things are no longer needed and can be removed.<br>b. things are not to be decided or relevant now but will be reviewed or could be done some day in the future.<br>c. things are kept as useful information for future reference.<br>2. Actionable means:<br>a. to identify what is the outcome (i.e. desired results) of the things/ projects to-do.<br>b. to determine what are the next actions (i.e. specific steps or subtasks) required in order to achieve the outcome of things/projects-to-do.<br><br>In relation to the actionable items, there are three possible further actions that people might take:<br><br>1. 'Do it' means action can be done within a 2-minute period.<br>2. 'Delegate it' means action will take longer than 2-minute and could possibly be done by someone else.<br>3. 'Defer it' means action will takes longer than 2-minute and thus has to be done later on or put on the waiting 'Next Actions' lists. |
| Organise | Personal information management or organisation is one of the key elements of GTD. It is essential to organise the actionable things that have been processed. People should have a list of projects, storage or files for project plans and materials, a calendar, a list of reminders of next actions as well as a list of reminders of things they are waiting for from someone.<br><br>Calendar is used to specifically set reminders of actions to do at a particular time, that might fall into three categories of actionable things:<br><br>1. time specific actions (e.g. meeting appointments).<br>2. day specific actions (e.g. things to do on a particular day).<br>3. day specific information (e.g. useful information to be referred to on a particular day (rather than actions)). |
| Review | People have to refer back to their organised items such as 'project' list, calendar, 'next action' lists and 'waiting for' list. By doing this, it enables people to gather and process emergent stuff, reanalyse the current system, update their lists and ultimately keep the lists current and reliable. |
| Do | The final step is to make a decision on what to do which could be based on the following criteria:<br><br>1. Context.<br>2. Time availability.<br>3. Energy level.<br>4. Priority.<br><br>People can define their priorities based on six levels of perspective:<br><br>1. current activities.<br>2. current projects.<br>3. areas of responsibility.<br>4. one-to-two-year goals.<br>5. three-to-five-year visions.<br>6. entire life.<br><br>People have to constantly reflect and ensure that their decisions are in line with the goals, values and directions of their organisations as well as other important people in their lives. |

### 2.6.2 Principles of 'Put First Things First' (PFTF)

#### 2.6.2.1 Overview

Covey (2004) associates time management with self or personal management rather than with managing the time or things. He introduces a concept of 'Put First Things First' which encourages people to identify, organise and do important things first. On the whole, these important things are based on people's perceptions as well as their roles (individual, family or work). To explain people's activities and how to better manage them, Covey (2004) introduces a time management matrix.

#### 2.6.2.2 Concepts

There are two constituent factors that define the matrix as shown in Table 2.3:

1. Urgent.
2. Important.

Urgent things are usually visible and require immediate attention. On the other hand, importance reflects the outcomes of actions. For example, 'important things' means that the outcomes that people desire can/could contribute to their mission, values and priority goals.

Table 2.3 Time Management Matrix (Covey, 2004, p.151).

| | **Urgent** | **Not Urgent** |
|---|---|---|
| **Important** | **Quadrant I**<br>ACTIVITIES:<br>Crises<br>Pressing problems<br>Deadline-driven projects | **Quadrant II**<br>ACTIVITIES:<br>Prevention,<br>PC(Production/Capability) activities<br>Relationship building<br>Recognising new opportunities<br>Planning<br>Recreation |
| **Not important** | **Quadrant III**<br>ACTIVITIES:<br>Interruptions<br>Some calls<br>Some mail<br>Some reports<br>Some meetings<br>Proximate or pressing matters<br>Popular activities | **Quadrant IV**<br>ACTIVITIES:<br>Trivia<br>Busy work<br>Some mail<br>Some phone calls<br>Time wasters<br>Pleasant activities |

Turning back to the matrix, each quadrant represents a particular type of task, such as follows:

**Quadrant I: Urgent and important**

It involves doing actions that have significant outcomes and need to be done immediately. Due to the increasing amount of these actions, people tend to do things that fall within quadrant IV.

**Quadrant II: Not urgent but important**

It involves doing things to build relationships, identifying personal goals, long term planning, preventative maintenance, etc.

**Quadrant III: Urgent but not important**

It deals with doing things that need immediate reaction due to other people's priorities or expectations rather personal desire.

**Quadrant IV: Not urgent and not important**

It deals with doing things that neither contribute to personal goals nor require immediate attention.

Covey (2004) recommends that it is fundamental for people to focus on doing things in Quadrant II. It can encourage people to always look ahead, plan fundamental principles and goals in their lives and stick to them. He believes that these are the most basic paradigms that influence their behaviours and attitudes towards their personal management, and hence people should avoid doing things at the last minute (i.e. in Quadrant I and III) or indulging in unnecessary things (i.e. in Quadrant IV). These can stimulate people to become more proactive and subsequently improve the effectiveness of their lives. Quadrant II can be used as an effective planning tool to support personal management. The key principles of the Quadrant II tool and its underlying steps are summarised in detail in Table 2.4 and Table 2.5 respectively.

Table 2.4 A verbatim summary of the principles of Quadrant II (Covey, 2004, p. 160).

| Principle | Description |
|---|---|
| Coherence | There should be harmonious relationships between personal mission statements, roles and goals, priorities and plans and personal desires, values and discipline. For example, people should explicitly identify their mission in their planner and include both short and long-term goals |
| Balance | The tool should support people to allocate their time wisely to promote a balanced life. |
| Focus | The tool should stimulate people to focus on their plans. It is essential to organise their plans for their lives on a weekly rather than a daily basis. However, they can still adapt or prioritise them to accommodate their daily needs. It highlights that people should schedule their fundamental priorities rather than prioritise the items on their schedules. |
| Flexibility | The tool should be used as guidance. It should be easily modified to suit their current or emergent needs or preferences. |
| Portability | The tool should be able to be carried anywhere and should not be constrained by context or locations. |

Table 2.5 A verbatim summary of the implementation of Quadrant II (Covey, 2004, p. 163).

| Step | Description |
|---|---|
| Identifying Roles | The first step is to specify individual roles at work, home or in other areas of personal or social life. |
| Choosing Goals | Secondly, based on their identified roles, people should identify a few important goals for each role that they want to achieve in the next seven days. These goals should be in line with their personal mission statement or long-term goals. |
| Scheduling | Thirdly, it is essential to look a week ahead and allocate time to accomplish the written goals. |
| Daily Adapting | The Quadrant II weekly planning can be used as framework to do daily planning but at the same time, it can be adapted or prioritised to respond to unexpected events or things-to-do during a day. This is to ensure that people stick to their personal missions or fundamental principles while still being flexible with their daily needs. |

### 2.6.3 Summary of the techniques

Getting Things Done (GTD) is a technique to support task management rather than time management (Allen, 2009). The technique suggests some steps to help people to be well-organised and to manage their actions/tasks better. It focuses on organising possible actions through a clear workflow that consists of five main components: collect, process, organise, review and do. For example, GTD encourages people to decide possible actions that they need to take now or later, breaking them down into details, categorising into a range of lists and assigning reminders if necessary. To further support this, it is useful to rely on tools that provide reminders and thus allow users to be in control of their overall commitments. It can also help people to easily review their commitments, in particular, to determine what things to do within a particular context or time frame. This can be achieved by specifying a particular project, action or context (e.g. what type of task, where and when to do it, etc.), and deadline to a particular task. This can assist users in viewing, classifying, and more importantly sorting or prioritising their tasks based on these properties, rather than being overwhelmed by all possible tasks at the same time. In order to determine priorities, the technique explicitly suggests a six-level model to categorise goals and their respective tasks into six different

levels. For example, the lowest and very specific level can be used to describe current actions (e.g. review article 'X') whereas the highest goals can represent the ultimate goals of life (e.g. to become a professor at a top university).

'Put First Things First' introduced by Covey (2004), on the other hand, can be mainly perceived as a principle-oriented technique to support personal management. It recommends people to focus on identifying their principles and aims in life in general. This enables people to determine the short and long-term goals that they aim to achieve and diligently schedule them with their preferred tools and prevents them from spending time doing unnecessary or less productive things. Covey proposed the time management matrix which includes four quadrants:

- Quadrant I - Urgent and important (e.g. deadline-driven projects).
- Quadrant II - Important but not urgent (e.g. planning, recreation).
- Quadrant III - Not important but urgent (e.g. interruptions, some mail).
- Quadrant IV - Not important and not urgent (e.g. some phone calls, pleasant activities).

Covey explains that people should focus their time on doing things in Quadrant II. To ensure that things to be done are in line with their principles and identified goals, he highlights that people should review these things regularly since it can motivate people to always be aware of their significant goals or priorities to accomplish and schedule them in their weekly planning.

Even though there are many tools implemented based on these methods, there is little evidence to show their efficacy and to what extent they meet users' needs or actual work-life settings (Haraty *et al.*, 2012). Leshed and Sengers (2011) assert that the 'busy' scenarios that people face are far more complex than the strategy recommended by GTD.

### 2.6.4 Strengths and limitations of GTD and PFTF frameworks

Although the existing frameworks can support users in managing their tasks - in particular, by organising them into goals, projects, tasks and contexts, and prioritising them according to their goals and priorities - they still have some limitations. Table 2.6 summarises the strengths and limitations of GTD and PFTF frameworks which have been identified based on their descriptions explained in Sections 2.6.1 and 2.6.2.

Table 2.6 Strengths and limitations of existing PTM frameworks.

| Technique | Strength | Limitation |
|---|---|---|
| **PFTF** | Suggests that people should identify their roles/responsibilities and balance their work and personal goals. | Has not provided a method for weighing a range of goals (projects and commitments) that they can take at a time, or explain a method for measuring the balance between their work and personal goals. |
| **GTD** | Recommends people to record all possible tasks that they want to do now (or sometime in the future). | Has not advised the number of tasks that they can take/do in relation to their current tasks or time availabilities/commitments or how to control this. |
| **PFTF and GTD** | Suggest that people should undertake tasks/activities that contribute to their roles and goals. | Has not provided a method for tackling the conflict between the different roles and goals that they have. |
| | Highlights key factors for prioritising tasks:<br>• Urgency (urgent and not urgent)<br>• Importance (important and not important)<br>• Priority (e.g. 1-5)<br>• Time availability, allocation and deadline<br>• Context<br>• Energy | Have not provided which among these is the most critical factor to consider nor shown a method for weighing all the factors at a time (e.g. how to decide the most important tasks among important tasks, which one is the most urgent/important at a given time).<br>Have not described other factors that go beyond this.<br>Have not suggested, in detail, when it would be appropriate to do a particular task in relation to current tasks/time constraints or other factors. |
| | Suggest that people organise (or categorise) their commitments into specific goals/roles, projects/activities/folders, tasks/sub-tasks, identify actions and set reminders for them. Suggest people to regularly review/update their tasks/list and calendar (i.e. time) and rearrange their plans in order accommodate any unexpected changes as they happen. | Have not provided a method for people to easily matching/rearranging between people's current commitments and time constraints/opportunities. |
| | Methods were prescribed based on experience of discussing with different people who face personal task management problems. | Have not explained the different levels or types/nature of busyness, nor the challenges experienced by people, nor shown/related how their techniques can be used to address these.<br><br>Have not shown with empirical evidence how the techniques were formulated, neither the implementation/evaluation of them for identifying the usefulness/effectiveness of the techniques. |
| | Suggest that people can use any tools that suit their needs (e.g. electronic or physical to-do lists, calendars, email, etc.) They have suggested that the tools should be portable and flexible. | Have not recommended the best PTM tool for users to use, nor explain what types of support the tool should provide, nor explain how to improve the usefulness of current tools. |

### 2.6.5 PTM tools based on GTD and PFTF frameworks

GTD and PFTF techniques have been also widely used to design commercial electronic time management tools (Priacta, 2010). For example, "Any To-do (Keane and Able, 2012)" was designed to support users to implement the PFTF technique. Figure 2.7 shows that users can create a list of their goals and Figure 2.8 shows a list of tasks that they have to do to fulfil the goals according to their priorities (which are based on urgency and importance).

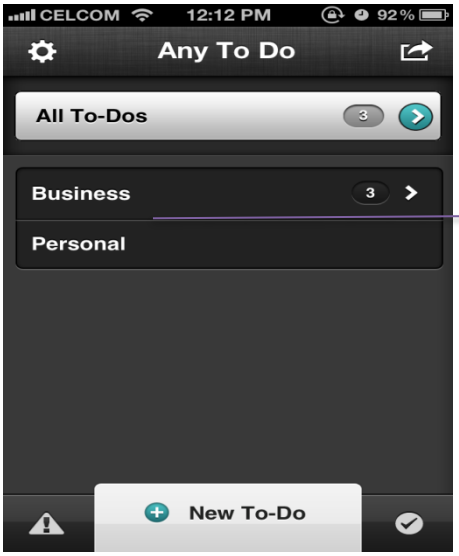



Figure 2.7 Any To-do – Identifying goals.

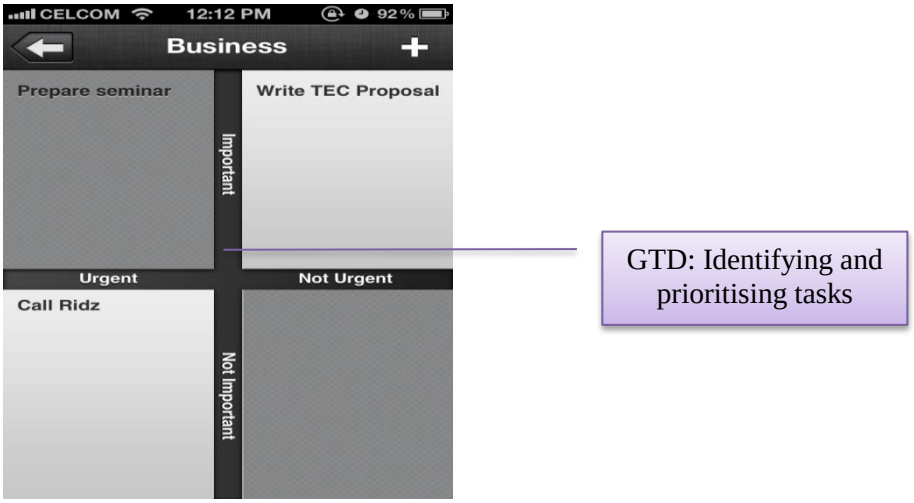
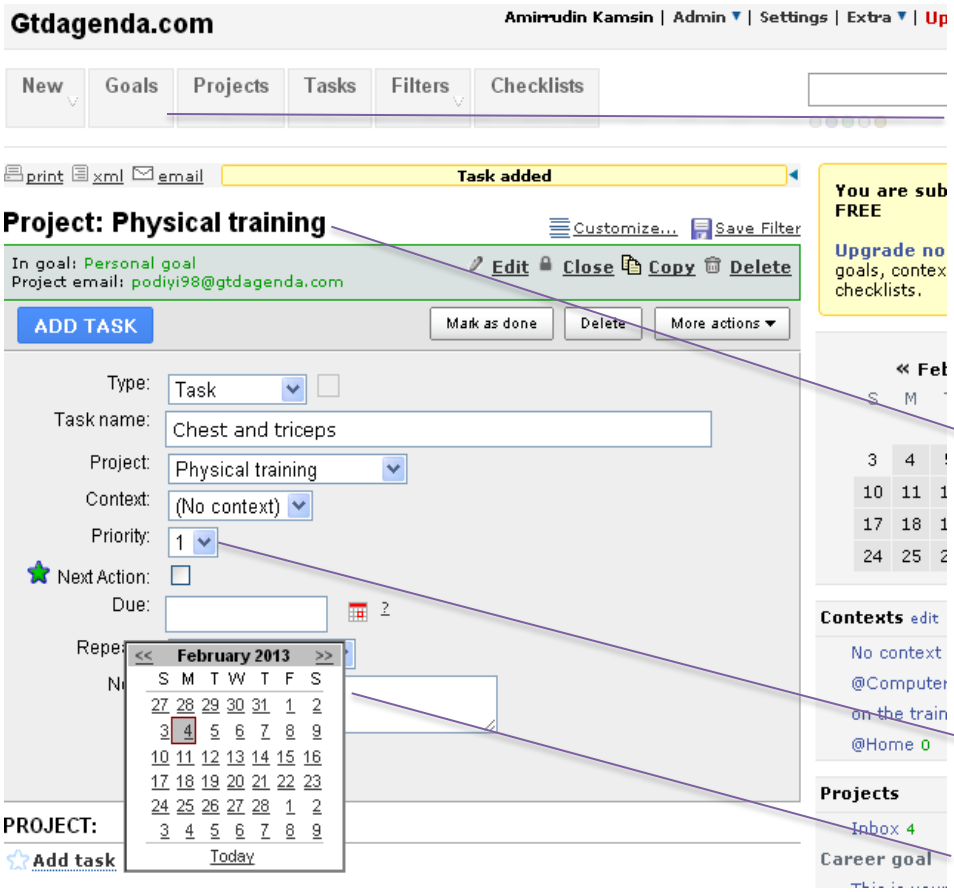



Figure 2.8 Any To-do – Identifying and prioritising tasks.

Gtdagenda (Gtdagenda.com, 2013b, 2013a) and Pocket Informant (Pocket, 2013) were developed to both support 7 PFTF and GTD techniques. For example, Figure 2.9 and Figure 2.10 show functions (or features) provided by Gtdagenda which allow users to implement the important steps suggested in PFTF and GTD techniques respectively.




Identifying a few (four or five) broad categories of personal life (i.e. career, family, health, finances, intellectual, hobbies, etc.)

Identifying activities (projects/tasks) to achieve the goals

Prioritising the most productive hours to do priority 1 and 2 activities.

Scheduling activities (or events) that match the goals

Figure 2.9 Gtdagenda – implementing PFTF.

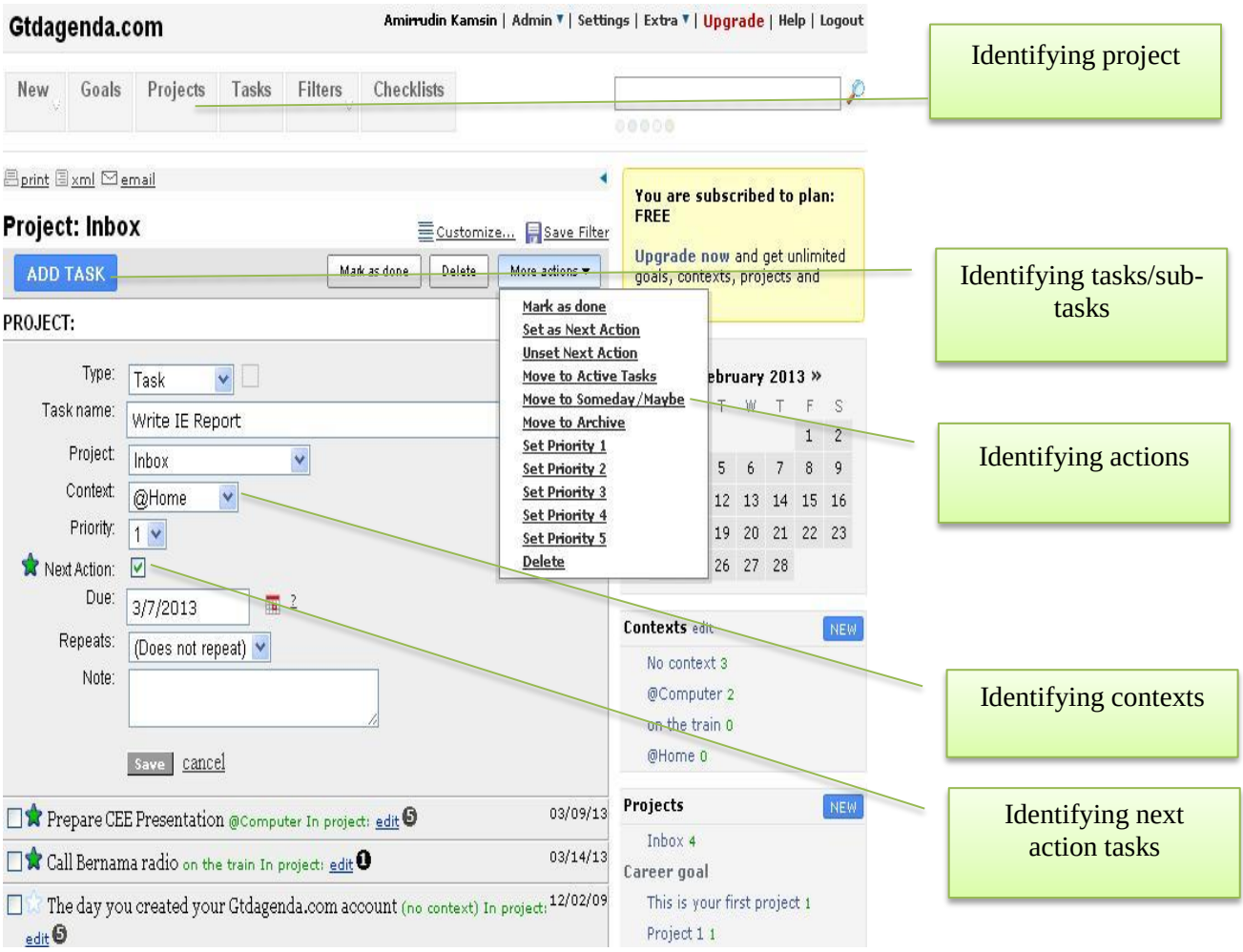



Figure 2.10 Gtdagenda – implementing the GTD technique.

## 2.7 Contributions of related studies

Before discussing them, it is important to recap the motivation for this thesis which aims to identify requirements for PTM tool support/features for facilitating busy academics in managing their tasks (as explained in Section 1.2). This section will show how these studies relate to this thesis which can be divided into two categories:

- Studies in personal task management issues among academics.
- Studies in personal task management tools requirements.

Both categories will be described in the following sections in detail.

### 2.7.1 Studies in personal task management issues among academics

Academics are busy professionals, but little attention has been given to further describing their personal task management strategies, issues, needs and how to better support them. Previous studies have shown that academics have to manage hectic lifestyles (Houston *et al.*, 2006; Newman *et al.*, Forthcoming) in competitive environments (Vardi, 2009) due to the increasing demand of their workloads (Barrett and Barrett, 2007), and hence time availability is their primary concern (Newman, 2004). These workloads can be divided into three disparate types of job: namely research, teaching and administration (Ailamaki and Gehrke, 2003; Houston *et al.*, 2006; Vardi, 2009). Houston *et al*. have highlighted that due to these competing workloads, there is continuous tension to manage their time while considering rewards or recognition that they might gain by undertaking a particular job. They found little evidence that academics are able to handle this pressure by prioritising their tasks, or refusing additional tasks. Instead, they tend to blame other units or systems for causing this frustration of an increasing workload. This has also caused them to compromise their time commitment on research in order to accommodate teaching and administrative responsibilities (Houston *et al.*, 2006).

Ultimately, the challenge that academics face in managing their competing and distinct tasks remains with them (Vardi, 2009). This has caused many of them to work long hours (i.e. beyond the conventional working hours perceived by other types of professions), causing dissatisfaction (Vardi, 2009) and stress towards their working life (Anderson *et al.*, 2002). Due to this prevalent issue, it has been a major concern for universities to support their staff by identifying strategies that can help them to better manage their work over time and ultimately improve their satisfaction and feeling of control over their duties (Vardi, 2009). Indeed, it has become a major concern for busy people to ensure that their tasks get done and therefore acknowledge any techniques or tools that can support achieving this goal (Newman, 2004).

It has been highlighted that academics face a challenge in managing their personal tasks, which include a wide range of complex and contrasting duties. For example, in a research job which involves a lot of searching, reading, thinking and writing tasks, it is difficult to ensure that these tasks are accomplished within a planned time frame (Newman, 2004). Newman (2004) noticed that it is a challenge to estimate lengths of time required to do these and other tasks such as checking emails, updating records, reading and searching for

work-related information. The overrun issues are partly caused by unanticipated interruptions, new demands or tasks or changes in their current situation (Newman, 2004).

Research jobs are often perceived as difficult and complex (Newman *et al.*, Forthcoming). This scenario becomes even more problematic because some of these tasks, for instance, doing follow-ups for a particular research project, usually do not have explicit deadlines (Newman *et al.*, Forthcoming). Besides, they further explain that most academics' jobs cannot be easily delegated, and hence they must be prioritised.

However, prioritisation and planning, in particular time estimation for doing their tasks, are in fact difficult for academics who may end up spending little time on some tasks in order to quickly achieve their respective goals (Newman *et al.*, Forthcoming). This is only one example of the subtle needs raised by academics which must be addressed and supported by future technologies.

This section highlights the challenges that academics experience in managing their tasks. It also explains how the nature of their job or work environment contributes to such issues. The next section identifies five studies (as mentioned earlier) that focused on understandings requirements for tools to facilitate busy people.

### 2.7.2 Studies in personal task management tools requirements

The following five most related studies (that are going to be described) share the same motivation as this thesis but differ in terms of their research settings (e.g. participants, study design and aims, data analysis approach, etc.) and key contributions. They employed a user-centred design (UCD) approach to understand personal task management and requirements for tools to facilitate the behaviour. In brief, Payne (1993) and Blandford and Green (2001) focused on a wide range of time management tools rather than specifically focusing on personal task management tools in detail. A further three studies focused on designing and evaluating personal task management tools (Bellotti *et al.*, 2004), (Gonzalez *et al.*, 2008) and (Haraty *et al.*, 2012). Table 2.8 provides an overview of these studies, highlighting the similarities or differences between them and this research project.

#### 2.7.2.1 The uses of calendars and task lists

Payne (1993) studied the uses of calendars, which involved studying 20 members of a single organisation using semi-structured interviews. Although the main focus of this study was on

calendaring rather than personal task management, Payne briefly extended his study to explore the use of task lists. He suggests that there were various task-list-making strategies adopted by the participants and hence it is difficult to generalise them. He found that most of them used task lists but the pattern of their use varied from regular to occasionally, especially when they felt overwhelmed. According to him, there were two types of list created by regular users: 1) Long term 'master lists' and 2) Short term 'working' lists. The master lists were stored on-line and used to record all current or completed projects as well as main tasks that usually took several weeks or longer to accomplish. In contrast, short term lists contained small tasks which can be completed within two days or so. In addition, Payne identified that these short term lists were made ad-hoc but some users created them on designated papers or calendars.

#### 2.7.2.2 Requirements for time management tools

Blandford and Green (2001) conducted a study that was inspired by Payne's (1993) study which was described in the previous section. Their aim was to further understand the uses of various time management tools and users' acceptance of them. The study involved 16 members of an academic department in a university in the UK. They revealed the usability issues of existing time management devices, namely diaries, calendars, task lists, etc. to support scheduling and reminding. They described to what extent the different properties provided can support users in managing their time. For instance, according to them, existing digital tools, in particular, Palm Pilot provided an explicit priority feature ranging from level 1-5. In contrast, people tend to prioritise their personal tasks using their heads or by annotating their paper task lists rather than by explicitly designating such unitary levels to their tasks. Table 2.7 summarises the strengths and weaknesses of existing time management tools as outlined by Blandford and Green. Based on the weaknesses of existing tools identified, they proposed requirements for time management tools and suggested a possible approach to design them. For instance, they highlighted the importance of linking diary information to other resources, and provide a means to identify events' properties such as importance, definiteness and movability.

Table 2.7 Strengths and limitations of existing PTM tools outlined by Blandford and Green (2001).

| **Tools** | | **Strengths** | **Limitations** |
|---|---|---|---|
| Paper-based | Paper diaries | Visual salience in the work setting. The user can place their paper diaries left open on the desk, or place post-it notes near their computer screens. | |
| | | Scarring. The changes made in the tools can be identified through 'scars' (i.e. by doing explicit crossings out and corrections). The user can easily annotate their diaries (which can keep a record of changes). | It can be difficult to understand personal symbolic notation that people used in their diaries. |
| | | The user can record information of various types in their diaries (e.g. scheduled events, blocks of time for doing solo activities, 'pulse' events ('must get that done this afternoon'), notes of deadlines and notes of other happenings that might impact on the user diary. | |
| | | Users need not specify a particular start time (e.g. activity B will done whenever A has finished). | It can be difficult for the user to appropriately allocate or control duration to be spent on a particular meeting or task. |
| | | | It can be difficult to share diary entries/contents and coordinate them with other peoples' diary entries (e.g. colleagues). |
| | | | It can be difficult to identify where other people will be or what they will be doing (for example it can be difficult to differentiate between their diaries entries: meeting appointments, solo/personal activities and deadlines/notes) at a particular timeframe. |
| | | | It is a challenge to automatically set reminders and a series of fixed events/activities (e.g. periodical lectures or seminars). |
| Electronic | Diaries (e.g. Meeting Maker) | Can be accessible by different people from multiple locations. | It can difficult for people to access the system if they have no opportunity to log in remotely. |
| | | Provide a better view (e.g. a month) to look-ahead (to plan and to view their future commitments.) | |
| | | | It can take some time to start up (e.g. 15 seconds to 2 minutes) and therefore can be difficult to rapidly access the system. |
| | | | Less ready-to-hand (if the user is away from their desktop computer). |
| | | | It can clutter the user's computer screen (obscuring items they are currently working on) or be hidden by other windows and thus is difficult to access quickly. |
| | PDAs | Are ready-to-hand. Users can quickly access their diaries without a need to wait for a few seconds or minutes. | Provide a feature to allocate a priority level of 1–5 to show how many urgent and important tasks but seem less meaningful in terms of highlighting which is the most urgent and should be dealt with first. |

| | | | |
|---|---|---|---|
| | Both diaries and PDAs | Have a more fluid visual structure (e.g. the time window being displayed can change dynamically as new entries are made) and the user can scroll down unrestrictedly (there are no fixed reference points). | The text entry (e.g. a long description) is not immediately visible (i.e. hidden) without 'clicking' on it. |
| | | Are well-suited to explicit scheduling. | Force entries to conform to types that do not match the user's types. There is no distinction between scheduled meetings, more flexible time-based intentions and other time-based information. |
| | | Allow users to create event series (e.g. lecture course, seminar series, group meetings, etc.) | Force users to be explicit about the timing of activities (e.g. to set start and end times of a meeting) and do not allow them to leave a certain indefiniteness. |

#### 2.7.2.3 Task list manager prototype (i.e. TaskVista)

Bellotti *et al.* (2004) conducted a series of ethnographic studies to investigate the uses of personal task management tools. The studies were divided into three different stages: 1) A pilot study, 2) A long term study and 3) An informal evaluation study. The pilot study involved 8 participants including administrative staff, researchers and managers and investigated their resources to support their personal tasks. They found that tasks are used in various ways. According to them, some lists explicitly represent the number of tasks to be done but sometimes they also include relevant resources on which the participants rely in order to perform their tasks. They suggest that people's tasks may be represented at various levels which mean that some tasks could be specified in detail by including sub-tasks whereas others might just be represented by a terse description. They suggest that some task items do not completely get done due to their low value of importance as compared to completed tasks. They noticed that a few of their participants tended to keep low priority task lists electronically.

The pilot study was followed by the long term study which included 7 participants who were involved in multitasking and performing different jobs. The study was conducted through periodical task-tracking interviews as well as background and final follow-up interviews. In the middle of the study period, they also performed a one-day shadowing observation. The aim was to capture and track a huge number of their tasks. During a one-hour weekly task-tracking interview, they asked the participants to rate the importance and urgency of their tasks on a scale between 1 and 5. They found that there was a range of tools/resources used to remind users of their personal tasks. These included emails, paper

tasks, printouts, calendar entries, index cards, notepads, physical objects or cues, etc. During their weekly task-tracking interviews, they asked the participants to rate their task resources.

From their statistical analysis, they noticed that there was no significant relationship between types of task resources and task completion. They also found that highly-rated important and urgent tasks were completed more than the low-rated ones. On the whole, they suggest that prioritisation is not the key issue of personal task management, but rather the amount of effort required to complete important tasks especially during unanticipated occurrences.

Following these findings from their ethnographic study, they developed and evaluated a compact personal task list manager prototype, TaskVista, to support task management as shown in Figure 2.11. In particular, the tool aimed to support users' tracking of their tasks over time and hence allow them to be aware of their overall tasks to be done. Users can create tasks by typing directly or dragging a file (for example notes, documents, etc.) or email into the list. Each of these tasks has 'importance' attributes which determine their priority position through which they can be sorted. There is also a deadline bar, which specifies the urgency of a particular task to the users. So users can prioritise their tasks based on these two distinct properties. In order to determine the effectiveness of this prototype, they conducted an informal evaluation involving 9 volunteers through 10 task management exercises. Overall, they found they received positive feedback towards the features provided, especially the drag and drop creation feature.

#### 2.7.2.4 Personal Activity Management (PAM) model and prototype

Unlike Bellotti *et al*. (2004), Gonzales *et al.* (2008) proposed a model of personal activity management (PAM) as shown in Figure 2.13, which then was used as a basis to design a prototype to support busy Information Technology (IT) professionals to manage their multiple activities concurrently. The prototype allows the users to plan, organise, prioritise, and get reminded of their overall tasks. Turning to the model itself, it was proposed based on selected literature as well as their previous work rather than grounded in data (from a user study). The PAM model is focused on describing planning and organising activities and hence the prototype was specifically based on this model. This is to ensure that users are always aware of, as well as reactive, to their tasks.

Table 2.8. A summary of related studies in personal task management using UCD approach.

| | **Haraty *et al.* (2012)** | **Gonzalez *et al.* (2008)** | **Bellotti *et al.* (2004)** | **Blandford and Green (2001)** | **Payne (1993)** |
|---|---|---|---|---|---|
| **Participants/ settings** | 19 students in an urban North America University (e.g. undergraduate and postgraduate students). | 8 information workers (e.g. IT professionals – software engineer, process manager). | 24 members of staff in various organisations (e.g. administrative staff, researchers, managers). | 16 members of staff in a British university (e.g. managers, lecturers, personal assistants (PAs). | 20 scientists (i.e. researchers) at the IBM T.J. Watson Research Center. |
| **Data collection methods/studies** | Focus group.<br>Semi-structured interviews. | Interviews.<br>Questionnaires. | Semi-structured interviews (i.e. pilot study).<br>Task tracking interviews and shadowing observations (long-term study).<br>Informal evaluation. | Semi-structured interviews. | Semi-structured interviews. |
| **Data analysis approaches** | Grounded-theory approach. | Quantitative and qualitative techniques. | Pearson's R and Spearman Correlation tests. | Qualitative technique. | Cognitive artifacts analyses:<br>task structure analysis and task entity analysis |
| **Aims/Objectives** | To identify how people manage their personal tasks and challenges they face.<br>To explore how people feel about their personal task management (PTM). | To understand how list-making activities/strategies can support personal activity management.<br>To identify the conceptualisation of work activity.<br>To develop a personal activity management model (based on existing literature/model, for example, Getting Things Done (GTD)).<br>To design and evaluate a personal activity management prototype.<br>To identify the usefulness of the modules provided by the prototype. | To understand how people manage their tasks and tools (in particular to-dos) that they use to support this.<br>To identify what factors influence task completion and prioritisation.<br>To design and conduct an informal evaluation of a task management prototype.<br>To identify the usefulness of features provided by the prototype. | To investigate how people use and manage paper-based, personal digital assistants (PDAs) and group scheduling system for managing their time.<br>To identify the strengths and limitations of these tools (by scrutinising properties/features provided by these tools) and solutions to integrate them.<br>To propose requirements for improving these tools. | To understand the use of personal calendar.<br>To explore the use task lists and list-making strategies employed by people.<br>To investigate the interactions between the designs of calendar and the task prospective remembering.<br>To identify strengths and limitations of the tools. |

| | | | | | |
|---|---|---|---|---|---|
| **Key contributions** | Individual differences (i.e. three approaches to Personal Task Management (PTM)). PTM behaviours. | Personal Activity Management (PAM) model and prototype. | Task management strategies/tactics. Task list manager prototype (i.e. TaskVista). | Requirements for time management tools and potential implementation approach. | Theory for describing aspects of the data. Design ideas/principles for future calendar systems. |

Figure 2.11. A screenshot of TaskVista (Bellotti *et al.*, 2004) (reproduced with permission).

Figure 2.12. A guiding model of Personal Activity Management (PAM) (Gonzalez *et al.*, 2008) (reproduced with permission).

As shown in Figure 2.12, the model consists of five underlying activities; each of them was designed explicitly within the proposed PAM prototype (see Figure 2.13). The description of each activity and its respective module is summarised in Table 2.9. The model assumes that all the activities begin with capturing activities which further trigger people to articulate, schedule, prioritise and organise their tasks. These activities do not have to be followed in sequence or be undertaken completely in all situations. An evaluation study which included interviews, a case study and questionnaires was conducted. The aim was to analyse the participants' backgrounds, their PAM strategies as well as the uses and acceptance of the prototype. The evaluation study involved four workers.

Table 2.9. A summary of the PAM model and its underlying modules (Gonzalez *et al.*, 2008).

Figure 2.13. A Screenshot of the PAM prototype (Gonzalez *et al.*, 2008) (reproduced with permission).

The PAM prototype was used as a complementary tool together with other tools such as email, a shared calendar and a paper agenda. Gonzales *et al.* (2008) found that particular modules such as focalisation, classification and review, were rarely used by the participants. They suggested that some of the focalisation utilities could be done through other modules and therefore it showed limited uses. This, however, highlights that there is no clear distinction between the modules. In brief, the participants mainly used the prototype to systematically capture, plan, organise and remind them of their overall tasks instead of prioritising them.

#### 2.7.2.5 Individual differences in personal task management (PTM)

Haraty *et al.* (2012) conducted field studies at a large urban North American University. They conducted an hour-long focus group that involved 7 Computer Science graduate students. Following this, they performed semi-structured interviews with 12 participants who were mostly undergraduate and postgraduate students (10 from Computer Science, 1 from Mechanical Engineering and 1 from Medicine). The aim was to understand the similarities and differences of personal task management tools or

strategies employed by people, and provide design guidelines in accordance with the behaviours identified.

Their main findings can be divided into two. First, they have identified three types of PTM users (as discussed earlier) based on two criteria: whether or not their primary PTM tool was a dedicated e-PTM tool, and whether or not they personalised their primary tools. Their results have suggested that people can be classified into three types of users (see Figure 2.5 shown previously and Table 2.10):

Table 2.10 Description of three approaches to PTM (Haraty *et al.*, 2012).

As mentioned earlier, the majority of users fall within the second type. They designed their own tools and personalised them according to their own needs or conceptual understanding. The second contribution of this study was that they have identified three groups of PTM behaviours: recording tasks, remembering tasks, and maintaining and organising task lists. These are shown in Figure 2.14. They also found categories of factors that influence these behaviours: personal, environmental and tool-related. However, little attention has been given to describing other important activities (for example planning/scheduling and prioritisation) and critical factors that go beyond these (e.g. emotion, motivation, task, social, time), which are highlighted in Kamsin *et al.* (2012). This will be further explained in Chapter 4.

Figure 2.14. Examples of PTM behaviours and tools' affordance to support them (Haraty *et al.*, 2012) (reproduced with permission).

## 2.8 Limitations of current research

Although previous research has made important observations and recommendations, previous researchers have also acknowledged that little is known about how people manage their tasks and what factors influence their behaviour (Payne, 1993; Bellotti *et al.*, 2004; Claessens *et al.*, 2010), and how various tools are used to support this (Bergman *et al.*, 2004). This thesis identifies three key gaps in current research. Firstly, the underlying components of personal task management behaviour remain unclear. What are the underlying activities involved and what are the relationships among them? How do people perform these activities? For example, how do people make, use, and manage their tools (e.g. task lists)?

How do these activities assist people in planning and prioritising their tasks? What makes them pursue these activities? What are the factors that influence these activities? What are the relationships among these activities or factors? Also, what are the main challenges that people face and the related critical needs?

Secondly, the definitions (or descriptions) of the concepts that are associated with PTM seem inconsistent. Previous research tends to describe concepts such as planning, scheduling, prioritising, urgency, importance and priority interchangeably (for example, the differences between planning and scheduling are not clear). Furthermore, to what extent they match with users' concepts cannot be ascertained. For example, some studies have suggested that the sequence of tasks is arranged based on priority, which can be determined by the importance factor. In contrast, some studies have proposed that task lists can be arranged according to their deadlines. Other literature has suggested the use of both concepts (urgency and importance) for classifying and selecting the order of tasks. On the other hand, previous research has pointed out that people face difficulties in managing their tasks based on these two concepts, particularly when they are challenged by constant unexpected tasks.

Finally, there is still limited empirical evidence that shows the usability of these existing tools, highlighting to what extent they match with users' requirements. The author has identified an inconsistency between the concepts suggested by the existing studies and the concepts provided by existing tools. For instance, some tools explicitly provide a feature where the user can assign priority, importance and urgency separately, but on the other hand, some literature has suggested that priority refers to the importance factor. Moreover, some tools exclude these factors by only showing tasks and their respective deadlines. It cannot be confirmed which prototypes best suit users' needs. Also, little concern has been given to improving the design of the interfaces and interaction features.

Thus, the focus of this thesis is to develop a detailed understanding of PTM behaviours from users' perspectives, providing a more grounded basis that confirms and explains the behaviours. It can also be used to both guide the establishment of requirements for tools to support people to manage their tasks and evaluate them.

## 2.9 Summary

There has been a range of concepts suggested by time management experts and researchers to support personal task management, but little attempt has been put forward to validate to what extent these

concepts match with users' concepts. In fact, little research has been done to build a more detailed understanding of the behaviour based on users' perspectives. Current research tends to focus on tools to support them rather than describe users' intricate behaviours and their individual needs or preferences in relation to their specific contexts (e.g. the nature of their work and busyness).

Previous literature shows that there are several users' concepts of personal task management, such as planning, prioritising, organising, list-making and scheduling. However, most of them are not adequately described. The descriptions of them, in particular, prioritisation and their related concepts/features (e.g. priority, urgency, and importance) have been inconsistent. Also, little concern has been given to understanding a wide range of other pertinent aspects that go beyond these preconceived notions. Overall, these existing personal task management concepts have been confused, whereby the concepts suggested by the experts or implemented within the existing tools contradict the users' concepts. The relationships between the underlying concepts are also not clear, motivating the author to explore these conceptual ambiguities in detail. Also, little is known about how to better represent these users' concepts into future designs based on users' understanding and preferences. It is a challenge to determine how these concepts should be better represented within future tools.

To date, there is no model that describes how people manage their personal tasks (i.e. solo activities), that is particularly grounded in empirical data. Allen's (2009) GTD model is focused on organising possible things to do while the time management matrix proposed by Covey (2004) is concentrated on categorising possible things to do into 4 quadrants, suggesting users particularly focus on doing things that fall within quadrant II (i.e. important but not urgent). However, it is not evident to what extent these strategies match with users' needs or current practice (Haraty *et al.*, 2012; Kamsin *et al.*, 2012). The PAM model proposed by Gonzales *et al.* (2008) was not primarily based on thorough analysis of empirical user studies and therefore, it lacks explicit evidence from users' conceptual understanding.

To address the issues highlighted earlier, this thesis aims to investigate and focus on filling the gaps found in the current understanding of personal task management. In particular, this thesis aims to build on the studies by Payne (1993) as well as Blandford and Green (2001). However, rather than focusing on concepts and tools to support meeting/events scheduling, coordination and reminding, the thesis instead focuses on personal task management (i.e. managing solo activities) which is still poorly understood compared to the former aspect. Although Bellotti *et al.* (2004), Gonzales *et al.* (2008) and (Haraty *et al.*, 2012) have investigated a similar area, little attention has been paid to describe factors that

influence PTM behaviours in detail and challenges facing busy people. Again, this thesis aims to complement these previous studies by focusing on identifying and determining the personal task management concepts primarily based on studies of users along with secondary sources that are highlighted by the existing literature.

Following this, it is important to compare users' concepts and the concepts recommended or implemented by the existing techniques or tools respectively. The possible gaps identified between these concepts might suggest how the existing personal task management tools and techniques can be redesigned or formulated in order to accommodate users' understanding and preferences. There is an abundance of existing personal task management tools, but again, little concern has been given to evaluating them and identifying to what extent they match users' concepts. Hence, the thesis aims to evaluate some of these tools and suggest design opportunities that can be taken in accordance with users' concepts which reflect a certain context of users (i.e. academics).

# Chapter 3: Methodology

This chapter highlights two types of study undertaken in this thesis: empirical and analytical. It will further explain different methods and the respective approaches undertaken to conduct them. These include interviews, video-diaries, member-checking and expert evaluations. The chapter also discusses techniques/steps employed for data treatment and analysis, participants' recruitments and ethical considerations. The chapter is divided into the following sections:

- **Introduction** – giving an overview of the methodological approach of this research project.
- **Empirical studies** – explaining and justifying the qualitative data gathering methods employed in user studies (i.e. interviews, member-checking and video-diaries).
- **Analytical evaluations** - describing the importance of expert evaluation and justifying the appropriateness of the analysis method chosen (i.e. CASSM).
- **Data collection and treatment –** explaining types of data collected and how they were processed.
- **Data reliability and validity** – discussing considerations made to produce reliable and valid data.
- **Data analysis using grounded theory** – elaborating the appropriateness of the approach for data analysis.
- **Data sensitivity** – identifying considerations made throughout the analysis process.
- **Ethical considerations** – highlighting the procedure followed to ensure that the studies were done ethically.
- **Methodological implications** – explaining the expected implications of the methodology chosen and the research outcomes.
- **Summary** – revisiting the highlights of this chapter.

## 3.1 Introduction

This research involved studies that can be classified into two types: empirical and analytical. The former allowed the author to develop a detailed understanding of personal task management behaviours based on the data gathered using three different methods. The latter enabled the author to determine the usability of existing PTM tools using an expert evaluation method (CASSM). In the next sections, all these methods will be explained, detailing the following aspects:

- Introduction – explains the usefulness of the method and its purposes, and discusses previous studies that employed the method.
- Approach – elaborates techniques that can be employed to undertake the method.
- Strengths or limitations – highlights the main contributions or drawbacks of the method.

It should be noted that the methods to undertake the respective studies will be explained in more detail in other individual chapters. This includes procedure, sample and materials, findings, discussion and summary.

## 3.2 Empirical studies

### 3.2.1 Qualitative paradigm

To begin, it is vital to explain the importance of using a qualitative paradigm in shaping the direction and contributions of this thesis. According to Rogers *et al.* (2011) (p.55), *"A paradigm refers to a general approach that has been adopted by a community of researchers and designers for carrying out their work, in terms of shared assumptions, concepts, values, and practices."* Hazzan *et al.* (2006) claim that a qualitative research approach is more appropriate to investigate phenomena about which little is known. Qualitative methods are useful for discovering complex phenomena (Strauss and Corbin, 1998) and the meanings that participants attach to their behaviour, how they interpret situations and what their views are on particular issues (Woods, 2005). Hazzan *et al.* (2006) highlight two advantages of using qualitative methods:

1. Expanding the findings – to discover new or even unpredicted findings or research directions that were not anticipated by the research.
2. Deepening the findings – to explain the findings from various perspectives (or relate them to many topics) due to the rich description contained in the data.

Qualitative methods enable researchers to produce more solid conclusions and richer descriptions of phenomena (e.g. how people do something, and the meaning behind the behaviour) (Berglund *et al.*, 2006). In general, the methods have been well employed in HCI research (Boardman, 2004), and the data can be gathered using various methods: interviews, diaries, observations, focus groups, case studies, etc. These are important for the following purposes (Fitzgerald *et al.*, 2011):

- Identifying the opinions, views and actions of participants.

- Asking both general and specific questions.
- Collecting data based on spoken words, writing or pictures.
- Analysing data to develop themes.

Indeed, the virtue of qualitative research is that it allows researchers to deeply understand participants' experiences and determine intrinsic meanings rather than testing variables (Strauss and Corbin, 1998). This allows researchers to understand phenomena from their perspective rather than from the existing literature or what is already known.

### 3.2.2 Validation of qualitative research

It is also a challenge to critically evaluate findings from qualitative studies. There has been a lack of agreement about a generic framework for this (Rolfe, 2006). Therefore, the process of assessing them is quite disparate (Lietz and Zayas, 2010). They are not generalisable as probability sampling is not adopted, instead, purpose sampling is used to identify particular participants who fit the phenomenon being investigated (Lietz and Zayas, 2010). Probability sampling uses random selection to ensure that all units in the population have an equal probability or chance to be selected and it is mostly associated with quantitative research (Davidson, 2006). Convenience sampling refers to a type of nonprobability sampling in which people are sampled simply because they are "convenient" sources of data for researchers (Battaglia, 2008). Each study has unique purposes and may use varied methods (Lietz and Zayas, 2010). Rolfe (2006) asserts that it is worthless to have predetermined criteria for assessing the studies because of individual judgments of individual studies and their uniqueness, and therefore a continuum of evaluation criteria should be adopted.

However, previous literature shows that many qualitative researchers tend to use the term 'validity' to determine the quality of good qualitative research (Johnson, 1997; Cohen and Crabtree, 2008). They explain that the term is used to refer to the research's plausibility, credibility, trustworthiness, accuracy and defensibility. For instance, the study can be considered trustworthy if adequate steps are taken to ensure that participants' views are ethically, authentically collected, analysed and presented in the findings (Finlay, 2006; Lietz and Zayas, 2010). Besides this, the study is credible if there is adequate evidence (e.g. quotations) or arguments well-grounded in theory (Finlay, 2006).

There are some possible approaches that can be used to achieve this quality: triangulation, member-checking, peer review/debriefing, external audits/audit trails, thick descriptions, reflectivity, etc.

(Johnson, 1997; Finlay, 2006; Cohen and Crabtree, 2008; Lietz and Zayas, 2010). It is not necessary to engage in all these strategies but it is important to show evidence that the researcher has taken steps to improve the trustworthiness of the study (Lietz and Zayas, 2010).

The following section justifies the qualitative methods undertaken in this thesis. In brief, it explains the usefulness of the methods, describes some previous studies that have implemented them, and highlights their underlying strengths or limitations.

### 3.2.3 Interview

#### 3.2.3.1 Introduction

Interview is a powerful method for exploring complex phenomena. Interview is a useful method for investigating users' experience (Rogers *et al.*, 2011). It allows the researchers to understand intricate phenomena by investigating users' experiences in detail. The method allows researchers to understand each individual participant by discovering their perception of a certain aspect of a study, allowing the researchers to further investigate the underlying concepts that are meaningful to them. This also enables the researchers to present empirical knowledge that goes beyond what is already known, particularly concerning aspects that remain unexplored based on individual users' perspectives.

The researchers can have a control of data to be gathered throughout the interviews. They can use a 'probing' device to explore subtle aspects of the study by raising further questions to participants based on their given responses. Throughout the process, the interviewer can also control the topics of the interview conversation, which builds a connection with users (Rogers *et al.*, 2011). For instance, based on their answers, the researcher can ask the participants to clarify or extend subtle aspects which are unclear and further define their meanings. This grants researchers the ability to discover emergent concepts which might be similar or contrary to existing knowledge. In other words, the interview method does not restrict the researchers to the existing theories or concepts, but allows exploration beyond them. Overall, the method enables the researcher to make sense of and provide an interpretation of the observed phenomena based on descriptions elicited by individuals who are involved in specific incidents or situations (Costa, 2009).

People are situated in various settings. They have a different perspective or understanding of a certain aspect and many individual experiences remain unexplored. However, interviews can be

expensive because they are time consuming (Rogers *et al.*, 2011); investigators need a huge amount of time to both conduct the interviews and later, transcribe and analyse them.

#### 3.2.3.2 Interview Approach

Previous literature shows that interviews can be done in three ways: structured, unstructured or semi-structured. The structured way involves a fixed set of questions with simple answers (Newman and Lamming, 1995). The questions tend to be short and typically are closed-ended. They are particularly useful when the aspects/goals of the study are well understood, and thus more specific questions can be designed (Rogers *et al.*, 2011). Unstructured, on the other hand, can be designed specifically without constraints, allowing the investigators to explore and build an understanding of a particular topic being studied (Newman and Lamming, 1995) and identify the range of opinions (Rogers *et al.*, 2011). Unstructured interviewing enabled the participants to explain their experiences and expectations in more detail as compared to semi-structured interviews (Gibson, 1998). Although researchers play an active role in the unstructured interview process by means of focused listening, they are not the central actors. Rather, central to the process are the interviewees who are telling their stories (Corbin and Morse, 2003). However, unstructured interviewed does not provide incremental validity and can compromise accuracy (Dana *et al.*, 2013). Semi-structured interviews apply features of both structured and unstructured interviews. Rogers *et al.* highlight the importance of 'probes' used throughout semi-structured interviewing for getting more information and improving the objectivity of the interview (Rogers *et al.*, 2011). According to Mack *et al.* (2005), "*Probes are neutral questions, phrases, sounds, and even gestures interviewers use to encourage participants to elaborate on their answers and explain why or how*". This also enables the interviewer to probe relevant materials that further confirm their findings or clarify things that are poorly understood.

Semi-structured interviews have been employed in a number of previous studies of personal task management (Taylor and Swan, 2004; Leshed and Sengers, 2011; Haraty *et al.*, 2012) , time management (Payne, 1993; Blandford and Green, 2001; Giusti *et al.*, 2010) and personal information management (Boardman and Sasse, 2004).

### 3.2.4 Video-diary

#### 3.2.4.1 Introduction

A diary study has been recognised as one of the most useful methodologies for researchers in understanding peoples' lives (Rogers *et al.*, 2011). It is different from other methods such as interviews or observations in that the participants capture the data. It specifically allows them to capture naturalistic, in-the-moment activities in their lives over a certain period of time without the presence of researchers (Palen and Salzman, 2002; Carter and Mankoff, 2005; George, 2006). Diaries may include common or remarkable activities, which occur regularly or rarely (Palen and Salzman, 2002; Blackwell, 2011). This approach is particularly useful when researchers want to understand participants' behaviour and their activities that cannot be directly observed (Jain, 2009) as well as their emotions towards them (Sas *et al.*, 2009). It also helps researchers to gain detailed information about the rationale of participants' behaviours and chronology that contributes to their problems (Palen and Salzman, 2002).

The structure and objectives of the studies determine what sort of information might be kept in the diaries and how they will be analysed. Diaries can be divided into two types: structured and unstructured (Palen and Salzman, 2002; Buchwald *et al.*, 2009). Using structured diaries, participants have to answer specific or closed questions in their diaries. For example, in a study conducted by (Conway and Brine, 2002), participants had to answer a questionnaire that was included in a daily booklet. In a study pursued by Czerwinski *et al.* (2004), participants needed to record certain parameters in an Excel spreadsheet file. For this type of diary, researchers may adopt a quantitative analysis approach.

On the other hand, for unstructured diaries, participants will be provided with more open-ended questions. There are no specific pre-defined concepts or categories that participants have to adhere to, hence encouraging them to record their experiences in their own ways in more detail. For example, in the study reported by Palen and Salzman (2002), participants were provided with prompts (i.e. open-ended questions) to report in their diaries if they experienced the phenomenon that was being investigated by the researchers. According to Palen and Salzman, this allowed them to obtain richer responses by minimising very specific or closed-ended questions. Brown *et al.* (2000) intentionally did not provide any prompts or questions but only instructed their participants to use a digital camera provided to record any incidents they wanted to capture. This provided more opportunity for participants to represent themselves and report what was relevant to them rather than just relevant to the investigators' initial concerns.

#### 3.2.4.2 Strengths and limitations

Previous studies have highlighted some strengths of the diary study approach, suggesting that the method is useful. It allows researchers to collect data on events or psychological conditions that people experience in situ and at the moment when they happen or when they have just taken place., in real situations over time without the presence of an outside observer (Conway and Brine, 2002; George, 2006). This enables researchers to gain an in-depth understanding of events that may be associated with a broader context in participants' real lives (Brown *et al.*, 1999). Diary studies can increase ecological validity since researchers are not present during the events to affect the behaviour of participants (Brandt *et al.*, 2007). This may also lead to serendipitous discoveries, allowing researchers to report unexpected events that might provide them with a deeper understanding of topics of interest that are being investigated (George, 2006).

A diary study can be used to complement other qualitative approaches such as interviews and participant observations (Noyes, 2004). For instance, in the interviews, participants may be asked to reflect on events that they could remember, whereas diary studies provide an opportunity for participants themselves to report specific or real situations (pertaining to a certain phenomenon that is being investigated) that they experience throughout the day, over a week for example (Conway and Brine, 2002). The interviews are also constrained by a fixed timeframe (for example an hour) and formal settings, which might limit what researchers can discover from the participant during the interview (Noyes, 2004). Similarly, during participant observations, researchers might be situated in a certain context for a limited amount of time and this might also be a hindrance to understanding the underlying aspects of participants' lives, which could be influenced by other unseen daily events that happen outside of the context of the interview, as well as their perceptions or feelings towards them (Noyes, 2004). It is evident that a voice-mail diary approach conducted by Palen and Salzman (2002) allowed them to discover the nature of use of mobile phones by understanding various kinds of events that occurred throughout their participants' real lives.

Similar to other methodologies, however, the diary study also has some limitations. Since participants are responsible for collecting the data rather than researchers, there might be a possibility that they might omit some data that seems trivial to them but is important to researchers (Brandt *et al.*, 2007). In this case, Palen and Salzman (2002) suggest that participants should be encouraged to include both mundane and uncommon events as they happen.

Diary studies also demand a high level of commitment from participants over a period of time. Due to this, their dedication in recording their diaries might deteriorate over time (George, 2006). To address this, Palen and Salzman (2002) highlight that it is essential to remind participants about the importance of the diary entries over time.

Due to the nature of diary studies that gives freedom to participants to keep and record their diaries, there could also be a situation where they might not be willing to report some feelings that they would not want researchers to know. This especially applies to research that is sensitive (for example aspects that are related to sexual behaviour) but again this could also be true of other related research (George, 2006).

#### 3.2.4.3 Diary studies approach

There are several techniques that can be used to conduct diary studies: hand written or typed, photo images, audio or voice mail, and video. These can be captured through various tools or devices such as pen and paper, electronic log sheets, audio recorders, video camera recorders, land line or mobile phones, personal digital assistants (PDA), web-based systems, etc. For example, Newman (2004) employed a paper-diary approach, requiring participants to write what they intended to do at the beginning of the day and also what they did throughout the day. At the end of the day, they were asked what hindered them from completing their works through semi-structured interviews (Newman, 2004). In another study, Czerwinski *et al.*(2004) used Microsoft Excel to allow participants to not only record what activities they did but also what types of interruptions they experienced during their working hours (Czerwinski *et al.*, 2004). Brown *et al.* (1999) used a photo diary approach, asking participants to capture any images of events that were meaningful to them and later during the follow-up interviews, they were asked to give more explanation about it. In contrast, Palen and Salzman (2002) used a voice-mail diary approach, allowing participants (who were in mobile conditions) to send information about the usability of their mobile phone to the researchers. Noyes (2004) adopted a video-diary approach to investigate pupils' dispositions when learning mathematics. On the whole, these diverse techniques can support a range of research objectives that can be analysed from different perspectives or foci (Palen and Salzman, 2002).

#### 3.2.4.4 Video-diary study technique

Although no previous studies of personal task management have employed a video-diary approach, a few studies in other fields have highlighted the effectiveness and usefulness of the method, which

complements the limitations of existing methods such as interviews, observations and written-diaries. According to Buchwald *et al.* (p.13) (2009), *"A video-diary is a digitized diary used for research with purposes similar to those of studies using written diaries; that is, the collection of data on informants' lives over an extended period. The informants are supplied with a video camera and receive the necessary instruction on camera use and maintenance. They keep the video camera in their homes for an agreed period, for example one month. During this period the informants conduct a daily camera session in which they share information with the researcher concerning their feelings, reflections, and other matters relating to the day and its events".*

Previous research has shown that the approach has been successfully implemented not only to complement existing qualitative approaches, but also to extend their understanding of certain aspects of their research that is unlikely to be revealed using other methods such as participant observation and interviewing (Noyes, 2004). According to Buchwald *et al.* (2009), video diaries offer a useful supplement to more conventional methods, allowing participants to provide data that would not otherwise be obtained, such as participants' thoughts, feelings, and actions over an extended period. It has also been highlighted that a video-diary technique is more useful and efficient compared to other techniques used in diary studies (for example written diaries, photo-diaries, etc.) (Eldridge *et al.*, 1993; Buchwald *et al.*, 2009). To get a better understanding, it is important to supplement passive video observations with data gathered from interviews (Newman and Lamming, 1995). In the next section, the significance of this technique implemented in the previous study will be explained, providing an understanding of how future video-diary studies should be conducted and what issues should be considered.

#### 3.2.4.5 Previous studies adopting the approach

There are few studies that have adopted a video-diary approach in their investigations. Noyes (2004) (as pointed earlier) used a video-diary approach to investigate the impact of three aspects – school, family and peer group on schoolchildren's mathematics-learning dispositions. In particular, they put a video camera in one room and allowed the children to express their experiences, feelings or thoughts about the subject whenever they wanted to, alone. Noyes found that the responses obtained through this approach were far more detailed, convincing, amusing and touching when compared with the previous semi-structured interviews conducted with the same participants. The approach also enabled them to discover things that they did not expect at the beginning of the study (e.g. the interconnectedness of school, family and peer group).

Buchwald *et al.*(2009) conducted another video-diary study, but in a slightly different way. In the study, participants were given a camcorder, which allowed them to make entries in their diaries at anytime and anywhere they wanted to. In brief, they were asked to reflect about their day-to-day experiences or actions as well as their thoughts and feelings towards them. They found that the approach has encouraged participants to give voluntary and descriptive comments. In fact, they also gained an in-depth understanding of participants' thinking in vulnerable situations. The study involved a combination of video-diaries and interviews for a three-phase study. The first phase began with the interview and was followed by video diary recording in the second phase. In the video-diary phase, participants (i.e. children) were provided with a video camera and necessary instruction. During the period, the participants conducted a daily session during the course of a month to record feelings, reflections and other matters that were related to the day and its events. The last phase was a final interview to allow the researchers to explore the participants' experiences further. Overall, they suggest that a video-diary is a powerful technique to obtain a detailed understanding of people's lives and investigate both verbal and non-verbal expressions shown by them. Video-diaries give an opportunity for participants to make sustained reflections and communicate their situation (Buchwald *et al.*, 2009).

Holliday (2000) also employed a similar approach to that undertaken by Buchwald *et al.*(2009) in which their participants were also given a video camcorder to make their diaries. Participants were asked to describe the way in which they managed and portrayed their identities throughout different contexts of their life: at work, rest or play. They explained that the visual dimension of the video allowed them to easily understand the self-representation presented by participants. They found that participants were inclined to describe their situations or aspects of their lives by showing and talking about their surroundings and products that they had relied on in situ. In fact, Holliday also found that participants tended to disclose the most intimate details about themselves to the camera, particularly when they were alone. George (2006) conducted a study to practise and learn about the diary recording method. The study involved 25 undergraduate students who were instructed to record their communication activities for seven days using Personal Digital Assistants (PDAs). According to George, participants refrained from behaviours that they would not want to report or reveal to the researchers; for instance, studies of sensitive activities that related to sexual behaviour. On the whole, Holliday suggests that a video-diary approach provides more opportunities for participants to represent themselves than other qualitative methods.

### 3.2.5 Member-checking

#### 3.2.5.1 Introduction

Member-checking, also known as respondent validation (Finlay, 2006; Turner and Coen, 2008) or validation interview (Buchbinder, 2010), refers to a process whereby the researcher returns to a sample of participants with the findings of his/her study to check if they agree with them (from their feedback) (Shenton, 2004; Lietz *et al.*, 2006). The participants may include actual participants and other members of the participant community (Johnson, 1997) or a targeted group (Simon, 2011). Previous literature has highlighted that this process, in particular, can be useful for the researcher for the following purposes:

- To allow participants to check, affirm or substantiate researcher interpretations, observations and conclusions (Finlay, 2006; Porter, 2007; Cohen and Crabtree, 2008; Turner and Coen, 2008).
- To build new, important or more nuanced interpretations (Johnson, 1997; Buchbinder, 2010)
- To incorporate members' perspectives into the findings (Porter, 2007).
- To identify and correct errors of fact and determine whether it takes into account participants with different viewpoints (Russell and Gregory, 2003; Simon, 2011).
- To identify aspects that have been neglected or misinterpreted (Lietz *et al.*, 2006).

Previous researchers have explained the importance of member-checking in improving the credibility of qualitative studies (Turner and Coen, 2008; Buchbinder, 2010; Carlson, 2010; Goldblatt *et al.*, 2010). It can promote and maintain the authenticity of results based on a mutual respect between the researcher and participants, and also enhance ethical aspects of the study (Buchbinder, 2010). The outcomes of member-checking, which may include confirmation or disaffirmation of the findings, can be used to corroborate or compromise research findings (Turner and Coen, 2008).

Member-checking can be done both formally and informally (Cohen and Crabtree, 2008). Although there has not been much explanation of how to perform this, some studies have explicitly shown how they conducted the process. A summary of the findings is given to participants to check whether a "true" or authentic representation was made of what he or she conveyed during the interview (Harper and Cole, 2012). The summary can also be returned to participants for their feedback (Turner and Coen, 2008). To assess the findings, it is worthwhile to include some quotes (e.g. excerpts from interview transcripts), allowing participants to further check researcher information and interpretations (Bryman, 2004; Furniss, 2008).

#### 3.2.5.2 Limitations

It is important to highlight some limitations that are to be considered when member-checking. The process is subject to unpredictable human occurrences which shape the construction of qualitative data and findings (Turner and Coen, 2008). Changes that might occur in a participant's life could influence them to alter their perspectives of certain aspects which are being investigated by the researcher (Goldblatt *et al.*, 2010). Goldblatt *et al.* explain that member-checking can encourage participants to give new views on certain aspects being studied, which could be different to those found in the original interview. The authors suggest that it is important to acknowledge any difference in perspective or presented 'truths'. It is common that feedback gathered through member-checking is influenced by contexts and the different views of researchers and informants, which may produce some disagreement in the level of detail of the presented findings (Turner and Coen, 2008). Although participants may be provided with materials to confirm the researcher's interpretation, it is still difficult to expect them to do so according to the social-scientific approach of those interpretations (as rigorously undertaken by the researcher over an extended period of time through a deep and iterative thought process) (Bryman, 2004).

## 3.3 Analytical/expert evaluations

### 3.3.1 Introduction

Rosson and Carroll (2002) explain that usability evaluation can be done in two ways: analytic and empirical. The first one focuses on modelling and analysing systems' features and their implication for use. The latter focuses on observing systems' users. Analytical evaluations can be done in a development process before any implementation work has started (Dix *et al.*, 2004) or prototypes and users are available to undertake the empirical tests (Rosson and Carroll, 2002). The aims are to produce a list of usability problems and rectify them early in the design. It is expensive to fix them when one has already put commitment into developing the system (Dix *et al.*, 2004). It is cheaper to conduct this type of evaluation than an empirical evaluation (Rosson and Carroll, 2002). It is flexible in a way that it aims to determine whether or not a system fulfils accepted usability principles rather than assess the actual use of the system (Dix *et al.*, 2004). In general, analytic evaluation can be done by experts who are knowledgeable of both the technology and the target users and can bring them together in the evaluation (i.e. without requiring users to actually test the system) (Preece *et al.*, 1994). It focuses on determining what and how to redesign, rather than the quality of the system (Rosson and Carroll, 2002).

There are several purposes of this analytic evaluation: assessing the extent and accessibility of the system's functionality (Dix *et al.*, 2004); predicting the problems that target users of the system would be likely to experience (Preece *et al.*, 1994); identifying what causes the problems and solutions to rectify them (Rosson and Carroll, 2002); comparing two or more designs and determining the best one (Preece *et al.*, 1994). The outcomes of the evaluation can be presented using a structured reporting format (Preece *et al.*, 1994). According to them, this can include important things; the specification of the nature of the problems encountered; the source; the importance for the user and any possible solutions.

However, little attention has been paid to conducting analytical evaluations of existing PTM tools. Most previous evaluations have been empirical. Such studies have measured user satisfaction and their perceptions of tools, (Bellotti *et al.*, 2004; Conley and Carpenter, 2007; Galicia *et al.*, 2007; Gil and Chklovski, 2007; Gonzalez *et al.*, 2008). Thus, little is known about how well the tools match people's needs in terms of conceptual fit. It is a challenge to determine whether each feature or function provided by the existing tools under investigation is conceptually fit for purpose. Dix *et al.* (2004) explain that it is essential to ensure that the system's functionality matches the user's requirements or expectations of the task, making sure that they can perform intended tasks more easily.

As Blandford *et al.*(2005) note, many of the difficulties encountered by users while working with interactive systems arise from mismatches between user and system concepts. There is value in conducting both analytical and empirical usability evaluation since their findings complement each other and provide more information on both what people have difficulty with and why those difficulties might arise (Papatzanis *et al.*, 2007).

Analytical evaluation is not focused on assessing a system with real users and investigating their satisfaction with the system, but can be useful for testing a system at an early stage - before the system is built or during the system's design (Mazza and Berre, 2007). It enables researchers to identify detailed conceptual difficulties, suggesting how easy it is to use a system and what potential difficulties might be experienced (Blandford *et al.*, 2004b). Analytical evaluation allows researchers to map problems to causative features in the design and to offer re-design recommendations (Hartson *et al.*, 2001; Blandford *et al.*, 2004a). The evaluation can also be used to guide essential modifications that need to be carried out during the development of a system (Mazza and Berre, 2007).

### 3.3.2 CASSM evaluation

#### 3.3.2.1 Introduction

The foundation of the CASSM evaluation method is to identify and bridge conceptual mismatches between the user and the system by juxtaposing their core/related concepts. The misfits identified can be used to inform redesign alternatives and further discuss the rationale behind them. It is important to clarify that this approach focuses on concepts rather than tasks or procedures, thus suggesting different types of user issues from other evaluation methods (Blandford *et al.*, 2004a; Blandford *et al.*, 2004b).

There are three steps of analysis that the analyst can use (Blandford *et al.*, 2004b):

1. **Identifying user–system concepts.** The first step is to compare user and system concepts and see how well they fit with each other. The user concepts can be based on the main sources such as interviews, think-aloud protocols and user-oriented documentation. For the systems concepts, the analyst can derive them from system descriptions which can be gathered from user manuals and perhaps a running system.
2. **Analysing entities, attributes and the interface.** For user, system and interface, the analyst needs to consider whether the concept is present, absent or difficult i.e. meaning 'present, but likely to cause problems in some way', such as being difficult to learn, discover or work with. 'Present' means that users naturally and easily think of it. 'Concepts may be 'absent' for the user if they are unable to recognise that they have been implemented in the system. Similarly, concepts may be present, difficult or absent to the system side. Concepts that are present in one place but absent or difficult in another highlight potential sources of misfits between the system and user, and might suggest potential re-design opportunities.
3. **Analysing actions.** Given that the interface is well-specified, the analyst can further identify actions and how the user might change the state of the system. This step allows the analyst to seek whether actions are 'hard' or 'can't' and to suggest further surface misfits. An action that is hard indicates that is difficult to perform for some reason; for example, due to a tedious sequence of steps or it is difficult to identify particular functions or features. An action that the user believes cannot be performed might be one which the analyst determines that it might be important for the user to tackle.

The analyst can easily and quickly use these three analysis steps (described above) to identify the misfits. It is intentionally designed to be 'sketchy' (i.e. require minimal investment) and can be done

iteratively or more thoroughly over time if needed (Blandford *et al.*, 2008a). The analyses need not be complete to be useful and they tend to be quite succinct (Blandford *et al.*, 2004b). The downside of this approach however, is that it has not been developed for all possible usability issues (e.g. how easy and quick it is for users to learn or use certain functions/menus, and whether they are consistently designed). It also does not provide useful insights into surface features of the system (e.g. layouts, colours, texts, etc.) (Blandford *et al.*, 2004a).

Although there is no CASSM evaluation conducted on the existing PTM tools, it has already been successfully applied to evaluate the usability of various tools and devices in previous studies: digital libraries (Blandford *et al.*, 2004a), a robotic arm, a digital library system and a drawing tool (Blandford *et al.*, 2008a), presentation tools (Schumann, 2006), and an in-car navigation system (Papatzanis *et al.*, 2007). Their findings revealed a number of misfits between the users' and the systems' concepts. In this respect, CASSM can be particularly useful and suitable to compare the user concepts which delineate user behaviours and preferences, against the system concepts which are represented by features or functions provided within the tools (Blandford *et al.*, 2008b).

## 3.4 Data collection and treatment

Data to support qualitative research can be gathered from various sources. These include interviews, observations, videos, documents, drawings, diaries, memoirs, newspapers, historical documents, autobiographies, etc. One of these sources alone or several in combination can be used to investigate phenomena (Strauss and Corbin, 1998). Strauss and Corbin further suggest that the existing data can be triangulated with other types of data such as documents that can be used to verify and add another source of data. For this research project, the author chose to ask about their personal task management behaviour and the tools used to support it. In order to gain an in-depth understanding of them, their existing tools were further observed and probed during the interviews. It is essential to observe these because sometimes people describe their behaviour in one way but in reality they are doing something else (Strauss and Corbin, 1998). All the interviews and video-diaries were transcribed verbatim using the annotations in Table 3.1.

Additionally, these anonymous transcripts were also sent to a paid native English speaker to re-transcribe them if necessary (i.e. if there are any errors, missing or wrong words or sentences identified in the transcripts). This was to improve the accuracy of the transcripts. Following these steps, all transcripts

were analysed using the grounded-theory approach suggested by Strauss and Corbin (1998). The analysis process is discussed in Section 3.6.

Table 3.1 Transcription annotations.

| Code | Description |
|---|---|
| *IV* | Interviewer (the author). |
| *P* | Interviewee (anonymous participant). |
| *[word]* | Speaker says something the transcriber (researcher) cannot hear/understand, but what transcriber thinks is being said. |
| *[]* | Speaker says something the transcriber (researcher) cannot hear/understand. |
| *WORD* | Capital letters give emphasis or loudly pronounced words. |
| *[...]* | A word/sentence that is irrelevant to a particular concept. |
| *[-word]* | Speaker refers to a particular thing. |
| *...* | Pause which is over 5 seconds. |
| *[~]* | Description of the non-verbal expression (e.g. when a participant is laughing, coughing, etc.) or other information that is not expressed (e.g. *[~smiles]*). |
| *?!* | Punctuation gives the intonation of the speaker. |
| *[X]* | Identifier is removed (e.g. *[Colleague X]*). |

## 3.5 Data reliability and validity

There are concerns about the usefulness of applying the concepts of reliability and validity (which were developed in the natural sciences) to assess qualitative evidence (Lewis and Ritchie, 2003). According to Lewis and Ritchie, reliability concerns the replicability of research findings by another study using the same or similar methods. The concept also refers to the ability to generalise findings to other participants in similar studies (Adams and Cox, 2008). However, there have been issues with ensuring replication in qualitative research (Lewis and Ritchie, 2003). It is uncommon to reproduce social phenomena, due to their intrinsic variability and complexity. According to Strauss and Corbin (1998), "*It is difficult to repeat the original conditions under which data were collected or to control variables that might possibly affect findings*". They suggest that it is adequate to ensure that the interpretations derived from the data should be as comprehensive as possible in order to accommodate a broad range of relevant contexts and that a developed theory should be broadly decontextualised.

It is expected that other researchers will arrive at the same or very similar theoretical explanations about similar phenomena, as well as alternative conceptualisations or emphases on other phenomena which are not well-articulated in similar studies (Strauss and Corbin, 1998). The authors assert that the advantage of a qualitative method is to provide richer explanations which highlight its ability to predict and explain what might happen in given situations. In order to ensure that qualitative research is reliable,

Lewis and Ritchie (2003) have suggested two levels on which research should be conducted . First, there is a need to ensure that the research is as robust as possible, by undertaking internal checks on the quality of the data and its interpretation. Second, there is a need to assure the reader of the research by providing information about the research process. It is therefore essential to ensure that the questions to be asked and interpretations derived from the findings are adapted and re-analysed throughout the study, in order to encompass a wide range of possible concepts and their underlying categories and properties in explaining personal task management behaviour.

Validity refers to the 'correctness' or 'precision' of a research study and the evidence collected and whether it accurately captures and reflects the phenomena under review, as perceived by the study population (Lewis and Ritchie, 2003). According to Maxwell (2005), validity refers to the correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account. It also relates to its accuracy to measure what it is supposed to be measuring (Adams and Cox, 2008). To ensure that this is the case, Lewis and Ritchie (2003) recommend that the following questions about interrogation methods are asked by the researcher throughout a research study:

- Sample coverage: did the sample frame contain any bias? Were the criteria used for selection inclusive of the constituencies known, or thought to be, important?
- Capture of the phenomena: was the environment conducive and the quality of questioning sufficiently effective for participants to fully express and explore their views?
- Identification or labelling: have the phenomena been identified, categorised and 'named' in ways that reflect the meanings assigned by study participants?
- Interpretation: is there sufficient internal evidence for the exploratory accounts that have been developed?
- Display: have the findings been portrayed in a way that remains 'true' to the original data and allows others to see the analytic constructions that have occurred?

Furniss (2008) highlighted the following possible levels of validation in conducting qualitative analysis that the researchers can undertake in order to increase data accuracy:

- Testing through data collection and analysis.
- Verification by the participants.
- Verification by a broader population.
- Triangulation with other methods or studies.

For example, the initial concepts identified from participants involved in a previous study should be critically tested and probed by comparing these concepts with the concepts informed by the present participants. This enables confirmation or contradiction of previous findings (Strauss and Corbin, 1998) before reaching saturation point. It is expected at this point that all the emergent concepts will become more apparent and hence can be used to support the interpretations developed by the researcher.

To establish that the findings are both accurate and transparent, it is important to ensure that the underlying themes and concepts are adequately supported by the evidence. The sources of evidence can be obtained from previous published studies, and compared with quotations based on the current researcher's interviews with the participants. This evidence can improve the credibility of the presentation of the findings and, more importantly, can be used by readers of the research to evaluate them.

## 3.6 Data analysis using Grounded Theory (GT)

### 3.6.1 Introduction

In this thesis, the author applied a grounded-theory approach suggested by (Strauss and Corbin, 1998) to perform the analysis. This qualitative analysis approach has been used by previous researchers to study: personal task management behaviour (Haraty *et al.*, 2012), time management (Giusti *et al.*, 2010), student self-evaluation, and planning and the novice programmer (Fitzgerald *et al.*, 2011), and interaction in informal requirements gathering (Costa, 2009). The grounded-theory approach is useful for exploratory research that aims to generate understanding, or hypothesise, about a process/topic as well as identify both general or specific aspects associated with it (Fitzgerald *et al.*, 2011). It is also a flexible method, and useful for basic taxonomy and conceptual development as well as synthesising theoretical frameworks (Furniss *et al.*, 2011). The authors also highlight that the focus of grounded theory is not on the reliability, validity of counting of instances (which are the emphasis of other methods such as content analysis and protocol analysis). The approach allows the researcher to identify the similarities and differences between participants (Haraty *et al.*, 2012). It is imperative to be aware of these and consider them in designs as best we can (Dix *et al.*, 2004). The emergent concepts developed can supplement and provide alternatives to existing knowledge (Strauss and Corbin, 1998).

### 3.6.2 Justification of the selection of GT approach

The important steps recommended in GT approach that the author applied are as follows:

**Research Questions and Openness.** To begin analysing the data, the author referred to the research questions originally formulated. This was to guide the author in identifying and focusing on concepts that were relevant and which could be applied to the questions. It is common in grounded theory studies to start with open questions and researchers frequently presume that they may know little about the meanings that drive the actions of their participants (Sbaraini *et al.*, 2011). In this project, the author sought to understand from participants how they managed their personal tasks. The initial research questions were:

- What are the activities that academics undertake in order to manage their tasks?
- What are the factors that influence these activities?
- What are the challenges that academics experience with managing their tasks?
- What are the strategies academics adopt to manage their tasks?
- How do their strategies differ or evolve as their career progresses?
- How do academics use their existing PTM tools and what their requirements for new tools?

The construction of theory using grounded theory is an 'evolving process' (Charmaz, 2014). It was important for the author to take an open approach to the phenomena being studied. As the emphasis of the study evolved, the author was able to identify or refine concepts which emerged as important to the participants and therefore had to be included in the PTM framework which was being developed.

**Theoretical sensitivity.**

Theoretical sensitivity refers to the personal quality of the researcher in showing an awareness of the subtleties of the meaning of the data (Strauss and Corbin, 1998). This was key, as it enabled the author to develop insight into the data. It also allowed the author to provide the data with meaning as well as to separate what was relevant from irrelevant data. To instil this theoretical sensitivity, the author had reviewed existing literature related to PTM from previous research, textbooks and commercial PTM tools (as explained previously in Chapters 1 and 2) before analysing the data. This provided an opportunity to identify concepts which were relevant to those identified by participants and to compare them further, as well as to inform the development of categories. Existing literature and theory should not be used to create categories or to impose them on the data; rather, the concepts or categories which are relevant to the study should be allowed to emerge from the data (Calman, 2006; Burden and Roodt, 2007; Myers, 2008). Furthermore, through the process of immersion in the data, trying to understand what participants see as significant and concurrently collecting and analysing the data, the researcher can increase

theoretical sensitivity to it (Calman, 2006). The author conducted three different phases in the interview study and one video-diary study and iteratively analysed the data following each phase, resulting in the development and refinement of the PTM framework (as described in Section 4.3.2, p. 102).

**Open Coding.**

Open Coding refers to the process of generating initial concepts from data (Strauss and Corbin, 1998) or using a succinct code to summarise text (Myers, 2008). This step allowed the author to break down the data, scrutinising, conceptualizing, categorising and comparing it. It also enabled the author to label phenomena, identifying categories as well as their properties and dimensions. In order to do this, the author had to ask the following questions throughout the analysis:

- What is this?
- What is going on here?
- What does it represent?

This process enables an examination of the data without limitations in its scope and without the application of any pre-existing concepts, thus all data are accepted and none are excluded (Jones and Alony, 2011). This stage in the process resulted in the identification of a wide range of uncategorised concepts. The concepts were then grouped into categories via a process of detailed comparison. This allowed the author to identify any similarities or differences between the concepts and to determine what made them so. Through this open coding process, the author was able to identify properties of categories by referring to their attributes. For example (see Table 4.4 on page 107), the 'task' category has the properties of complexity, size, and duration. In terms of dimensions, which refer to locations of a property along a continuum, the 'complexity' property varies from easy to difficult (see Section 4.3.6.1, 'Complexity' on page 128).

**Axial coding.**

This step focuses on developing and linking concepts into conceptual families (Strauss and Corbin, 1998). This enabled the researcher to refine the conceptual constructs (Myers, 2008) and restructure the data (Partington, 2000). Through this, the author identified relationships between the open codes or identify how they were connected to each other. For instance (see Table 4.3 on page 106), from the open coding process, the author discovered a range of concepts such as emotion, motivation, time gap and task size. Emotion and motivation can be classified under internal factors (see Section 4.3.5 on page 118 for its

definition) whereas time gap and task size can be grouped as external factors (see Section 4.3.6 on page 126). Both types of factors inform the characteristics that participants tended to assess in order to, for example, prioritise their tasks. The process of making such connections allowed the researcher to expand his knowledge of the categories or sub-categories, as well as identifying other possible conditions which gave rise to the phenomena. For example the 'mental/physical strength' and 'tools' concepts (which originally were absent in Table 4.3 on page 106), were identified and refined later in Table 4.4 on page 107.

**Theoretical Saturation.**

Theoretical Saturation refers to the stage in the process whereby the data collection and analysis cycle can be concluded (Calman, 2006). It is important in grounded theory to reach this point, informing the researcher that there is nothing further which can be learned or discovered from the participants and that all the concepts in the theory being developed are well understood and can be substantiated from the data (Sbaraini *et al.*, 2011). Awareness of this point allowed the author to determine when to bring data collection to an end. There is a further explanation of this in Section 1.6.

It is worth mentioning that the author did not claim to implement GT as a whole but rather used some of the GT steps when analysing the data. As described above, the author implemented four steps in order to analyse the data from the interview and video-diary studies. The author did not utilise other steps described in GT, such as selective coding and theoretical sampling. According to Strauss and Corbin (1998), it is not necessary to perform these steps in order to consider the analysis completed.

In relation to this thesis, the author has identified two key elements of Strauss and Corbin approach that make it useful for analysing the data as follows:

**1. Beginning and ending the analysis**

Their approach suggests that the process of early analysis can begin with the researchers generating research questions from their current insights in order to develop concepts and to explore their relationship. This helps the researcher to open up the research question and to gain insights into the areas where data needs to be collected (Grbich, 2009). This is in line with the nature of this thesis which begins with broad questions to gain early insights and later formulates more specific questions as the data is collected and explored, thus gaining new insights that were not immediately apparent. This encourages the researcher to conduct further data gathering and analysis until no new concepts related to the research questions emerge from the data (data saturation). In this study, this process guided the researcher to be focused (e.g. by identifying what aspects of phenomena required further data gathering and analysis) in order to develop his understanding of the phenomena and answer the research questions effectively.

**2. Dimensionalising and Sub-dimensionalising**

This refers to the process of dividing a particular code or category into its sub-categories. The process is carried out in order to include new and related data that emerges from the analysis and to differentiate between them, defining the codes or categories in more detail. This enables researchers to pose research questions and to gain insights into the areas where data needs to be gathered (Grbich, 2009). As mentioned previously, the approach describes three levels of coding (open, axial and selective) that can be applied iteratively, from aiming at identifying concepts and categories to developing more complex theories, frameworks or models and taxonomies. Open coding allows researchers to do word-by word or line-by-line analysis to interrogate the data in order to discover concepts and categories which can be further dimensionalised (or sub-divided) later (Grbich, 2009). During the open coding process, it is essential for the researcher to constantly critique and question the data in order to 'break open' the text, leading to new insights and specific examples. It is also important to compare the data with other empirical data and link it to conceptual frameworks. This helps the researcher to undertake a more detailed analysis to explain complex phenomena which identify or distinguish the commonalities, subtleties and diversity within and across the data (or between participants). This enabled the issues explained in Section 1.1 to be highlighted.

### 3.6.3 Analysis procedure

Turning back to this thesis, as mentioned earlier, the author employed this method to analyse all the qualitative data (i.e. user transcripts) gathered from the user studies. Each transcript was systematically analysed using a grounded-theory analysis approach as described by Strauss and Corbin (1998), supported by the use of the Atlas.ti and NVivo analysis tools. During the first and second phases of the analysis of the interview study, the author used the Atlas.ti. However, due to the licensing issue, the author had to change to the NVivo tool to analyse the data. The tools allow us to systematically assign codes that explain both trivial and subtle concepts within and across the data. It is also useful to use these tools to assign various codes to the data which represent different levels of abstraction. During the analysis, only the most frequently mentioned terms, concepts, ideas or issues which are pertinent to personal task management behaviour were coded. However, both Atlas.ti and NVivo were not particularly useful for the researcher to analytically and critically develop a grounded theory as a whole. As explained in section 3.6.2, the author carried out two steps recommended in GT - open, axial coding - but did not continue with the two additional steps - selective coding and theoretical sampling. As Strauss and Corbin (1998) explain, it is not compulsory for the researcher to perform these additional steps to complete their qualitative analysis. In this study, the findings describe concepts and categories rather than defining the causal/relationships between them. Returning to the issue pertaining the Altas.ti and NVivo (mentioned above), for this reason, both of the processes in this analysis (i.e. analytical and critical thinking processes) depend on the final judgement of the researcher himself to relate, compare and contradict the emergent and underlying concepts. These phases were done using other conventional tools such as Microsoft Excel and paper-based tools to tabulate and relate the concepts in detail. These are more flexible and preferable in that sense. For example, the emergent concepts tabulated in Excel could be more flexibly and easily sketched and related than by using the pen and paper-based tools, thus improving the satisfaction and understanding from the researcher's perspective.

Returning to the data analysis, Strauss and Corbin (1998) define analysis of qualitative data using a grounded-theory approach as an iterative process of generating, developing, and verifying concepts over time through the acquisition and interpretation of data. Interpretation itself is a sense-making process based on intuition, past experience, emotions of researchers which can be argued endlessly but neither proved nor disproved adequately (Wolcott, 2001). Hence, according to Wolcott, the process should not necessarily be based on agreed-upon and strictly specified procedures. In fact, the approach allows

researchers to combine systematic levels of data abstraction into a framework of a phenomenon which is iteratively conducted, extended and verified during the study (Adams *et al.*, 2008).

However, the overall analysis should be rigorous in order to discover a wide range of concepts. As highlighted earlier, the concepts emerging from the analysis of the initial data should then be further compared with emergent concepts from subsequent interviews in order to test the existing concepts (Strauss and Corbin, 1998). According to them, there is also an option in which more suitable concepts can be discovered to replace the existing concepts by actively revising the previous concepts and comparing them with the emergent concepts. In relation to this, it is essential to not limit our data interpretations to fit existing theories or understanding; rather the researcher should go beyond what is already understood (Strauss and Corbin, 1998). Overall, the emergent concepts, and their underlying categories and properties as well as the relationships among them were developed based on data interpretations using three different stages of iterative and rigorous coding.

Firstly, based on the grounded theory approach proposed by Strauss and Corbin (1998), open coding was done by assigning meaningful codes throughout each transcript. Throughout this systematic process, emergent concepts, categories, sub-categories, and their properties were discovered. Similarities and differences between codes were also identified. Secondly, axial coding was conducted in order to relate and contrast those emergent concepts, categories and sub-categories. Finally, selective coding was carried out in order to expand and redefine them by critically relating, dividing, adding or dropping codes, while new concepts and categories were discovered in subsequent transcripts. The interviews were then transcribed and analysed using the three coding steps proposed by Strauss and Corbin (1998) to identify concepts, categories and properties of personal task management behaviour and how they relate to one another. These iterative coding processes allowed the author to scrutinise and develop a central theory based on all the data. These processes were undertaken iteratively, allowing the researchers to develop in-depth knowledge of a particular topic (Adams *et al.*, 2008).

### 3.6.4 Methodological implication

Employing a qualitative method has implications. It might not be able to capture the complete story of a particular phenomenon being studied, due to the complex factors involved with participants (Strauss and Corbin, 1998). According to Strauss and Corbin, this means that users' experiences cannot be separated from other influential data such as social, political,

cultural, racial, gender-related, informational, and technological factors and that a methodology to understand the significance of each would be too complex. Strauss and Corbin (1998), however, argue that, even though it is not possible to capture all the important factors, it is still necessary to explore as much of the complexity as possible in order to explain the phenomena. Thus, researchers need to be critical when conducting their interviews and carrying out the subsequent analysis. This allows them to discover as much as possible to explain more apparent factors, as well as to identify more subtle influences on participants' behaviour which might be less well understood.

## 3.7 Data sensitivity

It is unavoidable that both research methods (i.e. qualitative and quantitative) are prone to subjectivity and therefore it is important for the researcher to minimise (or be aware of) bias when analysing the data (Strauss and Corbin, 1998). According to the authors, the objectivity of qualitative research means that the researcher is flexible, open-minded and willing to listen to the data elicited by the respondents and interpret what they mean. Strauss and Corbin suggest a few techniques which the researcher can use to reduce the risk of researcher bias:

- Thinking comparatively from one incident to another within and across the data.
- Referring to existing literature which is meant to stimulate our thinking about underlying concepts, categories or dimensions.
- Gaining multiple viewpoints of the same events through various methods such as interviews, observations, written documents, artifacts or tools, etc. In relation to this, it is also essential to gather data using various techniques and approaches.
- Periodically stepping back and reflecting on the data and analysing what they mean. This allows the researchers to obtain in-depth interpretations that are still grounded in data.
- Constantly making comparisons, asking questions, and sampling based on evolving theoretical concepts that have been developed throughout the analysis process.

Overall, these techniques can support researchers to remain sensitive towards their data so that they can give meaning to the events or to the data as accurately as possible. They can also go beyond what is obvious by discovering subtle or new concepts represented by the data (Strauss and Corbin, 1998).

## 3.8 Ethical considerations

It is important to conduct research in a responsible and ethical manner. According to The British Psychology Society (BPS), 'Research ethics' refers to the moral principles guiding research from its inception through to completion and the publication of results (BPS, 2010). Ethical guidelines explain the conditions under which research with human participants can take place. The Association of Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE) have provided codes of professional ethics and practice for Computer Science (CS) discipline (Buchanan *et al.*, 2011). In relation to this study, the guidelines explained in (BPS, 2010; ACM, 2014; IEEE, 2014) including the code of human research ethics, which describes a set of general principles that are applicable to all research contexts and are intended to cover all research with human participants, are relevant. According to the BPS, student research is expected to comply with the principles as set out in their Code. In order to achieve this, before commencing their research, it is important that all student researchers should apply for approval, and the request, on the basis of a written ethics protocol, must be reviewed by at least two members of academic staff, one of whom should be a member of the Society or other appropriate professional organisation (BPS, 2010).

To obtain this approval, two forms were submitted as follows to the UCL ethics committee which is responsible for granting ethics approval:

1. Application form to conduct the research.
2. Identification of risk management procedures to be used when working with participants.

According to the BPS, the 'Research Ethics Committee (REC)' refers to a multidisciplinary, independent body responsible for reviewing research proposals involving participants to ensure that their dignity, rights and welfare are protected. This ethics review is essential for two reasons (BPS, 2010):

- **Training purposes.** Completing the ethics review procedure has a dual function: first, it is a teaching and learning experience, and second, as for any other ethics submission, it is a formal exercise that seeks to protect participants, researchers and other stakeholders from harm.
- **Assessment**. The study implies an acceptance that some student submissions will contain significant errors. A final version should be produced (agreed with the supervisor or other staff member) that is suitably corrected to comply with the formal requirements.

## 3.8 | Ethical considerations

Ethical approval was obtained from the University College London Interaction Centre Ethics Committee (Ethics approval codes: Staff/0809/001). Before beginning the research, an adequate explanation of the study was given to the participants. They were also informed that their participation was voluntary, and therefore they may withdraw from the study at any time without further obligation.

The approval confirms that the author understands and has adhered to the code of principles recommended by the British Psychology Society and ethical considerations that have been formulated by the UCL ethics committees. For example, the application form must include the information sheet and informed consent form explaining the purpose of the study and the role and rights of participants. An informed consent form is essential for the researcher to obtain participants' informed consent to and ensure the anonymity and confidentiality of the data they provide (Lewis, 2003). Lewis further helpfully explains that anonymity means that the identity of those taking part is not known outside of the research team, whereas confidentiality means avoiding the attribution of comments, in reports or presentations, to identified participants. Anonymity and confidentiality are also important to protect participants and researchers from harm. Informed consent is an important concept in ethical considerations, which involves ensuring that potential participants have a clear understanding of the purpose of the study, the organisation or individuals conducting it, how data will be used, and what participation will mean for them (Lewis, 2003).

Another important requirement that the author must obtain before beginning research is to guarantee that data is used, stored and managed according to the Data Protection Act guidelines. The author also submitted the Data Protection Registration form to the REC. According to the BPS, the Data Protection Act gives individuals the right to know what information is held about them. It also ensures that personal information is managed properly (BPS, 2013). The Act works in two ways: firstly, it states that anyone who processes personal information must comply with eight principles, which ensure that personal information is (BPS, 2013):

- fairly and lawfully processed;
- processed for limited purposes;
- adequate, relevant and not excessive;
- accurate and up to date;
- not kept for longer than is necessary;
- processed in line with your rights;

- secure, and
- not transferred to other countries without adequate protection.

The second area covered by the Act provides individuals with important rights, including the right to find out what personal information is held about them in electronic form and in paper records.

Before agreeing to take part in the study, the author informed participants that the data collected would be kept confidential and stored in accordance with the Data Protection Act, 1998. This also included an explanation that the transcribed data (from interviews, videos and member-checking) would be anonymised and that any information that would lead to the identification of the participants or other people involved, and information associated with them, would be removed. The transcripts were numbered according to the order in which users participated (e.g. P1 refers to the first participant involved in the study).

## 3.9 Summary

This chapter explains the methodological approaches selected for this thesis, both empirical and analytical. For the empirical, this chapter describes and justifies the three methods employed to conduct qualitative studies on personal task management (PTM) behaviour: semi-structured interviews, video-diaries and member-checking. For the analytical study, the author explains the essence of the CASSM approach undertaken to conduct an expert evaluation of PTM existing tools. The user studies focused on describing important components of PTM and the relationships between them, which are strongly underpinned by the data analysis using a grounded-theory approach. The evaluations aimed at identifying the mismatches between the user and the system concepts, suggesting possible redesign opportunities and the rationale behind them. The chapter also discusses other important aspects or procedures of data gathering and analysis.

# Chapter 4: Interview study

The chapter elaborates the findings gathered from a series of interviews. It describes how academics manage their tasks by exploring two important issues: the underlying activities of personal task management and the factors that influence them. It also explores the relationship between these issues. The chapter discusses the findings in relation to the literature discussed in Chapter 2, highlighting the gaps that this study has addressed and identifying new knowledge or issues. At the beginning of the chapter, the procedure, sample and materials used to conduct the studies are explained. In brief, the chapter is divided into sections as follows:

- **Objectives** – highlighting the aims of the study.
- **Method** – explaining procedure, how subjects were chosen for the sampling and describing the materials used to conduct the study.
- **Findings** – describing the key components of personal task management that emerged from the study.
- **Validation** – describing the member-checking exercise undertaken to evaluate the findings.
- **Discussion** – discussing the findings in relation to the previous literature.
- **Summary** – revisiting the key points of this chapter.

## 4.1 Objectives

The aims of this study were to improve the understanding of how academics manage their tasks and discuss the implications for research and practice. To achieve these aims, the following objectives were identified:

1. To identify the underlying activities and factors involved in personal task management behaviours and the relationships between them.
2. To discuss to what extent the existing literature addresses the underlying activities and the factors involved.
3. To explore how to support people more effectively in managing their tasks.

## 4.2 Method

### 4.2.1 Interview procedure

The study involved three phases of interviews, where each included different participants. The first phase of interviews was conducted between the middle of January and the middle of February 2009. The focus of the first phase was to explore strategies that academics use to manage their time. The findings from the first phase identified that academics struggle to prioritise in particular their solo activities (e.g. writing a research article). The findings also showed key strategies that people used when prioritising their time.

The second phase was conducted between the middle of August 2009 and January 2010 to further investigate what contributed to these prioritisation issues. The outcome from the analyses of these first and second phases of interviews identified a number of factors that influence prioritisation. The findings also discovered that there were strong relationships between prioritisation and other components of personal task management (e.g. planning, list-making and emotional response to the task). As the researcher had a limited understanding of the impact of these tasks, a third, and final, phase of interviews was conducted. The aim was to understand all of these components in detail; for example, whether sub-activities were involved, how academics undertake them and why, as well as how these activities/factors related to one another.

The third phase was conducted between December 2010 and January 2011. The data gathered from the three phases of interviews were iteratively analysed to establish a detailed framework for describing personal task management (PTM) behaviour. Before describing the framework in this study in detail, it is worth discussing previous studies that have used frameworks to present their key findings. Many researchers have used frameworks as a way or organising or representing important concepts or components to describe a particular phenomenon or behaviour. Mackay and Fayard (1997) proposed a simple framework to represent different disciplines that contribute to Human Computer Interaction (HCI). O'Brien *et al.* (2008) organised core concepts to describe a definition for intuitive interaction with specific attributes. Dillon (1999) used a framework to address key human factors in a user-centred manner. Bishop (2007) proposed a framework for understanding why members of online communities either participate or do not participate in them. However, frameworks may not necessarily refer to conceptual representation of phenomena. For instance, Dillahunt *et al.* (2001) presented a framework to describe criteria to be used as guidelines for creating and developing sustainable technology.

Returning to the interview study conducted, each interview lasted approximately an hour. The interviews took place in comfortable private areas within the workplace and were conducted face-to-face. Participants were invited to show and describe as well as to review the tools which they used to support their time management, allowing the author to further investigate their underlying concepts of personal task management. All interviews were recorded using a digital recorder and were anonymous. Apart from the recorded audio data, photos of the tools used were also taken for future reference.

Before the interviews, all the participants were briefed about the objectives of the study. They were also informed that this study was strictly confidential and that the data they provided would remain anonymous. Only when the consent form had been read and agreed by the participants were the interviews conducted and recorded. The consent form was also used to confirm that they understood the purpose of the study and that their participation was voluntary. Thus, they could have withdrawn from the study at any time (The consent and instruction forms for the three phases of the study are provided in Appendices A and C respectively). The second consent form was provided due to a new procedure introduced by the ethics committee. The committee required all researchers in the university to complete new, and more comprehensive, application forms to get ethical approval for conducting research involving human participants.

Overall, the interviews were conducted in a friendly manner to create a comfortable and relaxed atmosphere for researcher and participant which culminated in 26 sets of interview data.

### 4.2.2 Sample and materials

The study was conducted by using opportunity sampling. All participants were recruited from one university in the UK (see Table 4.1). The participants chosen can be considered as highly proficient in their field and the study covered a wide range of people involved in administration, management, teaching, and research, across a range of disciplines. The educational level of the participants ranged from Bachelor's degree to PhD.

It is important to highlight that the recruitment of participants was not limited to those who used dedicated task management software only, but rather any tools that facilitated them in managing their tasks (e.g. paper diaries or task lists). This was to allow the author to gain a better understanding of academic PTM behaviour in their actual setting regardless of their

tools. The goal was to develop a framework that explains PTM behaviour that represents a range of PTM tools that academics use in their setting.

Participants did not receive any incentive for taking part in this study. Each participant was personally approached face-to-face or via email invitation. The face-to-face invitation applied to the participants who the researcher already knew through professional academic relationships. The email invitation was sent to potential participants with whom the researcher did not have direct contact or a personal relationship. The researcher's advisor also provided a list of participants with whom she had a professional relationship, scattered across several departments in the university. Based on this contact list, they were sent an email invitation. Those who agreed to participate were then interviewed at a convenient time.

A digital voice recorder (Olympus) was used to record the interviews. ExpressScribe was used to transcribe the audio. At the beginning, Altas.ti was used to analyse the transcribed data. However, due to a licensing issue, it was replaced by NVivo. A Sony digital camera was used to capture images of participants' task management tools.

There were three different interview scripts corresponding to the first, second and third phases of the interview study, and they are provided in Appendices B, D and E respectively. Data was analysed as described in Section 3.6. During the first phase of the interviews, the questions (included in the first interview script) were mainly aimed at understanding the participants' work and personal background and the techniques and tools that they used to support their time management. The questions were adapted from a similar study conducted by Blandford and Green (2001). Most of the questions however, focused on identifying the strengths and limitations of particular time management tools such as diaries and task lists, rather than investigating the main concepts or issues surrounding personal task management behaviour per se. To complement this, the author's questions were designed to explore and extend the understanding of personal task management based on users' conceptual understanding and how to support PTM more effectively. Each participant was asked to clarify their conceptual understanding, needs, preferences or problems surrounding their personal task management. The questions were also adapted to correspond to their individual answers as they differed from one participant to another. This allowed the researcher to obtain their individual perceptions and experiences of personal task management in detail. Participants were also asked about related issues that they faced and how they dealt with them. Based on the analysis of the first phase of the study, the author identified that most of participants raised more concerns with managing their personal tasks than managing time

(e.g. scheduling meetings). The author also identified several key concepts related to personal task management, namely: prioritisation, list-making, scheduling and their emotional response to the task. To further investigate these concepts and study the relationships between them, questions for the second and third semi-structured interview phases were generated. Open-ended questions were asked to allow the participants to articulate their experiences of PTM or views on this as much detail as possible but participants were guided back to the topic by the researcher if they went off track to ensure that the interviews remained within the scope of the study.

As shown in Table 4.1, only 8 participants reported having prior knowledge of PTM methods or time management (e.g. GTD and PFTF, which have been explained previously in Chapter 2). These participants represented a range of roles. Of these, only one participant was consciously implementing the GTD method in managing her tasks.

There have been no standard criteria suggested by previous literature in order to define the level of expertise of task management. However, Haraty *et al.* (2012) have classified PTM users into three categories (as described previously in Section 2.7.2.5) based on two criteria. This inspired the author to use the same criteria to identify the relative level of task management expertise among our participants. As shown in Table 4.1, the author identified that only two participants (P15 and P26 who were senior lecturer and professor respectively) used dedicated PTM software and these participants were classified as Adopters. For example, one participant used GTD Outlook Add-in. The majority of participants, however, were classified as DIYers as they preferred to use a range of tools and modify/personalise them to suit their personal needs. This is in line with the findings of Haraty *et al.* (2012). In Chapter 7, the author will identify the relationship between participants' level of experience and the tools they used. The chapter will also identify the relationship between their PTM strategies and career development or seniority to understand how their strategies developed over time.

Table 4.1 A summary of the participants and their main personal task management tools.

| **Phase** | **Participant** | **Gender** | **Role** | **Current Tools Used** | **PTM approaches (based on categorisation suggested by Haraty et. al (2012) in Section X) A – Adopter D – DIYer M – Make-doer** | **Skills/ knowledge of PTM methods (e.g. GTD, PFTF, or time-management)** |
|---|---|---|---|---|---|---|
| I | P1 | M | Post-doc researcher | Paper diaries, on computer and paper task lists (printed). | D | - |
| | P2 | F | Non-academic staff/support staff | PDA phone, paper diaries, paper task lists, sticky notes and physical notepads. | D | - |
| | P3 | M | Post-doc researcher | Paper diaries, calendars, paper and electronic (mobile phone) task lists. | D | - |
| | P4 | M | Non-academic staff/support staff | Paper diaries, paper task lists, meeting's agendas/task lists and physical notepads. | D | √ |
| | P5 | M | Non-academic staff/support staff | Paper diaries, on computer and paper task lists (printed). | D | - |
| | P6 | F | Post-doc researcher | Paper diaries. | M | - |
| | P7 | M | Post-doc researcher | Calendar (mobile phone) and email inbox. | D | √ |
| | P8 | F | Professor | Paper diaries, paper calendars, sticky notes and email inbox. | D | √ |
| | P9 | F | Lecturer | Paper diaries and paper task lists. | M | - |
| | P10 | M | PhD student | Paper diaries. | M | - |
| | P11 | F | PhD student | Paper diaries (task lists), PDA and phone (task lists). | D | √ |
| | P12 | M | PhD student | Paper diaries, Paper task lists & physical agenda. | M | - |
| II | P13 | F | Senior lecturer | Paper diaries, | D | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Paper task lists and electronic task lists. | | |
| | P14 | M | Lecturer | Paper diaries, electronic task list (miscellaneous files) and stick notes | D | - |
| | P15 | F | Senior lecturer | Electronic calendars and electronic task list application. | A | √ |
| | P16 | F | Reader | Email and electronic calendars. | M | - |
| | P17 | M | Lecturer | Electronic calendars and physical notepads (mind maps). | D | √ |
| | P18 | F | Lecturer | Paper diaries, sticky notes | D | - |
| | P19 | F | Reader | Electronic calendars, paper task list and sticky notes | D | - |
| | P20 | F | Professor | Paper diaries, email inbox and paper task lists. | D | - |
| | P21 | M | PhD student | Paper diaries, paper task lists and scraps of paper. | M | - |
| III | P22 | F | PhD student | Electronic calendars and sticky notes. | D | √ |
| | P23 | M | Post-doc researcher | Electronic calendars, paper-diaries and white board (A4 size). | D | - |
| | P24 | F | Professor | Paper diaries and physical notepads. | D | - |
| | P25 | M | Post-doc researcher | Electronic calendars, electronic to-do list, email and electronic documents. | D | - |
| | P26 | F | Professor | Electronic organiser and scraps of paper. | A | √ |

### 4.2.3 Analysis procedure

To develop the framework, as explained previously (in Section 3.6.2), it was essential to iteratively revisit the research questions. This was to ensure that the framework include all

related concepts, and more importantly can explain a particular phenomenon adequately (representing a broad range of people or contexts). Therefore, any concept identified that can inform the phenomenon, was selected regardless of their significance (i.e. how many people mentioned it). This is in accordance with the nature of grounded theory approach recommended by (Strauss and Corbin, 1998). The purpose is to explore a broad range of concepts in order to explain a particular phenomenon rather than to determine the significance of the concepts. This motivated the author to identify and select concepts that can address the research questions highlighted in Chapter 1. For example, as explained in Section 1.3, one of the aims of this thesis was to investigate 'how do academics manage their tasks'. In order to answer this, it is important to identify the following key topics:

1. strategies they implement – what activities they did, how and why they did them.
2. factors that influence their strategies – what aspects they considered in choosing what tasks they wanted to do at a certain time.
3. problems they encounter and their needs – what challenges they faced in order to manage their tasks.

These topics guided the author to be specific in seeking important or relevant concepts, and at the same time, be flexible in choosing what concepts to include. Thus, although a concept seemed not significant (only mentioned by one or two participant mentioned it), it was still selected since it informed answers for the research questions (i.e. considered to be relevant). To describe the approximate level of significance of the concepts presented in the findings, the author used the following three categories of description:

1. most – a significant number of participants (i.e. about half or more).
2. some – more than one but less than half (i.e. anywhere between 2 and 13) participants.
3. a particular participant – one participant (to suggest that a particular concept may be unique to him/her.

These categories were useful to briefly inform the significance of the concepts identified across participants involved in the study. In relation to the nature of the analysis approach and aim of the thesis, in general, the use of the categories can be considered appropriate to suggest how important or unique a particular concept is. As highlighted above, the aim was to explore the broad range of concepts as much as possible in order to show the variations across participants, rather than to determine the significance of all the concepts emerged from the findings.

Before describing the findings in detail, it is important to summarise how Grounded Theory was used to present them. The summary also explains how the findings were identified throughout different phases of data gathering and analysis and used to refine the proposed PTM framework, based on the findings from the interview study. As highlighted in Chapter 3, the author applied the essential steps recommended by Strauss and Corbin (1998) to the data as follows:

1. Open coding.
2. Axial coding.

To perform the first step, Atlas.ti and NVivo analysis tools were used to label/code the data (see Figure 4.1 for an illustration). They were also used to generate a report of the analysis, which contained the concepts and their respective user quotations (see Figure 4.2 for an illustration).

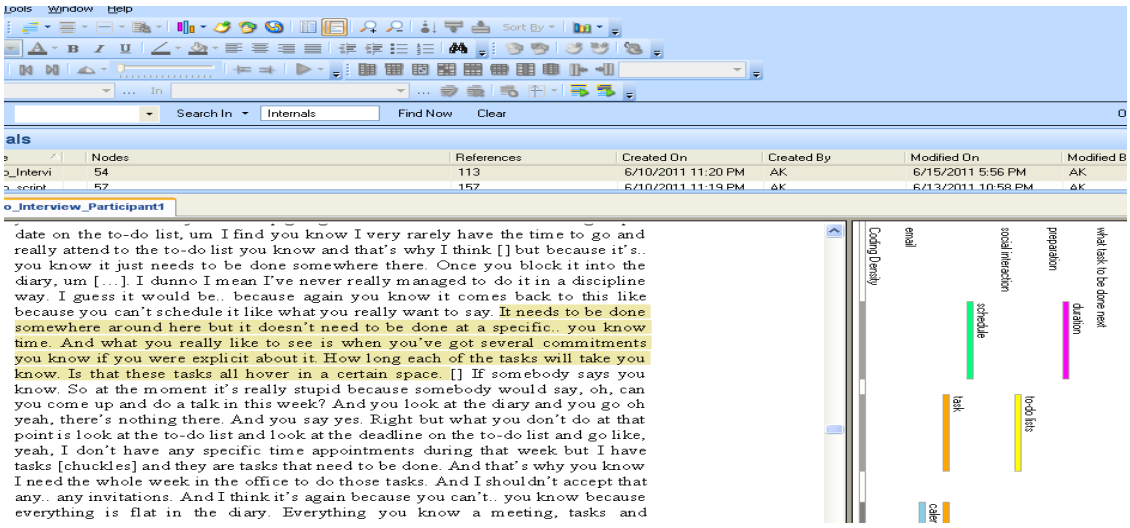



Figure 4.1 Open coding using Nvivo.

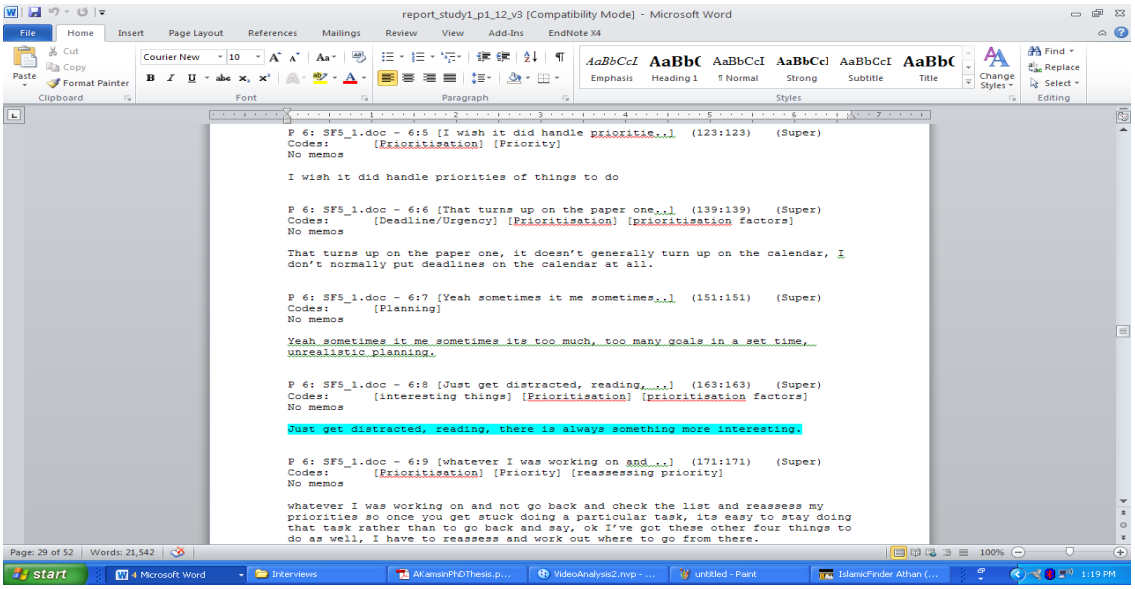



Figure 4.2 Report generation using Atlas.ti.

Based on the reports generated, the author created tables to organise the codes and perform the second step – axial coding. These tables were used to organise, classify and inter-relate the codes identified, and to develop them into a hierarchical representation or taxonomy of PTM categories/concepts. Tables were used for the following reasons:

- Identifying/redefining categories/concepts;
- Relating/contrasting categories/concepts;
- Integrating/subdividing categories/concepts;
- Adding/removing categories/concepts;
- Restructuring categories/concepts;
- Reflecting current categories/concepts and identifying areas/concepts for further investigation;
- Managing a large set of categories/concepts and relevant quotations identified from the interviews.

For example, the author restructured and redefined prioritisation concepts which, as we have seen, were one of the categories identified from the analysis of the first interview study. As shown in Table 4.2, the author identified that these concepts could be redefined in order to produce more meaningful/detailed sub-categories and properties. This was to assist the author to define, differentiate and identify the degree of relatedness between the concepts identified. For instance, instead of four categories to explain prioritisation, the author redefined prioritisation by extending it to seven categories (see Table 4.3). These redefined

categories represent both task and individual factors that influenced participants in prioritising their tasks i.e. choosing what and when to do a particular task rather than focusing on other tasks at any one time.

## 4.3 Findings

### 4.3.1 Overview of the findings

The findings are divided into five sections. **Section 1** summarises the development of the PTM framework throughout the different phases involved in the interview study. It shows how the concepts identified from the previous phase (e.g. phase I) was used to inform the next phase (phase II). In brief, the *first phase* revealed four key concepts planning, problems, prioritisation and users' needs. The *second phase* focused on elaborating two key concepts (task and individual factors) that influence prioritisation. *The third* (i.e. final) phase established two key concepts to represent PTM framework: underlying activities and contextual factors. Both concepts are described further in Sections 2 and 3.

**Section 2** explains the underlying PTM activities involved: planning, prioritisation and list-making. It defines each of the activities identified and describes how people perform them. It also identifies different approaches (or strategies) that they take to carry out the similar activities. In relation to the previous section, the third **Section 3** extends the discussion by summarising the main reasons for participants undertaking the PTM activities. It explains the importance of these activities from three perspectives: cognition, emotion and flexibility. The following sections further describe both internal and external factors that influence people in managing their tasks. For instance, in order to choose appropriate tasks to do at a time, the sections identify aspects that people tend to consider first.

**Section 4** focuses on explaining a wide range of internal factors involved in personal task management behaviour. The factors refer to psychological aspects that related to an individual person that influence him/her in managing his/her tasks. These include emotional response, mental/physical strength, motivation, interest and effective use of time.

**Section 5** is focused on describing external factors that also influence the behaviour. They refer to factors that can be associated to an individual's environment that influence what he/she picks to do at a certain time. In contrast to the internal factors (described previously in Section 4), these factors go beyond the individual psychological aspects. They include the nature of the task, the environment, tools, social influences and time.

### 4.3.2 Section 1: Summary of the development of the PTM framework

This section summarises the development of the PTM framework which was produced sequentially in three different phases. The aims of the **first phase**, the exploratory study, were to explore strategies/tools participants used to manage their tasks, and to identify problems/issues that they faced in managing them. Based on the analysis of the 12 participants in the first phase, the author identified four key themes (see Table 4.2). Following the first process of gathering and analysing data, the first year review panel made some suggestions to improve the study. For example, they advised that it would be beneficial to re-analyse the existing data and reorganise the findings, especially the concept of prioritisation, in order to make a clearer distinction between its underlying categories. The panel also suggested collecting data using a video-diary method in order to investigate the behaviour from a different perspective, as well as to strengthen the findings. The first suggestion, in particular, was in line with the recommendation made by Strauss and Corbin (1998) described in Chapter 3, that it is important for researchers to analyse their data iteratively in order to get new insights or a better understanding of the data. The findings from the first phase identified that prioritisation was the main issue/concern highlighted by participants. This motivated the researcher to focus in the second phase on identifying the strategies and tools that participants used to prioritise their tasks. The second phase studied nine additional participants.

During the **second phase**, the author analysed the data from the second phase and re-analysed the data from the first phase, and identified two main factors that were associated with prioritisation (see Table 4.3). These factors were developed based on the third theme identified from the first analysis i.e. prioritisation concepts shown below in Table 4.2. The author redefined and expanded the analysis by identifying a range of more specific factors that influenced participants in prioritising their tasks.

Table 4.2 Findings showing concepts identified based on the first phase of analysis of the interview study.

| **Category** | **Sub-category** |
|---|---|
| Planning | |
| Problems | Individual |
| | Social |
| | Tools |
| Prioritisation | Based on priority |
| | Based on time availability |
| | Based on duration and difficulty of tasks |

| | Based on mental preparedness |
|---|---|
| Users' Needs | |

There was a change of research direction following this second phase. The initial goal was to develop prioritisation tools but this was altered to develop a detailed PTM framework in order to make a more significant contribution to the body of knowledge about PTM. In particular, it was essential to extend the prioritisation factors identified from the analysis of the previous phases of the interview study. To extend this, the author recruited six more participants for the third (i.e. final) phase of the interview study. The extension to the proposed PTM framework identified from the second phase of the interview study involved four more factors that were closely related to prioritisation. These included planning, scheduling, list-making and emotional response to the task.

Following the re-analysis of the first and second phases and the new data from the third phase of interviews, the author identified two main themes that could be included in the PTM framework: underlying activities and contextual factors. Both themes were divided into sub-categories in order to describe PTM behaviour in detail (see Table 4.4). The first theme explains three key activities that people use to manage their tasks. The framework provides a description of each of the activities and identifies approaches and reasons for the participants to undertake them. The second theme focuses on detailing the factors that influence people in managing their tasks e.g. what aspects they consider before deciding when they choose to do a particular task over other tasks.

Table 4.3 Findings showing concepts identified based on the second phase of analysis of the interview study.

| **Category** | **Sub-category** | **Level 1** |
|---|---|---|
| Task | Urgency | Importance |
| | | Deadline |
| | | Opportunity |
| | Complexity | |
| | Size | |
| | Execution | |
| | Duration | |
| Individual | Working space | Time allocation |
| | | Time gap |
| | | Location |
| | Psychological factors | Mental preparedness |
| | | Interest |
| | | Motivation |
| | | Emotion |
| | | Body clock (effective time) |
| | | Mental switching |

| | | |
|---|---|---|
| | Current commitment | Work |
| | | Personal |
| | | Social |

Most of the factors had already been identified in the findings from the previous phases but they were restructured or redefined in order to represent them in a more informative and organised way. For example, social factors (which refer to participants' roles or responsibilities and their relationship with other people) which previously was classified as individual factors (which refer to the characteristics of the individual) (see Table 4.3 above), were classified as external factors, following the analysis of the third phase. The external factors refer to factors related to an individual's environment (as explained in Section 4.3.6). Also, in the second phase (see Table 4.3), both psychological factors (e.g. emotion) and current commitment (e.g. social) were grouped in the same category - individual factors. In contrast, following the third phase (see Table 4.4), both the emotion and social factors were divided into two new and different categories known as the internal and external factors respectively. The following section will explain two components of the final PTM framework in detail: PTM activities and contextual factors (which are divided into internal and external).

Table 4.4 Findings showing concepts identified based on the third phase of analysis of the interview study (which represent PTM framework).

| **Category** | **Sub-category** | **Level 1** | **Level 2** | **Level 3** |
|---|---|---|---|---|
| The underlying activities | Planning | | | |
| | Prioritisation | | | |
| | List-making | | | |
| Contextual factors | Internal | Emotion | | |
| | | Mental/physical strength | | |
| | | Motivation | | |
| | | Interest | | |
| | | Effective Use of Time | | |
| | External | Task | Urgency | Importance |
| | | | | Deadline |
| | | | Complexity | |
| | | | Size | |
| | | | Accomplishment | |
| | | | Duration | |
| | | Environment | | |
| | | Social | | |
| | | Tools | | |
| | | Time | | |

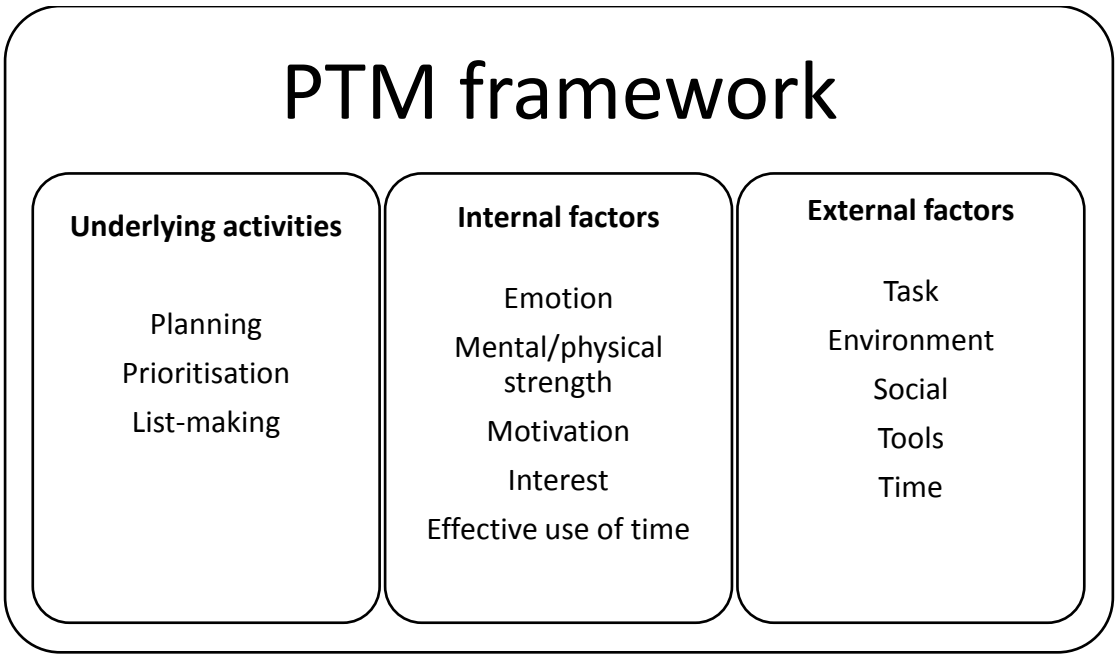



Figure 4.3 Personal Task Management (PTM) framework.

### 4.3.3 Section 2: PTM Activities

As highlighted previously, two components that establish the PTM framework include the underlying activities and contextual factors. Both of them will be explained in the following sections. To begin, the author will first describe the activities that people do in order to manage their tasks. The findings have identified three key related activities that can be associated with PTM:

1. Planning.
2. Prioritisation.
3. List-making.

Each of these activities will be explained separately in sub-sections. Each sub-section provides a definition of the activity and its categories or types. Each sub-section also describes different approaches or strategies that people use and the factors that they take into consideration in order to perform the activity. In order to support the claims made in this thesis, the author includes examples of excepts from participants (for example, (P1) , (P25 and P1), etc.) to represent the claims.

#### 4.3.3.1 Planning

A planning activity can be defined as a cognitive activity that supports people in deciding or predicting the goal or task they are going to achieve or perform in the future (P23 and P1):

> *P23: Planning is predicting something before it happens.*
>
> *P1: If you could have a way of estimating how much you are likely to achieve in a day... and setting your goals to that, then life might be more enjoyable.*

Planning, in detail, can be associated with two activities: goal/task identification and scheduling. Some participants referred to a goal as a big or high-level task that needs to be completed within or by a certain time period (P25 and P1). This usually involves carrying out a series of sub-tasks in order to achieve the goal or complete the task. The researcher noted that participants tended to use the words goals or tasks, interchangeably, to refer to activities/actions that they were aiming to do within a certain length of time:

> *P25: I guess the planning is more kind of high-level, should I be working on this goal or this goal?*
>
> *P1: it's just the name of a high-level goal like write that paper about you know… alert management board or ... do the analysis for that paper for a particular thing [...] or something like that… could be a small thing actually like contact somebody to arrange something [um] could be something like that [um] could be a smaller thing but it doesn't take much thinking about.*

In order to identify tasks, some people are inclined to assess the degree of dependency of their tasks. For example, they will identify the relationship between the current task and the following or previous tasks e.g. a sequence of various tasks that they have to do throughout their project time-frame (P23). To plan their tasks, some participants also determined their location at a particular time and the tasks they should be doing there (P24):

> *P23: And after that, I have to think about the next steps. This is a very, very stage-like process, you know. And each stage is relevant to the previous stage and the next stage.*
>
> *P24: Then I can see where I've got some spaces to make more appointments with different students. Maybe stay home and do work on my own stuff... maybe for an afternoon. Maybe like, Tuesday's afternoon and Wednesday morning. I say, 'Oh, good!' I've got that time when I can stay at home and do my own writing. Um, and so then I put all that down.*

Planning was not seen as only identifying goals or tasks, but also referred to an activity that allowed participants to schedule. Scheduling refers to the activity of allocating time by which they were going to do or complete their tasks (P19 and P23):

> *P19: For example, writing a book chapter, a five thousand word book chapter, might take me a couple of days, so then I have to find some time in my diary to block that out.*

> *P23: Scheduling is about the date and time. You know, your goals can be defined under a specific time.*

The activity allowed participants to determine deadlines or milestones that they wanted to reach in order to accomplish a particular task (P15) or to identify the dependency of their time in order to accomplish a task within a certain period of time (P25):

> *P15: Yeah, I set myself a deadline for when I wanted to get it done by.*

> *P25: I think scheduling is, um, so I have some tasks, which have prerequisites, dependencies and if I want to get something done for three weeks' time, say, so it's important to find what those dependencies, what those prerequisites are. And then you can think about, have I realistically got two weeks to do this? And that's maybe as far as they go with scheduling.*

This section will further identify types of planning. The author categorised that the planning activity could be classified into three timescales: short, medium and long-term. The author made this classification based on the relative timespan or time period that was available for participants to complete their tasks. For short-term planning, this could be applied to tasks that they were going to do within a day (P25) or within a few weeks' time (P24):

> *P25: I have very, very short-term goals which essentially are just daily tasks.*

> *P24: Everything is written there about what I'm gonna do in a week.*

For medium-term planning, one particular participant identified tasks that they were going to do within a few months (P25). Some participants tended to do long-term planning where they identified the key tasks that they had to do or goals that they wanted to achieve within a long period of time e.g. within a year to a few years' time. Participants who ran long-term projects which included a number of major tasks or phases to accomplish sequentially in between one to several years tended to use this type of planning as a framework to guide their direction (P11):

> *P25: So, when I plan, I think I look at maybe a three or four months' time period.*

> *P11: I have a 3-year period which my supervisor normally stresses on planning a lot... So what I did is I just came up with like an Excel Gantt chart using only Windows and I just plan and see for this activity.*

For both medium and long-term planning, participants tended to define and view all the high-level or 'big' tasks that they had to do. They were also inclined to define these tasks in general rather than in detail. Thus, participants preferred to separate this high-level abstraction of tasks from their short-term planning (P8), which they mainly used to define tasks in more detail that they needed to accomplish on a daily basis (P19):

> *P8: I don't find this kind of diary any good for getting an overview of the big things that are coming up and how you plan around them so...why did I do it?... Partly, I did it in order to work out which conferences I was going to try and get to this year because you know, I don't want to be away...too much in a chunk. I want to kind of spread it through the year. Partly, it is things, you know, when am I gonna fit my [hobby] in this summer?*

> *P19: This [-Google calendar] is the kind of overall what's happening, but this [-paper task list] is what I am actually going to do today.*

The previous sections have provided descriptions of planning in detail. The following section explains prioritisation, which appeared as one of the key activities that underpins personal task management behaviour. Instead of identifying and scheduling tasks (or sub-tasks to be done), the prioritisation activity is focused on rearranging both their planned or unexpected tasks to be done at a particular time due to changes in people's current conditions (i.e. internal and external factors which will be explained later in Sections 4 and 5, in detail). The following sections explain the activity in detail.

#### 4.3.3.2 Prioritisation

Prioritisation, as understood in this study, refers to an activity that allowed participants to review tasks that they were going to do within a certain timeframe e.g. what they should be doing now or later (P26):

> *P26: Prioritising… by that I mean deciding which needs to be done immediately or today or tomorrow or within the next week. So for me, I guess prioritisation is, um, it's something that I would review on a daily basis, um, because I would know a timeline of when a certain thing had to be done by. And the process of prioritisation is really one of continuously reordering the tasks that I'm going to do next if you like, um, in the light of when each needs to be completed.*

Prioritisation also referred to an activity of rearranging tasks and identified four different activities associated with task prioritisation: moving, swapping, changing and

reordering. Some participants prioritised by moving around the tasks that they had to do, in order to suit their current situation (P8):

> *P8: A few post it notes go a long way, let's put it like that, and it's.. it's low cost, it's.. flex very flexible, you know it allows I can... I can move things around and reprioritize things very easily.*

Other participants preferred to prioritise their tasks by swapping around both their key tasks and sub-tasks, and changing the deadline (P25). Some participants explain sub-tasks by referring to the division of a main task into smaller tasks or actions/steps they need to perform in order to finish the main task by a certain deadline (P11)(P15):

> *P25: So I might swap tasks, sub-tasks around.[…] I might introduce a new task and play with the Gantt chart, change the start date, change the end date.*

> *P11: So how do I assign the […] task is that... so to achieve that particular objective, I will divide the task into maybe into sub task so for each particular sub task, there will be.. I will assign some kind of duration so when should I start and when should I finish it to [for] this particular to perform this particular task.*

> *P15: OK, I think I write it down into these... things. I think what you're supposed to do is that, here is the project and these sub-projects. [um] and then maybe each of those projects has a number of actions in order to complete them.*

One participant prioritised her tasks by rearranging them according to the order of their assigned priorities in her task list (P26). Participant 26 explained that she assigned a priority number (from 1-9) to her tasks and put them in order according to these numbers. Participants were inclined to place the tasks that they had to do first at the top of their task lists. This reminded them to start doing the tasks at the top of their lists before undertaking subsequent tasks (P5):

> *P26: Um, because I think it immediately reorders the list. You know, if I want to, if you write things on a piece of paper, you know [laughs] you can't do it that sort of way. I'm also allowed to put in, um, so if you put, um, a number one, you can prioritise. […] In addition to assign the date that you want um to do thing. Um you can also put in um a priority from 1 to 9 I think um and if you put priority 1, if will show up on the day so it also serves as a diary and if you then go to the day view, this is why I do this thing [] I kept with it because if you then I mean I am sure other organisers do this as well but this is the one that I'm familiar with. It then comes up as a number one on that day so I know on Monday I've got to do I've got to prepare my session on promoting [] otherwise I won't get that to the admin team you know in time*

This was not always the case, however, because sometimes participants switched to other tasks even though the first task had still not been completed (P5):

*P5: I start at the top, it's often prioritised, like do this first, then do that, then that, so I'll do the high priority things first, resolve them, and then move onto the low priority things. If they can't be resolved then I'll skip them and move on to other things, but in general I work in priority order.*

This section will further describe two different prioritisation approaches that participants tended to implement: internal and external. Some participants prioritised tasks by using their memory. Most participants tended not to externalise the factors that they took into account when prioritising tasks, but rather kept them in mind. For example, they preferred not to identify factors such as priority, urgency or importance, explicitly in their task lists (P8):

*P8: I don't do explicitly. You know there's... I don't have some external artifact on which I go "this is very important but not urgent, this is urgent but not very important... this is..." That's all in my head.*

Participants were also disinclined to rank their tasks explicitly by giving them values or labels (P7). Most participants tended to rely on their internal sense of understanding the urgency as well as the order of tasks that they might want to do or to start with first (P15):

*P7: Although I know that I could use the label like 'priority' and 'don't forget this', for some reason I just don't tend to do that. I tend to use my labels as topical things so a way of splitting work on my proposal from work on my students to train... but I don't tend to use it for softer things like priority.*

*P15: I have an implicit understanding of which things I want to work on first, but I don't make that explicit usually.*

On the other hand, some participants preferred to prioritise their tasks explicitly by using external tools e.g. task lists or diaries. They tended to rank, draw, annotate, highlight or categorise their tasks. One participant tended to rank her tasks by assigning a priority number to them, allowing her overall tasks to be arranged in a sequence of priorities (P26):

*P26: It's just priority rating. So 1 is top priority, etc., except of course I use 5 for things I'm gonna do on the train [laughs] because I tend not to assign more than 1,2,3 or 4 because actually if it's lower than 4 probably I'm not gonna do it [laughs]. I would tend to put number 1, 2 and 3 and then 5 I use for things I'm going to do on the train. […] they have perhaps a more tangible meaning than priorities normally do. So if I've got 1, it means that I'm going to, um...it will come up on the day so I know I will see it when I open the diary for that day. Um, 2 is something that I think I might - I should be able to get done that day but I'm not sure so it's more likely that it can go on to another day. It's not something that I really have to do that day. Um, and 3 I think is more something that I don't want to forget about.*

Instead of assigning priorities, some participants preferred to draw symbols on their task lists. For example, some participants drew a circle around a particular task that seemed important to them (P13):

> *P13: Well, sometimes I think in my mind, sometimes I have big [] on there on the top big you know like this [drawing a circle on the item]. So I don't put a number, "Priority 5", "Priority 3", but it's more the way I identify them, so these are very important and have to be finished.*

This caught their attention and encouraged them to do the circled tasks. Another participant preferred to draw a clock alongside a particular task to show that the task was very important and needed to be completed urgently (P17):

> *P17: Where there's a clock drawn on these [mind mapping diagram] that means that I need to make time in my life in these six months to do the work that I needed to do... So where there's a clock it would have meant that needs to get done, that's a priority... and I need to then go to my diary, my electronic system, and make sure that the things are booked in.*

The additional drawing alongside a particular task helped to draw participants' attention to it and differentiate it from the other tasks (P24). Apart from ranking or drawing, some participants externalised the importance of a particular task over others by highlighting it (P6):

> *P24: Um, the circle it's just so when I look back at the list, like we just did now, sometimes I look back at the list, it stands out.*

> *P6: They're just highlighting if it's really kind of... I have to remember that thing. And if it's important and then I highlight it... yeah... yeah so like deadlines... you know... highlights... kind of thing. So there're things that are more important than others... so I highlight the ones that are really important.*

Most participants were inclined to externalise the deadlines for their tasks or important events in their diaries or post-it notes. This helped them to identify necessary tasks which needed to be completed and to alert them to deadlines (P10):

> *P10: Yeah, I mean, you're not going to forget something like, you know when your transfer exam is due...and in big events you're going to forget those and probably towards as it gets closer you might actually note down in your diary, you know, how many weeks you've got left 'cause it's a short term but saying things such as conference deadlines, I put those in a little sticky note just to remind me because I put it right next to my computer 'cause I see that every day.*

One participant used different sizes of post-it notes to represent and differentiate between two different categories of tasks: big and small tasks, and therefore, she could

identify and rearrange them in her task lists more easily (P 8). Task size is one of the important external factors that people consider. Based on the factor, they review what would be the most appropriate task to do at a certain time, and this will be further explained in Section 4.3.6.1:

> *P8: I started cutting these... this size of post-it note into three. And so a lot of these ones are... this sized post-it note cut into three. And the advantage of them is they fit width ways... nicely on one of these days and you can only fit about three of them on a day and that's the maximum that I'll ever manage to get done in a day because each job takes at least two hours, probably longer. I don't want to plan more than three or four of them in a day.*

To summarise, two underlying activities of task completion have been identified and described: planning and prioritisation. We have illustrated what these activities mean and how and why participants use them as strategies for achieving their goals. To externalise the activities, participants tended to make task lists which we have described as a list-making activity. This is explored in detail in the next section.

#### 4.3.3.3 List-Making

List-making refers to an activity of creating, representing or manipulating external task lists. People use the lists serve as explicit mechanisms to represent both cognitive activities described earlier (planning and prioritisation). Participants used various means to create a list of tasks that they wanted to complete. Most took the next step of writing their tasks down on a range of media, for example, diaries, scraps of paper and whiteboards (P23). Instead of making a record of their tasks, some participants tended to rely on available objects in their environment to represent and remind them about their tasks (P8):

> *P23: For me, writing something on the paper or a whiteboard what I want to do in a specific time, it's very important.*

> *P8: You know, in a sense what there is to do is defined by the piece of paper. Some of them are defined by bits of papers so in my work bag which... I mean this is essentially my office you know, I've got a proposal I need to review and I know when I need to review it by.*

List-making also involved the manipulation of task lists i.e. how participants interacted with their task lists. The author has identified examples of how participants manipulated their lists as follows:

1. Sub-dividing.
2. Categorising.

3. Annotating.
4. Drawing.

Some participants were inclined to **subdivide** their tasks in order to identify prior or additional tasks they needed to do (P13):

> *P13: Within the big item maybe I identify some sub-category like working on a particular section of that paper.*

Some participants preferred to **categorise** their tasks into sub-categories. For example, participant 7, who generally relied on his email messages to represent his list of tasks, then categorised them using different labels. Each label represented a separate type of job that he had to manage. Unlike participant 7, participant 15 tended to organise her tasks into a 'short-term list'. This contained the tasks that she wanted to do within the next 7 days. This allowed her to concentrate on a certain number of tasks at a particular time, rather than be overwhelmed by the complete list of tasks. The author refers this as a task duration factor. The factor appears to be one of external factors that people consider in order to manage their tasks (which is elaborated in Section 4.3.6.1). Returning to the task lists categorisation activity, Participant 13, however, tended to divide her tasks into three different categories: teaching, research and administration. This can be related to a social factor. The factor also emerges as one of the external factors that people consider in prioritising their tasks. The factor helps them to be aware of other people's tasks or goals that they feel obliged to fulfil first (or later), and this is described further in Section 4.4.6.3 (page 120):

> *P7: And then I've got separate folders in my Gmail for different types of work and so... for things... that I don't need reminding but I do need some kind of organisation then I label my different emails that come in because usually my workload tends to come in from email so I label the different emails by different things.*

> *P15: So the reason I use this is because instead of having this enormous list of all the things I have to do, um, it gives me a small list of just things I need to concentrate on in the short-term, like today or in the next seven days.*

> *P13: Well I really list, probably by... I have the different categories as I said, there is the teaching, there is the research, there is the supervision, there is the administration bit, and I list there all the various things I have to do, um, for that period that I am working on.*

Participants also tended to **annotate** their task lists. For instance, Participant 5 tended to annotate his current list in order to describe additional tasks. It was particularly helpful for him to use the annotated list when he wanted to create a new task list:

*P5: So one feeds to the next one, this one gets annotated and forms tasks, get time to report on the meeting, I write a new one which feeds from that one and what I've done and this one gets put aside and this is the new one, which then in the meeting gets annotated and new tasks get added to it.*

Some participants occasionally preferred to **draw** mind maps to visualise and represent the overall list, particularly big or complex tasks that they have to do within a month (P17):

*P17: I'd probably be looking at doing something like this [mind mapping]once every... maybe once a month, maximum.*

### 4.3.4 Section 3: Reasons for using PTM strategies

In the previous section, the three PTM activities that participants undertook in order to manage their tasks have been described. The importance of these activities to participants will now be explained. Participants facilitated their PTM activities by employing two key strategies:

1. Cognition
2. Flexibility

**Cognition.** Planning helped participants to look forward and remember the tasks that they had to do in the future. It also enabled them to clearly understand what tasks they needed to do in order to achieve their future goals. As has been discussed previously, planning allowed participants to determine their tasks in advance, which tasks they were going to do, when they were going to do them and how long they expected to take to complete them. Hence, participants were able to identify what tasks they were supposed to be doing at a particular time (P26) and move forward if they got stuck by referring back to their plans to identify tasks they could do instead (P25). They were also able to keep track of their progress at a particular time. For instance, throughout the year, they could identify whether they had accomplished their tasks (P25):

*P26: Um, so it's part of looking ahead of the day then some other things generate themselves that sort of subsidiary tasks.*

*P25: So usually if you feel stuck, then maybe opening up that medium-term planning spreadsheet is always useful because you can think actually what I should be doing is this. So it helps… a bit of direction. So I think it's useful.*

*P25: In terms of the long-term goals, I don't have a representation for them. But what I do have is, um, a working document which specifies what my objective for, um, the*

> *coming years... There's no real time based but it's definitely used to kind of think about overall progress, um, where something is going.*

**Flexibility.** Prioritisation helped participants to be flexible when managing their tasks. Since they had a limited timeframe in which to do their tasks, they needed to prioritise them dynamically over time. Flexibility enabled them to change to another task, rather than rigidly sticking to the tasks that they had planned in advance (P18). Prioritisation encouraged participants to be more efficient by doing the right task at the right time, and by taking an appropriate amount of time to complete it (P26):

> *P18: like you have just said, about that dynamic sort of management stuff that you have to do I think, um... and the... and to be flexible.*

> *P26: Um, what makes me prioritise my tasks? Well, just a need to be efficient I think um, I have too much, I have too much to do that isn't, um structured... many years ago I was a school teacher. And, um, there I knew exactly what I'd be doing every Wednesday morning, you know... in the hall or something like that at ten o'clock. And the whole day was timetabled apart from the little bit in the morning and a little bit at lunchtime and a little bit after school. Whereas now, I, um, don't have that much lecturing to do that I have that sort of rigidity so I do need some means to decide what I'm gonna do and when.*

The following sections describe the hierarchical classification of factors that made participants to manage their tasks (e.g. prioritising which tasks to do next). These factors can be classified into two categories: internal and external. Both factors are explained in Sections 4.3.5 and 4.3.6 respectively.

### 4.3.5 Section 4: PTM factors - Internal

Internal factors refer to psychological factors that influence how people manage their tasks. The factors can be associated with people's internal conditions (e.g. feelings, mental strength, etc.) rather than the external conditions (e.g. regarding the task, time, environment, etc.), The factors can be divided into five sub-categories as follows:

1. Emotional response.
2. Mental/physical strength.
3. Motivation.
4. Interest.
5. Effective use of time.

#### 4.3.5.1 Emotional Response

The findings show that participants experienced different emotions while doing or managing their tasks. Their emotional responses influenced what tasks they chose to do at a particular time. These emotional responses can be classified into two types: positive and negative. The findings identified two examples of positive feelings that participants experienced when managing their tasks: happiness and calmness. There are many things which made participants happy when managing their tasks. They felt happy when they could set and accomplish realistic goals (P1) or when they were doing tasks that were enjoyable (P8):

> *P8: Last weekend I worked on a couple of papers on Saturday, and actually I really enjoyed working on them, so it was more like hobby than work, really. And I probably did those... earlier than was really necessary because it was stuff that I was looking forward to.*

> *P1: If you could have a way of estimating how much you are likely to achieve in a day... and setting your goals to that, then life might be more enjoyable... If you set yourself realistic goals...which are achievable, life, I think, is a lot more enjoyable then.*

Participants felt happy if the tools that they used to manage their tasks made sense and were useful for them. For instance, Participant 17 elaborated that he felt happier viewing task lists represented by mind maps, rather than creating a long list of tasks. He added that this could also stimulate his excitement to identify and accomplish a particular task. In contrast, some participants were content to rely on paper diaries *(P18) to manage their tasks.* They perceived that these tools were adequate and supported them in deciding how and when they were going to complete their tasks:

> *P17: Um, just because I've got lots of different things I'm trying to do and they're all starting at different points and... and it's only... it's analogous to just having a list... I'm happier to see things in the round. I could type everything up, you know, I do type lists up... You know, I can look at that now and think "That's really interesting!, I've got to do that!" Whereas a diary system or a to-do list doesn't necessarily give you that feeling. I mean if I had a to-do list for everything I had to do it would just go and on and on and on and on. I'd need pages and pages and pages of to-do lists and that's probably what this [mind mapping] is doing for me.*

> *P18: I'm quite happy just to keep a paper diary.*

Calmness is another positive feeling that participants experienced in relation to task management. There were several reasons that participants felt calm while managing their tasks. For example, some participants felt calm if they were able to complete quite a number

of tasks (particularly small tasks) before undertaking their main or big tasks (P21). They felt in control if they could explicitly schedule or allocate time to do a particular task (P17):

> *P21: I always like to do a lot of things at the start of the weekend, just so that I already feel like I did a lot of things and then I'm more relaxed on working on the other things... which is one reason for working on the fun thing, well the thing that I like to do myself, on Sunday. Because if the other things are done I don't have to worry about them anymore and I can work more relaxed and better on that one.*

> *P17: And so you have to then build in the time to deal with that work that has been accrued, and I suppose that I don't get stressed now because I build in the time [to do that].*

However, some participants did not need to allocate a specific time to do their tasks. Instead, they calmed themselves by writing down their tasks individually, particularly when they felt stressed by a lot of tasks which needed to be completed at the same time (P7):

> *P7: I'm just gonna write down, list in priority what I need to do. And that's involved breaking things down task into sub-tasks, just so that I can tick off the sub-tasks as I do them and I make myself feel better.*

Negative feelings could also influence participants in deciding what tasks they were going to do, and when they were going to complete them. The findings identified three examples of negative emotions informed by participants: stress, frustration and dislike. There are many reasons why participants got stressed when managing their tasks. Most felt their level of stress starting to increase when they realised that they had a large number of tasks to do and a range of deadlines to meet (P17):

> *P17: I'd say there's sometimes when I get a bit stressed and it just overwhelms me... you know you said about "how do you prioritise", there are times when if I'm really busy, got lots of deadlines, then new stuff coming in is just kind of... waves over me.*

A sense of frustration was another feeling that was commonly experienced. Participants felt frustrated for several reasons. For instance, some participants got frustrated if they were unable to finish a particular task within a designated time-frame or achieve a particular goal that they had set for themselves by a certain time (P11). This usually happened during term-time when participants were busier because they had to undertake teaching responsibilities in addition to their academic work (P18):

> *P11: I feel a little frustrated with myself because I was not able to complete a design for the experiment.*

*P18: But when it's busier during term time, I probably get more frustrated with myself that I can't sit down and do a particular task at that particular point when I decided I was going to do it.*

As described earlier, participants tended to feel stressed by doing certain types of task e.g. tasks which they regarded as less interesting. Some participants disliked certain tasks, for example, marking examination scripts and teaching. Therefore, they tended to defer the marking tasks and choose to do more interesting tasks first (P16):

*P16: So I hate marking. So the marking gets... gets put off to the last minute because I'm always going to find something more interesting to do [laughs] than marking stuff, you know?... Well, giving a lecture is ok. I think it's very, very exhausting. I don't like to do too much of it. And, um, the smaller classes, we have this small back-up classes for undergraduates. Those I don't enjoy doing really and the marking, I don't enjoy doing.*

#### 4.3.5.2 Motivation

Motivation was important in driving participants to accomplish their tasks. This not only helped them to concentrate on doing the tasks, but also ensured that they could accomplish their tasks within a certain time-frame (P3). Their motivation level, which might change over time, tended to influence the number of tasks that they could do or complete within a certain time (P11):

*P3: I think the problems that I have with time management is more to do with... with there being me not getting work done or not being motivated enough.*

*P11: And it depends on your motivation on that day itself. There're times when you can complete more than you have allocated for the day and there are times when you can complete less than the tasks that you have allocated for the day.*

There were a range of reasons that motivated participants to tackle and complete their tasks. For instance, some felt motivated if they discovered interesting things for example, research findings (P11) or produced an outcome from their work (P22):

*P11: Um, in some way it keeps me motivated in the sense that I have to complete this because I managed to see some interesting findings from the limited data.*

*P22: The results. The outcome. If it's a short-term thing, then the outcome of having it done [unclear] and off my mind [unclear] me, um, and often with the PhD things like, you know, just writing a paper. I really wanna get my work out so I guess that's the result as well... I guess that motivates me.*

Other participants felt motivated if they had the opportunity to do tasks that interested them (P11):

*P11: If the task is very much interested to yourself, then you're really much [more] motivated to [do] it. For example, designing an experiment might be an interesting task to me.*

Some participants highlighted that getting good feedback from other people pushed them further to continue doing their tasks (P22). For example, participants were more eager to do their tasks if they received encouragement or support from other people, such as their superiors or colleagues (P23):

*P22: Um, and also now with demonstrating... getting good feedback about what I'm doing, um, you know, motivates me to do it better and put more time into it.*

*P23: I feel sometimes my motivation maybe increases or decreases in the working day on the basis of other staff's reactions, you know, because you have the specific expectation and to do this, to satisfy your expectation, you need other staff's contributions. If you feel you're the only person to do this task, you maybe feel bored, you know, alone and it maybe disappoints you. To do this, two things are important to me. My self-motivation and other reactions and behaviours about the type of contribution from the line manager, from the supervisor and from the other staff involved in this project.*

A deadline was one of the significant factors that forced participants to complete their tasks. It acted as a motivator that reminded them when they had to complete their task (P22), speeding up their efforts to achieve it (P25):

*P22: Um, also obviously the deadlines of things so, um, I have to, yeah I have to write this conference paper but I was also asked to organise a competition for designing a t-shirt and the deadline for that is sooner and the [] so I need to send this email sooner so I have to allocate my time for that. Yeah, so deadline and the easiness of tasks generally motivate my choice of one task over another.*

*P25: I guess impending deadlines, um, it makes me provide motivation I think to get stuff done. Um, I think sometimes it's good to set myself deadlines to increase motivation because if you're working over your project which has a lot of deliverables, it's easy to say, 'Oh yeah, I'll start that next week.' Um, but actually it's good to set this deadline, NOT hard deadline but this deadline to manage your time.*

Some people also feel motivated if they are in a suitable environment for the particular task. People believe that some tasks can be done at their office but other tasks might require them to work elsewhere, for example at home, where the environment is more motivating and they will not be interrupted (P22):

*P22: And also what is suited to the environment. So something that suits to do it in the office and something that I just can't do in the office because I need to be at home and I need to be listening to my music and in my own area and able to work without interruptions. So what the environment is around me is like [laughs] definitely*

*motivates me a lot to choose what to do, especially when thinking about what to write about.*

Some participants also believed that awareness of the importance of their tasks could motivate them to complete them. Participants who had a strong concern about their work seemed to be naturally motivated to do any task that is related or contributed to it (P23):

*P23: I love work and the work is a very important motivator for me. And I think I feel happy. I feel very satisfied about the work. And anything around the work is very, very comfortable.*

Some participants lacked motivation if their work had no clear direction. In contrast, other participants explained that the non-productive periods that they experienced could motivate them to do their tasks. For example, it could trigger them to rethink their tasks and identify alternative ways to accomplish them (P25):

*P25: Um, so I guess that kind of period of um, non-productiveness kind of maybe in a way motivates me to kind of think about planning time and maybe allocating tasks in a different way. So it's good. I like...sometimes it's very healthy to feel that you're not making progress and sometimes it's very healthy that you've got a full schedule. I think it's good to have both those kind of experiences.*

So far, the author has explained that changes in people's emotion and motivation level do influence their PTM activities (e.g. determining which task to do next). The following section further shows that some participants explained that their mental/physical strength (at a given time) also influenced their PTM activities.

#### 4.3.5.3 Mental/Physical strength

Mental strength was described in terms of how prepared they were to undertake a particular task. It also referred to how much mental effort they anticipated was needed in order to undertake the task (P8). Sometimes, participants' mental state did not encourage them to undertake a certain task, and therefore they might choose to do other things instead (P18). This can be related to other external factors (i.e. task complexity and size) that are discussed further in Section 4.3.6.1. For instance, some people describe that they were inclined to do (or continue) complex or big task when they were in good mental/physical strength. In contrast, they tended to switch to do easy or small tasks if they were exhausted. This seems beneficial in ensuring that they can still be productive (i.e. make the best use of their time) by undertaking other more appropriate tasks. This is also to allow them to take some time to refresh their mental/physical strength before undertaking difficult or big tasks.

*P8: I work out how long something is gonna to take me to do, I think, and how much mental effort I have to put into it.*

*P18: I don't know, I have some days when I just... it doesn't feel quite right to do a task so I just... I can't... I can't think coherently think about it or I don't feel prepared or... so just things like that, I suppose it's, you know, mental... a sort of mental state or... I don't know... yeah.*

On other occasions, however, participants' mental state might trigger them to do a certain task more diligently, for example when they discovered interesting ideas or undertook tasks which they found exciting (P24):

*P24: Um, it varies. Sometimes I don't, like, sometimes I resent it. Other times I move into a different mental space altogether and I can feel quite high. I can have, um, you know, I can have like this effect like runners. Runners get this effect on their brain. I think academics can do that too with their work. You know, if it's something that I'm very interested in and excited about and I'm having interesting thoughts, then I can get quite [] I suppose. It's quite high.*

Some participants preferred to continue writing a piece of work if they could think and write about it fluently (P24). In this instance, they tended to defer other tasks in order to enable them to continue exclusively with their writing. They also preferred not to be interrupted or switch to other tasks (P22):

*P24: Um, when I'm not under that kind of pressure, I suppose, um, I can occasionally generate an internal sense of urgency about something I'm writing... I'm going well with it, you know, the idea is coming well and I'm writing very fluently. I don't want to interrupt that. I don't want that to be blocked. So sometimes, it's not very often but sometimes that will create a feeling of, well, significance, of importance. Let me go with this piece of writing and then I might be able to push aside some of the daily tasks that just keep on but I have to be very much already, um, in the middle of a big piece of writing or a big project in order to have that kind of momentum to keep me going. Otherwise I would get distracted by the daily tasks.*

*P22: So obviously, you have a feeling of thinking, "Oh, I could have completed this or there are still other things that I'm worried that I might forget them," or, you know, when you just get into desire...you just, you're writing really well. So yeah, [you get] frustrated at breaking your runs. Although sometimes it comes as a nice break if I'm like, "Uh! I can't think what to write. Ok. Well, I'm gonna switch to that one!"*

Some participants were inclined to change to other tasks if they were unable to think clearly or carry out their present task effectively (P6). Participants believed that this kind of mental switching was useful because it allowed them to have enough time to rethink their current task and continue it later with a fresh start:

*P6: I know it's normal you need time to switch your mind from one thing to the other. I know that when you...when you read, certain information on new, lots of new things... you need time for this thing to kind of think in your head. You can't keep on going. So you need that kind of distraction, you know, to give you time to kind of break... the information to kind of sink in. You know you can go back again.*

In addition to their mental strength, participants' physical condition also influenced their behaviour. When the level of their energy increased, it was evident that participants were able complete more tasks and work harder for longer (P24):

*P24: Other times, you know, if you're feeling very well and really strong and you're mentally functioning well, you can cram in more, you know. You can work longer and harder... So I guess I'm not very keen on [laughs] the undergraduate teaching. Um, I am certainly glad not to do it. I think it's incredibly exhausting to be standing up and delivering lectures. To me, that is one of the most exhausting things and also marking all the assignments. That was so pretty awful, too.*

On other occasions, however, they were not able to do their tasks, particularly when they felt sick or tired (P18). At this time, they tended to defer a certain task by doing something else, for example less important or easier tasks (P25):

*P18: Um, just because they're smaller and easier and it's... you just can't face doing the big task, even though it's at the top of the priority list. So sometimes it's just... yeah, just that, just being unable to face it [laughs] tired or you know.*

*P25: Um, other time is different... sometimes you switch to a task and, um, because you know that you haven't completed what you should have done. You become lethargic and maybe procrastinate instead of really switching, you check Facebook [laughs].*

#### 4.3.5.4 Interest

Participants' personal interests also played a major role in how they managed their tasks. For instance, they tended to do the tasks that interested them before less engaging tasks. Thus, some participants postponed tasks that were compulsory, even though the deadline was imminent (P15):

*P15: Mainly based on which one is gonna be easier to write, or which one I'm more interested in... because they don't really have a hard deadline.*

Some participants tended to choose tasks which they enjoyed if they worked during the weekend (P8). Most participants spent their weekend at home rather than at their office. Participant 20 gave programming as one example of a task that he found fun to do. He explained that he preferred to carry out this task during the weekend rather than other tasks which could be more difficult and stressful (P20).

*P8: what I enjoy doing versus what I don't, so particularly if I'm working at the weekend, I try to do things that I enjoy.*

*P20: I do it at home. And it's programming. It's fun. [laughs] so I don't mind to do that during the weekend. Whereas some of the other stuff that I'm currently working on is more.. It needs to be done and it needs attention and it can be stressful so it's not fun to do it at the weekend.*

One participant mentioned that she is inclined to take on new tasks that seem interesting to her regardless of the number of tasks she already had to do. This could affect her existing plans so that she was not able to tackle or complete her existing tasks or fit new tasks into schedule (P14).

*P14: And I'm enthusiastic [] person. I like to do a lot of things and that's maybe thing with my personality. […] you're looking at my personality and that could be something that interferes with my planning. My [...] the fact that I think I like to do thing and I get interested in many things.*

#### 4.3.5.5 Effective use of time

Some participants pointed out that they were more effective at a certain period of time during the day. Thus, they tended to complete tasks at that time. For example, some participants were able to work very effectively in the morning (P17), and therefore tended to tackle tasks like reading and writing then, whereas others preferred to do certain tasks in the evening (P16):

*P17: So I certainly don't, you know, I'm not one of these people that, you know... work after... six o'clock at night, you know. I'm happy to get up early in the morning*

*P16: I'm a strange person in that I work better from about four o'clock in the afternoon to about nine or ten at night.*

The previous section has described a range of internal factors that participants experienced when managing their tasks and the importance they gave to specific times during the day when they felt that they would be able to achieve more. On the whole, internal factors can be associated with individual participants. Additionally, the study identified a hierarchy of external factors that also influenced personal task management behaviour, as explained in the following section.

### 4.3.6 Section 5: PTM factors - External

External factors refer to the factors related to an individual's environment that influence what he/she chooses to do at a certain time. They can be divided into five categories (see Figure 4.4):

1. Task.
2. Environment.
3. Social.
4. Time.
5. Tools.

#### 4.3.6.1 Task

Task factors describe the characteristics of a particular task which can be further divided into five sub-categories as follows:

- Urgency.
- Complexity.
- Size.
- Accomplishment.
- Duration.

### Urgency

Urgency refers to how soon a particular task needs to be done. In contrast to most of the literature (as summarised in the literature review chapter), urgency is not necessarily determined by a deadline. It also depends on two other influential factors, namely the importance of and opportunity to do the task. For example, people reported that a task requested by a superior might be treated as being urgent even if it had no deadline imposed, or that an opportunity (that might not be available later) might be taken immediately, hence treating the opportune task as more urgent than others. These three factors that determine the urgency of tasks will be explained in this section.

Importance is one of the key elements of urgency. The author has identified four reasons to determine the importance of a particular task, namely the requirements for doing the task, its benefits, consequences and dependencies. In this context, “requirement” refers to the idea that the individual feels that they are required, or expected by others, to perform the task (i.e. that they cannot delegate it to someone else); “benefit” refers to the likely positive outcomes from completing the task; “consequence” refers to likely negative outcomes from failing to complete the task in a timely way; and “dependency” refers to the impact that achieving (or failing to achieve) the task will have on other activities, whether for the individual (him or herself) or for other people. The requirements of doing the task can be

further classified into 2 types: compulsory and optional. Compulsoriness refers to the tasks that the participants must do due to obligations of their job (P8). 'Option' refers to tasks that people would like to complete if they have extra time. The tasks which fall into this category are the least important tasks to be done. There would be no significant impact of not doing the tasks, either for the individual or for other people involved. Thus, the participants might only choose to do the tasks if circumstances permit (P9 and P16).

> *P8: The dean of the faculty's PA sent out a message to five people saying, "I'm trying to organise a meeting Friday this week or Monday next week, you know in order to organise that I need to know people's availability as soon as possible" and I judged that as being urgent because, you know... it doesn't change the world in any big sense but if I'm to influence the timing of that meeting and if I'm seen to be participating properly, then I feel it's important that I reply.*

> *P9: I can choose not to attend the committee meeting if I have something more important.*

> *P16: That article would just get put off because there's no urgency to have the article written.*

As mentioned earlier, to determine the importance of a task, people also tend to gauge how much benefit they (or other people) might get from doing the task (P16). People also reflect on the risk of negative consequences of not doing the task to determine its importance (P24).

> *P16: But the fact that in the situation I'm in, I have to do it- It's for the benefit for other people as well as me.*

> *P24: So, um [sighs] urgency for me is usually to do with a deadline which if I do not meet the deadline, it's going to cause trouble for someone possibly for myself as well but, you know, more often it's someone out there who has to have the reference written because they're going for promotion and there's a special or particular date required for the reference. Or a PhD student who has to get some feedback because they have got to finish their chapter and get the thesis finished and submitted on time.*

Furthermore, in deciding the importance of a task, people are inclined to look at the dependencies that they have on the tasks. The dependencies show whether the tasks belong to and affect other tasks or people. Most of them have a tendency to treat tasks that involve other people as more important than tasks that only involve themselves (P2).

> *P2: Everything that belongs to me I can, but obviously then it makes sense because if it just belongs to me.....it's not going to be that much of a problem.*

People also tend to consider tasks that involve or depend on other people to be more urgent and hence, they need to respond to or do them immediately (P1).

> *P1: Some of those things have to be done and can only be done at one time. Those are things which involve other people usually.*

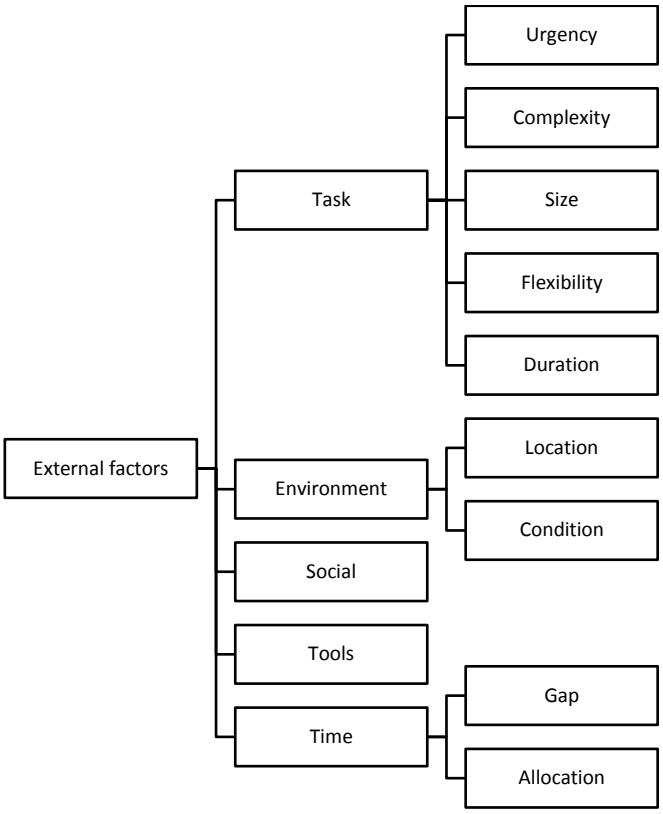



Figure 4.4. External factors that affect the completion of tasks.

Most participants relied on deadlines to determine the urgency of tasks. The deadline was one of the most significant factors that stimulated participants to complete their respective tasks (P1 and P24). Some participants associated 'urgency' with an opportunity to respond to their tasks:

> *P1: It depends on the deadline as well. If I've got a deadline coming up for something... and that becomes more important.*

> *P24: So, um [sighs] urgency for me is usually to do with a deadline which if I do not meet the deadline, it's going to cause trouble for someone possibly for myself as well but, you know, more often it's someone out there who has to have the reference written because they're going for promotion and there's a special or particular date required for the reference.*

*P8: Opportunities... that come up will sometimes get prioritised over routines so, you know, the chance to talk to [Colleague A] this morning got prioritised over a regular meeting with [Colleague B] because I know, you know, I can't see [Colleague A] tomorrow.*

### Complexity

Participants also determined the complexity of a task before undertaking it. Complexity refers to how much mental effort is required in order to do the task. It can be seen as a continuum between two end points. The first is categorised as a difficult task which requires deep thought and therefore normally needs more time to complete (P1). The second can be classed as an easy task, requiring little thought to complete. It can usually be carried out immediately and quickly. This type of task requires less time to accomplish (P10). As explained previously, some people had a tendency to gauge their mental/physical strength (see Section 4.3.5.3) and effective use of time (see Section 4.3.5.5), and match these conditions with the complexity of a particular task that needs to be done. They were inclined to do difficult tasks (e.g. writing a journal article or a book) when they feel energetic or effective/productive.

*P1: The other mode of thinking is when you're sitting down thinking deeply about something [shutting] off all distractions and trying to... um... you know, think deeply about something that requires a lot of thought.*

*P10: Whereas something fairly easy, perhaps like I have to submit a shortlist of research topics to [Colleague X], I can take about fifteen minutes so not very difficult.*

### Size

Participants were inclined to consider the size of a task before committing to it, referring to the amount of work they needed to do or steps that they needed to take in order to get a particular task/goal completed. They often divided this into two categories: big tasks and small tasks. A big task may consist of several different sub-tasks and might require a long period of time to finish. Participants usually needed a few hours or days to complete these tasks (P8). This factor can be related to time gap - the other external factor that will be explained further in Section 4.3.6.4. In brief, people tend to match between both the size of their task and the time gap. This is to ensure that they could schedule (i.e. allocate) a reasonable amount of time or identify any opportune time to do or complete the task.

*P8: Whereas if I've got a day at home, I will do the next big job that's sitting on my stack.*

Small tasks required a relatively short amount of time to complete due to the relatively limited amount of work that needed to be done. Participants typically needed between a few minutes to an hour to finish a small task and could also quickly deal with it in order to clear their existing stack of tasks. Some participants tended to do all the small tasks at one time, others might complete these tasks when they had relatively short gaps where they could fit them in (P1):

> *P1: I'm probably likely to deal with emails, outstanding emails first thing in the morning and then get on with other things after that... that's kind of part of getting rid of small activities.*

### Flexibility

Flexibility can be defined as how, where, and when tasks should or could be dealt with. According to some participants, some of their tasks were rigid whereas others were flexible in terms of when they could be done. For instance, participants considered meetings, appointments, and lectures to be rigid because they could only be completed at a particular time and at a particular venue, and normally required face-to-face contact. For these reasons, participants had to schedule these tasks on certain days and at specific times. This was to ensure that they reserved personal and more flexible time to complete their other tasks. During this time, they dealt with those tasks which were not constrained by face-to-face contact or by having a specific time slot or venue in which they must be completed (P16):

> *P16: I tend to try organise my time, especially in the vacation so I have meeting days like today I've got another six meetings and all, you know... which means it freezes up my time to do more... flexible stuff.*

Participants were able to modify the execution of such tasks whenever they felt necessary, in order to accommodate their current workload or to cope with unexpected situations (P10):

> *P10: When I manage my time I have to be flexible enough to accommodate other things that are important and that perhaps take high priority. For example, someone sends to me an email, asking me to get this done by, you know, this time. I have to drop with whatever it is I'm doing to get that done.*

### Duration

Duration refers to the given or available time period to complete a task. Long-term tasks can be accomplished within a long duration, such as a few months. Some participants deferred long-term tasks in order to allow them to accomplish short-term tasks or unexpected tasks

which could not be anticipated in advance (P1). In contrast, short-term tasks could be completed within a few days (P8):

> *P1: So I have a list of long-term projects long-term things like, you know, all the papers I've promised that I'll write and haven't done yet.*

> *P8: If it's really urgent, it's usually about meetings that are meant to be in... in the next twenty four hours or it's about... arranging a meeting that's in the relatively short term.*

#### 4.3.6.2 Environment

Location in this study is defined as where people are situated at any one time. It can be divided into three possible locations: office, home or mobile i.e. away from both home and office. Participants preferred to plan their activities according to location. Some participants tended to do certain tasks when they were working from home, preferring to complete difficult and larger tasks there, rather than small tasks or tasks that could only be completed while they were in their office. In deciding which tasks to complete where participants took into account the opportunity to have flexible and uninterrupted time and to be able to exercise deep thought and a high level of mental preparedness (P16). Additionally, some participants were inclined to do small tasks, such as reading articles and prioritising their tasks, while they were mobile, while others preferred to be in a particular location (P16):

> *P16: Or if I'm working at home, then I can actually be more flexible in terms of writing or doing something like that. I can do a couple of hours writing and go out and then I come back or whatever, you know. […] A lot of the time, I read on the train. If I'm... coming out of London, and it's a very useful time to read stuff. If I'm doing a journey [or going to] conferences or working on other projects in different universities, either on the plane or sitting at airports or something like that, I find that it's a good time to read.*

Participants were inclined to do certain tasks depending on the suitability of their environment. For example, they might switch to easy tasks rather than big or difficult tasks if their environment was inappropriate for tackling larger or more complex tasks, e.g. if the surroundings were too noisy (P22):

> *P22: So yeah, when it needs deep concentration and deep reflection and I, yeah, I, where I am reflects how I do. So I know I need to be at home and in a quiet environment.*

#### 4.3.6.3 Social

Busy participants faced challenges in managing their personal tasks due to the various demands that resulted from their personal relationships, in both their work and social life. They referred to having to accommodate demands that came from their employer (i.e. university), colleagues, for example their superiors, peers or subordinates, (P24) and students (P16). Besides these work-related commitments, they also needed to undertake tasks in order to meet demands from other people: societies - both work-related and non-work-related, organisations (P9), family members, friends and acquaintances. Some examples of various demands that participants had to deal with were as follows:

> *P24: ...considering the departmental interests, my colleagues and the future of this department [x] I think about that quite a lot. Um, try to maintain all these constraints working together, I make the decision about what I do next.*

> *P16: I've got lots of different things happening and it's managing the demands from various different projects from various different people, from students, from colleagues, from people who... like RAs who work for me, from PhD students who all have their own schedules, and they... obviously, you know, want access to me and they don't know how complicated my schedule is.*

> *P9: It is not just the teaching and the admin here - I'm also working for my professional society. I'm also doing consultancy.*

In order to make a decision about which tasks to do first, participants believed that it was important to consider the relationships they had with these different groups of people. People were inclined to assess the *importance* of a certain task (as discussed previously in Section 4.3.6.1). This seems to be based on the benefits/social values of having the task completed to both them and other people, or how important the people were to them. Participants tended to do tasks that helped them to maintain good relationships and communicate effectively with other people (P24). They were also inclined to complete tasks that could benefit other people or the group they were working with, such as the department or research group that they belonged to (P23):

> *P24: I'm expecting some communication from some colleague from somewhere whether it's [University X] or other institutes that I have a lot of connection within Europe. Um, sometimes even friends! You know it's all mixed. That's the thing about the email. It's all mixed. The work issues, the friend issues, the family issues, you know. I'm always waiting to hear how things are with my family in [Country X]. So, it's just there all the time. It takes a lot of will on my part to switch it off and just focus on something else.*

*P23: It's very important to contribute or collaborate with other persons, other people around you... In this study... I am a member of the teamwork. And I need to contribute and collaborate with the other staff.*

#### 4.3.6.4 Time

Time can be divided into time gap and time allocation. Participants tended to estimate the time gap that they had, such as the time between scheduled appointments in order to identify appropriate tasks to do during each gap. Time gaps could be classified into long or short gaps. Long gaps usually referred to gaps of more than an hour. Short gaps might last from a few minutes to an hour. Some participants identified tasks according to the available time gap (P8). As highlighted earlier in Section 4.4.6.1 (page 118), people described that it is essential to match between the available time gap that they have and the size of task (i.e. amount of work or steps involved to complete the task):

*P8: Whereas big jobs need big chunks of time, so I'll tend to do things I expect to take at least two hours when I'm working at home. […] I can do little jobs in little chunks of time.*

Time allocation referred to the time slots which participants dedicated to carry out a particular task. Time allocation could be further sub-divided into public and private time. During public time, participants were open to other people such as their colleagues and students. During these periods, they were prone to interruptions and therefore tended to perform tasks which did not require deep thought or full mental concentration (P4):

*P4: They simply ask me something, they ask me a question, I give them an answer. That's it. It's just such a short interruption. Or they come in and they tell me I need to do something effectively.*

In contrast, participants allocated private time as their personal time to do tasks which required deep thought or extended commitment. Some participants preferred to be away from their office for private time, such as working at home where they were less likely to be affected by frequent interruptions. Private time allowed them to complete the difficult or big tasks effectively (P16). Private time was used not only for working, but also for leisure activities. For example, one participant noted that he allocated his private time in the evenings and weekends for his personal life rather than for work commitments (P17). Few participants made a very clear distinction, however, between work and leisure time:

*P16: That's why I like this... big block of time at home because I don't... I wouldn't... AT ALL change task, you know. I would just work on that one thing. Yeah, sometimes I mean, why I like to work at home is because you can concentrate.*

*P17: But I wouldn't work at weekends. And I wouldn't work in the evening. So I'm kind of, I suppose I have my sense of, "Oh, the computer is now off, and that's it."*

#### 4.3.6.5 Tools

In order to manage personal tasks, participants relied on a range of task management tools such as emails and physical objects (cues) in their context (P14) rather than only on diaries or task lists. Participants used them interchangeably to determine which tasks they should be doing and when they were going to complete them (P8). They used each tool in a different way, they believed that different tools could complement each other (P2):

*P8: Ok, yeah, ok so, I mean some of them are defined by meetings in the diary... and, you know, in a sense what there is to do is defined by the piece of paper. Some of them are defined by bits of papers so in my work bag which... I mean, this is essentially my office, you know, I've got a proposal I need to review and I know when I need to review it by... but that's one bit of my to-do lists... actually. It's represented by those… And another one is represented by my email. I have a fairly complicated way of organising my emails so that I... keep track of... what I should be doing and when I should be doing it, and the third is my very beautiful little set of post... of post-it notes which I schedule... and what I do with these is... these are jobs which are probably at least... two hours long... usually mostly, anyway.*

*P2: It's difficult to choose one because I think one complements the other. You know, the paper and the electronic complement each other.*

There were many factors which encouraged participants to use these various tools. The author identified two factors which were important to participants when choosing tools for managing their tasks: availability and affordance. Participants were inclined to use tools which were within reach at a particular time. For example, they might use post-it notes or scraps of paper rather than their diaries to record their tasks if they were the only tools available (P7):

*P7: I have a piece of paper in here with the discussion with [Colleague X] I had this morning and I have to think through some ideas some more and I have everything in the kind of sequence I know once I've sort of thought that through and know that my proposal is what I want it to be about then I need to talk to... then I need to write out another kind of abstract to get... make sure [Colleague X] agrees with my overall picture then I need to write the literature that reflects on that and then I need to go through, step-by-step through all the parts so I have really clear in my head what I need to do… and I don't record that anywhere.*

Tool affordance is another factor that participants considered when choosing the right tool to manage their tasks. The author identified two examples of affordance highlighted by participants: physicality and automation. Physicality here is defined as the physical appearance of the tools and the way participants engaged with them. Participants referred to

how such tools allowed them to write or draw (P17) and manipulate or rearrange their tasks (P8). These sorts of physical interactions supported participants in organising and managing their tasks both more flexibly and more logically:

> *P17: If I get a bit overwhelmed, then... for example, this one [mind mapping diagram] was done in June this year, this was a plan for my fellowship work from July 'til December. It doesn't have to make any sense to you, it means sense to me. Where there's a clock drawn on these [mind mapping diagram] that means that I need to make time in my life in these six months to do the work that I needed to do. And on this date I can remember what I had here was so much in my head that I needed to do over the six or seven months, that I needed a way of visualising the whole stream of tasks and figuring out what was important.*

> *P8: So you know, at the beginning of March, I'm gonna have to do another lot of [Module X] teaching prep. I don't need to, so I can move it, you know, and actually the very physical act of moving it... you know... either to the back of the page like that one is, or to another future date kind of says I have done this now, I don't need to worry about it anymore. But you can see, I've only got one in March because what that means is, I don't need to worry about it in February.*

In contrast, most participants preferred to use electronic-based tools to manage events they needed to attend such as appointments, seminars or lectures because they provided automation affordance. They used such tools to set reminders for their tasks (P15) as well as to rearrange them according to deadlines or priority rankings (P26):

> *P15: So let's say you sent me an email with a document you wanted me to read and comment on, then I receive that email, I can set up a task for myself which says I have to do this, and then I can set a deadline by which I have to do it, but I don't have to choose an actual time when I'm gonna do it. I can set up a reminder... so I might say "Ok, I don't need to do this before until our next meeting which is in two weeks' time", so I remind myself a week before we're gonna meet that I need to read it in that week, and then it will be on my to-do list for that week and I can do it then.*

> *P26: Um, because I think it immediately reorders the list. You know, if I want to... if you write things on a piece of paper, you know, [laughs] you can't do it in that sort of way. I'm also allowed to put in... um, so if you put... um a number 1, you can prioritise. In addition to assigning the date that you want, um, to do [the] thing. Um...you can also put in, um, a priority from 1 to 9, I think, um, and if you put priority '1', it will show up on the day so it also serves as a diary and if you then go to the day view... this is why I do this thing.*

This section has established a wide range of external factors that impact on personal task management behaviour. It has explained that, in addition to internal factors, participants also have to weigh external factors, particularly pertaining to the size of tasks and time constraints. The section has also related between both the external and internal factors (described previously). The following section describes a member-checking study undertaken to validate the key findings from the interview study.

## 4.4 Validation

In order to validate the findings, a member-checking exercise was undertaken. This section will explain this in three sub-sections:

1. Approach
2. Feedback
3. Discussion

### 4.4.1 Approach

A feedback information sheet, as shown in Appendix F and based on findings from the previous interview study was prepared. Instead of providing an exhaustive explanation of the findings, it was essential to identify the key elements and present them in a succinct format which participants could easily understand and absorb. It is important to highlight that the feedback summary sheet (see Appendix F) was adapted from a member-checking template proposed by Turner and Coen (2008). Rather than presenting the findings in detail, Turner and Coen presented a summary of findings, including only the key points/concepts, main issues, causes and solutions, to their participants. It was not essential to provide definition for each of the items/terms included. Their approach motivated the author to implement a similar approach.

The author identified that the main themes gathered from the findings were brief definitions of activities that people undertook in order to manage their tasks, and the internal and external factors that influenced these activities. Thus, these findings were included in the feedback sheet (see Appendix F). The feedback sheet also included important recommendations based on the findings. Additionally, the author included user quotations as evidence and as justification for each of the key concepts/findings identified. The need to supplement the findings with respective quotations was inspired by the member-checking undertaken by Furniss (2008), who also included users' quotations in his feedback report. This was important as it allowed participants to assess whether the concepts/categories presented in the findings were appropriate and made sense to them. To test the transferability of the findings to similar contexts, the feedback sheet was also disseminated to academics who had not been involved in the previous interviews.

The feedback sheet was checked both internally and externally. Internal participants were the academics who took part in the interview study whereas external participants

referred to academics who had not been involved. The sheet was sent to 28 participants (14 internal and 14 external). Of these, 14 participants provided feedback (7 internal and 7 external) through email. This return was considered to be adequate when compared with outcomes from previous studies (Furniss, 2008; Turner and Coen, 2008). They conducted their member-checking exercises via email rather than in face-to-face interviews. Furniss (2008) has explained that process of sending back the report (containing the key findings from his study to participants) enabled him to achieve two objectives: fulfilling the ethical purpose of checking whether they are happy with the quotations used, and giving opportunities for the participants to check the accuracy of the interpretation of the quotation. Returning to member-checking conducted by the author, in the email invitation sent to participants, they were instructed to read the feedback sheet containing a summary of the findings and invited to provide comments. They were also allowed to raise any questions about both the summary and the member-checking exercise itself. For example, they could ask the author to explain what they were supposed to do, or to explain about the findings or any concepts (provided in the feedback sheet) that they did not understand. Table 4.5 summarises the roles of the participants who agreed to participate in the member-checking exercise.

Table 4.5. A summary of participants who participated in the member-checking exercise.

| **Type** | **ID** | **Job title** |
|---|---|---|
| Internal (I) | P3 | Postdoc researcher |
| | P4 | Research project manager |
| | P7 | Postdoc researcher |
| | P17 | Lecturer |
| | P18 | Senior lecturer/Head of department |
| | P24 | Professor |
| | P26 | Professor |
| External (E) | P1 | Senior lecturer |
| | P2 | Associate professor |
| | P3 | Senior lecturer |
| | P4 | Senior lecturer |
| | P5 | Senior lecturer |
| | P6 | Assistant professor |
| | P7 | PhD student |

### 4.4.2 Feedback

The responses of the participants in the member-checking exercise can be classified into four categories as follows:

1. Agreements.
2. Disagreements.
3. Related issues/questions.
4. Suggestions.

#### 4.4.2.1 Agreements

The majority of the participants agreed that the framework was accurate and that it represented their experience of managing their tasks. Most of the participants also confirmed that the proposal for the use of future tools matched their needs. They agreed that the framework was well-organised, represented all the activities involved and covered the factors that would influence how they managed their tasks (I_P18, E_P2 and I_P26 ):

> *I_P18: I feel it represents my views and I don't have anything to add.*

> *E_P2: The findings are quite accurate in picturing academic people. […] the three main processes highlighted the key elements that we should be doing properly. Yes, the proposals suggest that all the factors should be considered.*

> *I_P26: Both the categories and classifications into processes and factors made good sense.*

Only two of the participants expressed the view that it was difficult to distinguish between the activities of planning, prioritisation and list-making. For example, one participant believed that prioritisation and list-making was part of planning (I_P3):

> *I_P3: Hard to tell the difference between them. Isn't prioritisation and list-making part of planning?*

Participants also agreed that future tools should provide features or functions that went beyond those currently provided by existing tools (e.g. I_P26). For instance, the tools that allowed them to match between task complexity and time-scale would be something new and potentially useful (I_P18):

> *I_P26: A tool designed in accordance with proposal [E] would be very useful and represent a distinct advance on what is currently available.*

> *I_P18: Your proposal for a tool that is dynamically able to link task complexity and time sounds potentially very useful.*

#### 4.4.2.2 Disagreements

There were several participants who expressed minor disagreement about the findings and proposals suggested. For example, one participant argued that Q21 and Q23 (as provided in Appendix F: 1 – Evidence) represented effort and ease of task rather than motivation and interest (I_P3). Another participant explained that he was unable to distinguish between Q10 and Q15 (E_P5):

> *I_P3: Q21 and Q23 are more about effort and ease rather than what you fancy doing.*
>
> *E_P5: To me, 'Time' is a subset of 'Duration'. How can I differentiate them? (e.g. Q10 vs. Q15).*

In terms of the limitations of existing tools, one participant explained that people still used conventional ways to manage their tasks because of a lack of awareness of available tools. It is thus important to highlight both the features and functions provided by existing and future tools and how they could be of benefit (E_P3):

> *E_P3: I tend to use a traditional method. My tasks are still manageable using this method. A little exposure to such tools may influence people to use conventional ways.*

One participant stressed that it was important to rely on tools that were not too complex but rather simple and more straightforward. The more complex tools that were intended to capture the reality of their actual lives, i.e. by attempting to include all the factors involved, she felt might cause difficulty for users in managing their tasks. She believed, although current tools had not addressed all the factors involved, they were still useful due to their simplicity and adequacy (e.g. E_P7):

> *E_P7: I prefer to use software which is simple and straightforward. If you come up with software that looks at all the factors and links and relations, then you would have a very complicated system. It might be useful theoretically but it will take too long time to learn or difficult to use. […] I would like to use software that allows me to list down my tasks, prioritise them, set a deadline, remind me of the deadline, and link the tasks to other resources.*

One participant disapproved of tools that tried to match different factors involved and provide tasks recommendations (I_P3):

> *I_P3: It seems controlling to me.*

The disagreements identified here, alongside the related issues and suggestions (which will be described in the following section), are addressed later in Section 4.10 (page

144). This is to show how the feedback (provided by the participants) was used to revise the developed PTM framework.

#### 4.4.2.3 Related issues/questions

This section illustrates issues raised by participants which might potentially be useful in refining or improving the proposals and findings. As the academic feedback summary sent to participants highlighted the important aspects of the findings and proposals, it triggered some to raise further questions. For instance, two participants questioned whether there were ways of each of weighing each of the factors considered by participants (E_P1):

> *E_P1: Are these factors equally important?*

Participant E_P6 raised a question about whether there was a relationship between existing personal task management methods - getting things done (GTD) - and the external factors identified. He further queried whether the creation of a relationship between the factors of time gap, task complexity and time suggested in the academic feedback form section [E] represented another factor:

> *E_P6: Does the method of organising/prioritising come into play here (External factors)? E.g. The 'getting things done' method or the zero inbox method?*

One participant raised some issues in relation to the proposed future tools. He doubted that he would be willing to specify the details of his tasks to accommodate the complexity of all the factors involved (I_P3). He further highlighted that he found it difficult to specify his tasks in detail and found it a challenge to predict the complexity of a certain task before he began it:

> *I_P3: I'm not sure I would want to be endlessly entering in task characteristics for all my tasks. […] It's a challenge to add information about tasks. For example, it is difficult to estimate the complexity of tasks until they are started.*

#### 4.4.2.4 Suggestions

Some of the participants provided suggestions for making the findings or proposals more reliable or detailed. It is important to highlight again that the academic feedback form summarised the findings rather than explaining them in detail. The author has excluded the sub-categories of all the factors involved, allowing the participants to understand the key concepts rather than the details of each. For example, due to the brief explanation, one

participant required that the ‘importance’ factor, explained in Chapter 4 in detail, should be clarified further (I_P4):

*I_P4: Need more clarification on ‘importance’ factor.*

Other participants pointed out that some concepts seemed unclear to them and suggested constructive improvements. Participant I_P7 suggested a slight change that could be made to the description of external factors to make it clearer. Another participant identified that one of the factors involved (the effective use of time) could be classified into both internal and external factors (E_P6):

*I_P7: Change your description of 'external factors' to 'factors related to an individual's environment rather than to the individual themselves' or something similar, as I find the current wording confusing (the term 'surrounding individuals' is unclear to me).*

*E_P6: The distinction between the two might be more blurred under certain factors (e.g. effective use of time to me seems like a factor that is a direct combination of both internal and external factors).*

Two participants suggested that there could be more factors involved (I_P3 and E_P4). They explained that human-to-human relationships or team factors also played a vital role in assisting them to manage their tasks. In particular, one participant highlighted that the strategy of delegating/assigning her tasks to her students according to their capability also helped her in tackling her tasks (E_P4). Another participant suggested that regular advice provided by his supervisor or mentor was a critical human factor or medium which assisted him in managing his tasks more effectively. He regarded it as a useful check and balance, enabling him to control his actions and encouraging him to move forward (I_P3):

*I_P3: There may be more other factors involved.*

*E_P4: I think you missed this important point "student". My students help me a lot in managing my tasks. […] It is more human-human relationship. I divide my tasks according to student capabilities. Students who are good in programming will help students who are good in writing and analysing. We work as a team.*

*I_P3: To improve task management, people have to look back too; learning how to manage tasks better when you have over and underestimated time-frames and complexity; feeling good or bad about what you have achieved which is important for keeping sane and moving forward too; auditing and advice by a supervisor or mentor so more collaboration is needed at points.*

Finally, one participant added that personal task management is not only about managing tasks that people 'should' or 'could do' but also about considering tasks that people 'want' to do (I_P3):

> *I_P3: Would add 'want to do' tasks as well, which is different from 'should or could do' tasks – it's not just about getting jobs done in the available time.*

### 4.4.3 Discussion

The results gathered from the member-checking exercise showed that the majority of participants agreed with both the findings and proposals [A]-[E] (as shown in Appendix F). They confirmed that the Personal Task Management (PTM) framework was accurate, well-organised, and represented their experiences of managing their tasks. They showed no major contradictions between the framework and their actual experiences but rather made positive comments or suggestions that the author was able to use to reflect on the findings for the main study. Participants' responses also confirmed that there were no important concepts that were omitted from the framework.

However, there were two participants who found it difficult to differentiate between the activities involved. One possible reason is they are parts of the same thing. One category is a sub-category or super category of the other. For instance, in order to manage their personal tasks, people tend to undertake both the planning and prioritization activities. The planning activity consists of two sub-categories: task identification and task scheduling. The focus on the prioritisation activity is to review and rearrange the sequence of tasks to be completed.

Most participants also agreed with the proposals for future tools. Some, particularly less busy academics, notably the PhD student and postdoctoral researcher, pointed out that the tools would be particularly useful to busier academics rather than to them. As the author expected, some participants from this less busy group of academics were inclined to use more conventional or simple recording tools (e.g. electronic or paper-based task lists) and felt that they were adequate.

In contrast, senior or busier academics responded positively to proposals for being able to access more complex or technologically 'intelligent' tools which could match, compare or 'weigh' the different factors and provide more active task/time recommendations, which went beyond features provided by existing tools on the market. This, they thought, would be beneficial, particularly for very busy academics in choosing the right tasks to tackle

and the time within which they should be completed. In contrast, less busy academics usually have one or only few projects or tasks to do and more available time gaps in which to undertake them and tended to use conventional or simple tools, feeling that they were adequate for their purposes. This is in accordance with the findings from the interviews and video-diary studies discussed in Sections 4.3.6 and 5.3.5.

There was no disagreement. There were only two participants who disagreed with the interpretations of the user quotations, believing that those quotations could represent concepts other than those identified by the author. There were two possible explanations for the disagreements from one internal and one external participant. Firstly, the three underlying activities are closely interrelated. They tend to happen simultaneously, rather than exist independently. For instance, in order to plan their tasks, people are inclined to create explicit lists from which they can externalise the cognitive activity. There is also a tendency to review and rearrange their tasks while they are making lists. It is therefore challenging to differentiate the subtle differences between them. To address this, the researcher noted that it is important to refine the descriptions of the underlying activities involved and their representations in the PTM framework.

There was one difference in the feedback provided by the internal participants when compared to the external participants. The majority of external participants tended to scrutinise and provide comments for each of the individual sections provided in the participant feedback form (see Appendix F). By contrast, most of the internal participants preferred to provide overall or general comments about the findings (see Appendix G). One possible reason for this is that the internal participants had previously been involved in the interview study and so had a general understanding of the study. As the findings were based on the data gathered from their interviews, it is to be expected that the findings seemed familiar and therefore they were less likely to question them. On the other hand, external participants were not involved in the study and therefore may have been inclined to review the findings more critically and relate them to their own experiences of managing their tasks.

## 4.5 Revisiting the PTM framework

The feedback gathered from the member-checking was used to revise the PTM framework. The author identified key points of disagreements, issues or suggestions (as explained previously in Section 4.4.2), and considered whether there should be any revisions or modifications to Version 1 of the proposed PTM framework (as previously shown in Figure 4.3). Table 4.6 summarises the actions that the author undertook following the feedback

gathered from participants. While no major changes needed to be made to the framework, additional description was added to 'External factors' to redefine it.

Table 4.6 Actions undertaken in response to the feedback received from the member-checking.

| **Categories of the findings from the member-checking exercise (related to the PTM framework)** | **Point/Highlight** | **Action** | **Reason** |
|---|---|---|---|
| Disagreements | Participant I_P3 argued that Quotations 21 and 23 (as provided in Appendix F (Section 2 – Evidence)) represented effort and ease of task rather than motivation and interest. | No changes/ modifications | As explained in Section 3.3.5.2, the analysis is based on individual interpretations, which can differ from one participant to the next. However, it is essential to ensure that the evidence (from quotations) justifies each participant's interpretation. The two concepts suggested by this participant (effort and ease of task) can be associated with the size and complexity of task, which have already been represented in the proposed PTM framework (see Sections 0 and 0). |
| | Participant E_P5 explained that he could not distinguish between Quotations 10 and 15 which represented 'Time' and 'Duration' factors respectively. | No changes/ modifications | Only one participant believed that task duration referred to a period of time within which tasks are completed and can be sub-divided into two categories: short and long-term. The author, however, classifies time into two sub-categories: gap and allocation. Time gap refers to an available/free slot of time during which tasks can be completed. This can be further classified into small (e.g. a couple of minutes to an hour) and large (a couple of hours to a day). On the other hand, time allocation refers to the time that participants set aside or scheduled to complete a task. Detailed descriptions of these concepts are provided in Section 4.3.6.4. |
| Related issues/questions | Participants E_P1 and E_P6 questioned whether there are distinct contributing weights or scales | Not included in this thesis. | This provides a potential area of future research. The aim of this study, however, is to identify factors contributing to PTM activities rather than determining the relative |

| | | | |
|---|---|---|---|
| | associated with each of the factors considered by participants. | | significance of factors involved. However, this highlights a potential area of interest for future research. This is discussed further in Chapter 8. |
| Suggestions | Participants I_P4 required more explanation of the 'importance' factor. | No changes. | This point has been explained in detail in Section 4.3.6.1. |
| | Participant I_P7 suggested a slight change that could be made to the description of external factors to make it clearer. | Changes (i.e. additional points) were made to redefine the factor. | The description of external factors which the author originally referred to as 'independent factors surrounding individuals' was changed to 'factors which are related to an individual's environment that influence what she/he chooses to do at a certain time' (see Section 4.3.6) . |
| | Participant E_P6 suggested that one of the factors involved (i.e. the effective use of time) could be classified as both an internal and external factor. | No changes | One participant. The author refers to 'internal factors' as psychological aspects that influenced how people manage their tasks (see Section 4.3.5). In contrast, as mentioned in the row above, external factors refer to factors that were outside the control of participants' own psychological factors. Returning to the 'effective use of time' factor, the author refers to it as a time where participants felt productive in using the time to perform a certain type of task. Here, the focus is on 'a sense of productivity' rather than the time itself. For example, some participants 'felt' more productive in the morning and thus tended to devote this time to writing tasks. The author decided that this 'feeling' is more appropriately categorised as internal or 'related to the person'. The 'time' factor represented by external factors focuses on the period of time (i.e. gap or allocation) rather than an individual psychological experience/feeling (see Section 4.3.5). |
| | Participants I_P3 and E_P4 suggested that there could be more factors involved. They explained that relationships or team factors also played a vital role in assisting them in the management of their tasks. | No changes. | This factor is addressed in detail in Section 4.3.6.3. |

The previous section has explained the member-checking undertaken to validate the findings from the interview study. It has also shown how the feedback gathered from the exercise was used to revisit the findings. The following section discusses key findings, in particular, factors related to personal task management behaviour in relation to previous literature. The aim is to identify similarities and differences between these studies, and highlight factors that have not previously addressed.

## 4.6 Discussion

The section to discuss this chapter is divided into two sub-sections:

- Comparisons with existing literature related to personal task management activities.
- Comparisons with existing literature relating to personal task management factors that impact on the activities.

### 4.6.1 Comparisons with existing literature related to PTM activities

As we have seen, the findings describe in detail three underlying activities of personal task management:

1. Planning.
2. Prioritisation.
3. List-making.

As highlighted in Section 4.3.3, the author identified planning, prioritisation and list-making as three essential and interrelated activities that participants undertook in order to manage their tasks. This is in line with research by Blandford and Green (2001) and Green and Skinner (2005) who also describe the importance of planning and prioritisation activities. Their coverage of these activities is, however, sparse. The findings from this study also support the definition of prioritisation suggested by Yli-Kauhaluoma (2009) who refers to it as an activity of making reasonable judgements in determining what tasks need to be done and when to do them.

It is evident that list-making is an important activity that underpins personal task management. This is supported by previous research conducted by Payne (1993) and Blandford and Green (2001) which asserts that creating list of tasks assists people in managing them. Both of these studies show that people use various mechanisms (for example diaries or to-do lists) to represent the tasks that they intend to do in the future. The findings

also confirm research conducted by Mackay (1998); Dix et al. (1998); Bellotti and Smith (2000); and Blandford and Green (2001) that show that people rely on implicit task lists such as mental lists, physical cues, emails and scraps of paper to represent their future intentions. However, none of these studies has explained in detail two important activities related to task lists:

- How people manipulate their task lists.
- How list-making activity supports people in the management of their tasks.

The findings in this study provide a detailed understanding of how people manipulate their task lists and how they are supported by them. This section discusses the most significant manipulation activities people undertake: categorising and drawing.

It is evident that people categorise their tasks according to their size. This assists them in differentiating between their tasks and determining when they will be done. Some people explicitly create task lists that are intended for big tasks rather than including them in lists which detail smaller tasks. This however, is not adequately addressed by previous studies, as a mechanism that allows people to separate or distinguish between different sizes of tasks has not been provided. For instance, a personal activity management tool proposed by Gonzales et al. (2008) allowed people to categorise their tasks into a number of action categories: 'Inactive', 'Do it as soon as possible', 'Scheduled', 'Delegated', 'Someday', 'Reference', 'Done' and 'New Project'. It is important, however, to note that most people, the participants in this study included, are inclined not to classify their tasks based on these categories. In another example, Bellotti *et al.* (2004) and Gil and Chklovski (2007) proposed a feature that enabled people to categorise their tasks based on importance or priority. Conversely, the PTM framework in this study shows that most people tend not to create explicit representations to define or assign the importance or priority of their tasks. They believe that they have an implicit understanding of these factors and find them difficult to externalise.

The findings show that drawing is an important task manipulation activity. However, little is known about what encourages this behaviour. The findings suggest drawing or sketching activity can assist people to express their feelings towards their tasks. Some tend to circle some of the items in their task lists in order to remind them about the importance of the tasks, so they are aware of them and try to do them as soon as they can. The findings also identified that some people tend to draw objects such as clocks and keys alongside their tasks on the maps. These implicit and personalised representations provide visual cues which assist in the management of tasks. This is in line with previous findings that suggest people tend to

scribble (Bellotti and Smith, 2000b; Bellotti *et al.*, 2004; Bernstein *et al.*, 2008) and draw spatial maps to represent their lists. This allows users to review their overall tasks as well as to take into account constraints or relevant factors that need to be considered (Taylor and Swan, 2004).

Previous research gave little attention to describing how task manipulation activities can assist people in managing their tasks more effectively. The findings in this study explain that, by making lists, people can visualise a broader understanding of what tasks they are going to do, how they are going to do them and when they need to be done. Moreover, they can visualise constraints that they need to consider in order to manage them. It appears that physicality and task representation are two significant aspects of task management that can help people to manage their tasks better. As discussed earlier, some people tend to draw mind maps and attach and move around sticky notes on a paper calendar. This helps them to feel more engaged and increases their motivation to perform their tasks.

This greater engagement seems impossible to achieve by relying on conventional task lists alone, as it is difficult to distinguish between the tasks. Lists also lack representations of time properties to determine when the tasks could be performed or the deadline by which they need to be completed. Moreover, they lack the flexibility that allows people to move their tasks around and easily rearrange them.

The author suggests that there should be alternative tools that represent tasks spatially rather than as a 'wish list'. Furthermore, the tools should provide adequate visualisations both of tasks and underlying factors - such as time gaps, size of tasks and deadlines - that people need to consider in order to manage their tasks more effectively. In the following section, the underlying factors that impact on personal task management behaviour are discussed.

### 4.6.2 Comparisons with the existing literature relating to PTM factors

As mentioned earlier, the framework classifies a wide range of factors which impact on how people manage their tasks. However, previous research has provided a limited or contradicting explanation of factors that influence personal task management behaviours. This leads to a partial understanding of how people manage their tasks, and what the adequate tools to assist them to better manage their tasks could be. One of the significant contributions of this study is that it shows hierarchical classifications of factors that suggests why people manage their tasks in a certain way. For example, what factors influence people to prioritise a

certain task over other tasks. To discuss this in detail, the following section is divided as follows:

1. Internal factors.
2. External factors.

The study shows that there are various internal factors that significantly influence how people manage their tasks: emotion, motivation and mental/physical strength. They appear to be significant to determining what people want to do at a particular time. One study suggests that people who have positive feelings can plan their tasks and stay focussed (Claessens *et al.,* 2010). The findings reveal that people tend to experience negative and positive feelings when trying to manage their tasks, and both influence what tasks people choose to do first.

People have certain emotions towards their particular tasks. This might influence them in choosing what tasks they are going to do next. For example, some people feel excited by research tasks but hate teaching, and in particular, marking tasks. Hence, they might have a tendency to defer these tasks and choose to do preferred tasks first. Besides that, people tend to feel bored or annoyed by the nature or complexity of their tasks rather than due to the representations of task lists. As a result, people might tend to switch to other tasks that are more interesting to them or take a break. However, this does not mean that the task will not get done. This supports work done by Claessens, *et al.* (2010) that suggests that task attractiveness is not related to task completion.

Previous literature highlights that motivation can also encourage people to complete tasks that they have planned (Claessens *et al.*, 2010). They assert that people are motivated to undertake their tasks if they are aware of their importance. We further expand this by showing that people's motivation to do their tasks can increase for other more specific reasons, e.g. by being aware of task deadlines, discovering exciting findings, getting feedback on their work from other people or working in a comfortable environment. These lead people to pursue their task or complete it. In other situations, the period of time in which they feel stuck or less productive can also stimulate their motivation to do their tasks.

The study identifies that the mental/physical strength also strongly influences people's personal task management behaviours. People consider this factor in order to choose what tasks they want to do. It also determines how many tasks one can complete, and when they can start or continue doing the tasks. It is evident that people need to be in a certain

mental space in order to complete their tasks effectively. For example, one might choose to do a writing task at a time when they feel ready to undertake it. Conversely, they might choose to switch to another task if they are less mentally prepared for the one at hand. This mental stability suggests a reason as to why people tend to do less important or small tasks rather than the big or important tasks first. Mental stability can also be associated with the level of concentration that can be given to a task.

As highlighted earlier, previous research explains a limited range of factors that impact on personal task management behaviour. For instance, it has been suggested that urgency and importance are common factors that determine how people manage their tasks. In fact, this framework not only defines both notions in detail but also shows the relationships between them as well as explaining a wide range of external factors that influence the behaviour. Among these factors, at a higher level, it appears that task and social factors strongly determine how people choose to manage their tasks. Each of these factors, in particular task factors, can be further described by other sub-categories: urgency, complexity, size, accomplishment and duration.

Firstly, the findings identify that urgency is not the only factor that influences how people manage and prioritise their tasks. Previous studies have suggested that urgency and importance are two distinct factors (Barry *et al.*, 1997; Bellotti *et al.*, 2004; Covey, 2004). In this study, urgency refers to how soon people have to undertake a certain task. This is in line with the previous research which refers to it as the extent to which it is relevant to engage with tasks as soon as possible (Claessens *et al.*, 2010). One study has suggested deadlines as a factor that determines the urgency of tasks (Bellotti *et al.*, 2004). However, the framework reveals that urgency is not only determined by the deadline. It is also determined by two other factors: importance and opportunity (to perform a task). For example, a task can become urgent if it is important (e.g., if it is a directive from a superior even though it does not have an explicit deadline) or if one has limited opportunity to perform it. This contrasts with the previous literature that defines urgency and importance as two orthogonally independent concepts. As explained in Section 2.6.2.2, Covey (2004) suggested that the concept of the time management matrix (see Table 2.3) can be used to prioritise tasks. He further explained that a particular task can be identified into one of four task categories: urgent and important, urgent but not important, important but not urgent or not important and not urgent. Covey recommended that people should focus on doing important but not urgent tasks. Blandford and Green (2001), however, highlighted that people find it difficult to prioritise and explicitly distinguish their tasks based on these two dimensions (i.e. urgency and importance). The

relatedness between urgency and importance concepts (as explained previously in Section 4.6.2) suggests that therefore, it is a challenge to dissociate them. As explained in the section, the more important the task, the more urgent it can be. It is also evident that people find it difficult to weigh the importance of their tasks when they have a large number of tasks concurrently. It is also difficult for people to externalise the importance of their tasks explicitly (either by scaling or ranking them).

The complexity of determining the urgency and importance of tasks is not the only consideration. It is also challenging for people to manage their tasks due to other factors that are associated with the task as well as time constraints (for example, size and complexity of tasks and time gap that they have). For instance, some people tend to undertake and finish small tasks first before they begin and concentrate on their big tasks. In other situations, some people tend not to want to start big or difficult tasks if they only have relatively small time gaps during the day. However, little attention has been given to addressing these subtle factors that people consider in order to manage their tasks.

Besides the task factors, it is significant that social factors emerge as one of the important factors that influence personal task management behaviour. Previous work has highlighted other factors that help people to prioritise their tasks. These include relationships (i.e. who is important), or participant dependencies (Bellotti *et al.*, 2004). However, the study has not sufficiently discussed how social factors in particular affect the way people manage their tasks. For instance, it is not clear who is considered to be important or what makes them important. The framework identifies that people have various commitments (or demands) that come from various people with whom they have different relationships. This includes their superiors, colleagues, students, researchers, etc. People tend to undertake tasks for people whom they have these sorts of relationships with. Nevertheless, it is still a challenge for people to juggle different tasks to satisfy/fulfil other people's requests at a time.

The study suggests some reasons that make these social factors significantly impact on people's personal task management. People believe that it is important for them to undertake tasks that are important or can contribute to other people's goals or benefits. This confirms previous research that suggests that in order to prioritise tasks, people need to know who they are doing the tasks for (Bellotti *et al.*, 2004). Hence, they tend to prioritise tasks that involve other people rather than their own or personal tasks. The framework shows that people tend to do tasks that contribute to other people's goals in order to help acknowledge their contribution to them in the past or simply to show their concern for them. This suggests

that people often do not choose to do tasks that are related to their own work or personal goals. This conflicts with previous research which has shown the importance of undertaking tasks that are related to participants' own work or which contribute to their personal goals (Ailamaki and Gehrke, 2003; Claessens *et al.*, 2010).

## 4.7 Limitations of study

The study has several limitations. Firstly, it was based on participants in one academic organisation in the UK. Hence, the framework proposed might not be generalisable to other organisations, particularly ones which have different contexts or natures of jobs. However, the framework suggests factors that influence personal task management behaviour of people who have similar characteristics (i.e. very busy people) who are involved with a wide range of tasks (e.g. teaching, research and administration).

Another possible criticism of this study is that the findings were based on qualitative analysis and in particular, the interpretations the researcher made of the data. One might argue that the results could be interpreted in different ways and hence give other perspectives that were not highlighted here. To address this, it is important for the researcher to provide a selection of quotations as evidence to support the framework (i.e. narrative of the findings). Another important mechanism the research employed was to iteratively compare the previous data with current data and identify the similarities and differences between them. This helped the author to identify diversity of personal task management concepts (i.e. activities and contextual factors involved) informed by participants.

Another limitation of this study is that it was based on an hour-long interview. This might limit descriptions that participants could give to the researcher. This might also hinder the researcher to understand the bigger picture (or reality) of their life and what really matters to them. To address this, it was important for the researcher to refer to their tools that participants used to manage their tasks. This allowed the researcher to ensure that the conversation was rich enough and specifically based around understanding aspects that were related to personal task management.

Finally, it appears that the social factor emerges as one of the important factors that influence personal task management. This might be due to confounding variables in which participants who took part in this study were considered as people who were socially-oriented (i.e. had a concern towards other people and therefore agreed to participate). The framework

might not represent people who were more self-oriented (i.e. were more concerned about their work) and had less of a concern towards fulfilling other people's needs.

## 4.8 Summary

To summarise, it is imperative to highlight the main contributions of this study. Firstly, the study has developed a detailed framework of personal task management. The framework identifies that personal task management is underpinned by three underlying activities: planning, prioritisation and list-making. More importantly, the framework explicitly defines and distinguishes each of these activities, describing what is involved in those activities and explaining how they support people in managing their tasks.

Secondly, the framework describes a wide range of factors that influence the behaviour and shows the relationship between them. In general, they can be classified into two categories: internal and external. Internal factors are factors that are related to the individual. This can be further divided into 5 sub-categories: emotion, mental/physical strength, motivation, interest and effective use of time. The findings elaborate how these factors influence people in deciding what tasks to do at a particular time. Among these, emotion, mental/physical strength and motivation appear as determinant factors that affect their choices.

Thirdly, and more importantly, the framework describes a detailed hierarchical decomposition of external factors that suggest why people choose a certain task over other tasks. It shows the division of some of the factors into their respective categories, suggesting how they are related to each other. The external factors refer to factors that are associated with the individual's environment, which can be categorised into 5 sub-categories: task, environment, social, time and tools. Among these, task and time emerge as the two most influential factors that influence personal task management behaviour. In particular, people tend to match the size and complexity of their tasks with the available (or possible) time gaps that they have to undertake them. These go beyond the two notions (importance or urgency) which have long been assumed as the main and orthogonally independent factors that inform how people manage their tasks.

# Chapter 5: Video-diary study

Chapter 4 has shown some of the inconsistencies identified between the findings gathered from the interview and the member-checking studies. The limitations of both studies were also explained. Such issues motivated the author to conduct a video-diary study to further investigate PTM behaviours and conduct deeper analysis. This led to the development of Personal Task Management framework version 2 (see Figure 5.1). This will be further explained in this chapter, which is divided into the following sections:

- **Objectives** – explaining the objectives of the study.
- **Method** – discussing procedure, sampling choice and materials employed.
- **Findings** – describing in detail the key concepts that emerged from the study.
- **Validation** – confirming the key findings derived from the previous interview study.
- **Discussion** – discussing the main findings of this study in relation to previous work.
- **Summary** – highlighting the key findings of the study.
- **Limitations** – explaining the limitations of this study.

## 5.1 Objectives

The study built on the earlier interview study to further understand how people manage their personal tasks and how to better support them. The video-diary study was undertaken for three reasons. First, the video-diary study was not the main study but it was rather pursued as a second mechanism (in addition to the member-checking study – the first validation mechanism) to validate the key findings from the main interview study. Both mechanisms aimed to determine the PTM activities and factors that influence the activities (which had been identified in the main study), rather than to explore new research topics/agenda. Second, the video-diary study was employed to resolve inconsistencies identified between the interview and the member-checking studies. The video-diary study was also aimed at improving the understanding of PTM behaviour and therefore extending the PTM framework based on the findings from the previous interview study. This is in line with the decision that had been put forward in the research roadmap, which identifies the objectives and scope of the thesis (see Table 1.1)

## 5.2 Method

### 5.2.1 Sample and materials

The same approach for recruiting participants and materials used to gather data described in Section 4.2.2 was used. In brief, the author personally approached potential participants and invited them to take part in the study via email and meeting appointments. They were had the objectives of the study explained to them as well as what they were required to do throughout the study. They were also informed that they could contact the author if they needed further assistance, clarification or to withdraw from the study. Table 5.1 shows participants who took part in this study.

Table 5.1. A summary of the participants and their main personal task management tools.

| **Participants** | **Gender** | **Role** | **Current Tools Used** | **Participated in the previous interview study (participant id-see Table 4.1, p.100)** |
|---|---|---|---|---|
| V1 | Female | Professor | Calendar (Google), paper calendars, sticky notes and email inbox. | √ (P8) |
| V2 | Female | Professor | Calendar (Google), email inbox | X |
| V3 | Male | Post-doc researcher | Paper diaries, sticky notes, paper and electronic (mobile phone) task lists. | √ (P3) |
| V4 | Male | Post-doc researcher | Calendar (iCal) and whiteboard | X |
| V5 | Female | Post-doc researcher | Paper-diaries and email inbox | X |
| V6 | Female | PhD student | Electronic calendar and paper-diaries | X |
| V7 | Male | Lecturer | Electronic calendar and electronic task list (Things) | X |

Of these participants, V1 and V3 were the same participants as P8 and P3 respectively and were previously involved in the interview study (see Table 4.1). Similar to the interview study, the participants recruited in this study involved students, staff in the early stages of their careers and senior staff. This group used both electronic and physical PTM tools. The participants were personally approached by the author to share their experiences of managing their tasks by observing them over a 1-3 week time period. As described above, prior to securing their consent, the study was explained in detail and participants were instructed on how the interviews would be conducted.

The study involving participants V1 and V2 was conducted between February and April (spring term). The other five participants (i.e. V3-V7) were observed and interviewed between September and December (autumn term). Both terms were considered busy terms for the participants for they had to undertake teaching (e.g. preparing/giving lectures), research and admin tasks concurrently. For example, for the tasks related to teaching, they had to prepare and give lectures throughout each term, create exam questions and do exam marking. In addition to their own research projects, they managed and completed admin tasks on a daily basis.

Regarding the materials used in the study, a digital voice recorder (Olympus) was used to record the interviews. ExpressScribe was used to transcribe the audio. NVivo was used to analyse the transcribed data. A flip-mino camera was used to capture videos of participants' task management tools and managing their PTM activities.

### 5.2.2 Procedure

The study was divided into three phases:

**Phase I:** As mentioned previously, an initial appointment was set up to explain the implementation of the study to the participant in detail. The objectives of the study and instructions for it were explained to the participant. The instruction sheet and consent forms are included in Appendix H. Following this, an instruction sheet for recording the video-diaries was provided to the participant to be signed if they agreed to participate in the study (see Appendix I). Next, a schedule of a one-week diary study and a follow-up interview was set up.

**Phase II:** Participants were asked to record their diaries based on the prompts given for between one and three weeks using a flip-mino video camera. Once or twice throughout the period of the study, they were reminded to record their diaries. Before submission of the camera footage, the participants were allowed to add, edit, view and delete their diaries, then the flip-mino camera was collected.

**Phase III:** During an hour's follow-up interview, the participant was asked about their diaries. Significant events or aspects of their video-diaries were selected and used as prompts for the interview session. The prompts were used to encourage them to explain or further clarify aspects of their diaries that might be of interest for the research.

## 5.3 Findings

### 5.3.1 Overview of the analysis and the contribution of the findings to thesis

The analysis of the video-diary study was conducted separately from the analysis of the interview study. The analysis was guided by the research questions in order to investigate concepts/explanations that could address them adequately. As described previously, the analysis seeks to answer the following three key questions:

| Question | Aim |
|---|---|
| *How do academics manage their personal tasks?* | To explore and compare PTM strategies employed by academics. |
| *Do existing tools provide adequate support/features?* | To investigate the PTM challenges faced by academics. |
| *What support or features do academics need?* | To highlight the strengths and limitations of existing tools, identifying the improvements that can be made. |

The findings from the analysis were used to inform the following thesis components:

- PTM framework.
- Personas.

The PTM framework, developed from the previous interview study, identified two areas of study: PTM activities and contextual factors. In the video-diary study, the author identified four additional areas/concepts to further inform academics' PTM behaviour (which will be further described following Section 5.3.3):

- Sources of tasks.
- Challenges (problems facing academics and how to address/tackle them).
- Nature of the job (contributing to the challenges).
- Perception (about their job and how to better manage their tasks).

Figure 5.1 (p. 166) distinguishes between the contributions of the interview and video-diary studies to the development of the PTM framework.

### 5.3.2 Overview of the findings

The findings section can be divided into two parts. The first part shows how the data gathered from the video-diary study was used to validate the findings from the interview study (described in Chapter 4). The second part discusses the findings from the video-diary study, which describe five more concepts to inform PTM behaviour (and each is discussed in more detail below).

The first concept identifies **sources of tasks.** It describes the medium (e.g. calendar, email) that represented or identified tasks that have to be carried out, and the important details that the medium contained.

The second concept explains **challenges** facing busy people, which can be divided into two categories: management and performance. Both categories refer to issues that people face in order to manage and complete their tasks. Some of the challenges identified by participants highlighted the limitations of existing tools and they suggested design opportunities to improve them which are described in detail in the coverage of the fourth and fifth aspects.

The third concept highlights the **contextual awareness** of users. This can be classified into two sub-categories: participants' perceptions of their task management tactics and habits, and the nature of their jobs. The findings reveal that existing tools tend to ignore these factors in their design and implementation, and thus contribute to some of the key challenges identified.

The findings further describe two other concepts that are worth further investigation. They include **usability aspects** and **design suggestions**. The findings reveal the inadequacies and limitations of existing tools and identify important criteria which should inform the design of future PTM. Some of the participants involved in the video-diary study proposed design ideas that are worthy of consideration. The ideas were based on their reflections on the

challenges, in particular the limitations of existing tools that they experienced throughout the study, providing, as we have seen, important design opportunities for future implementation.

Figure 5.1 shows the updated Personal Task Management (PTM) framework, which include additional concepts. The emergent concepts will be described separately, and each of them contains further categories/sub-categories to be explained in detail. The second part of the findings ends with a brief comparison made between the key findings from the interview and video-diary studies.

### 5.3.3 Validation

In order to validate the findings from the interview study, the key concepts (categories and sub-categories) and their descriptions (which have been discussed previously in Section 4.4.3), were referred. The key concepts include:

- The underlying PTM activities (planning, prioritisation and list-making).
- The contextual factors (internal and external).

Based on these, the author determined whether these concepts appear in data gathered in the video-diary study. The author identified any evidence (i.e. quotations) that can be related to the similar concepts identified above (see Table 5.2). Overall, the findings from the video-diary study confirmed all the key concepts that had been identified from the interview study. There was no clear evidence that contradicted the findings. The following part describes the additional five concepts that emerged in the video-diary study (as mentioned briefly in Section 5.3.1 in detail

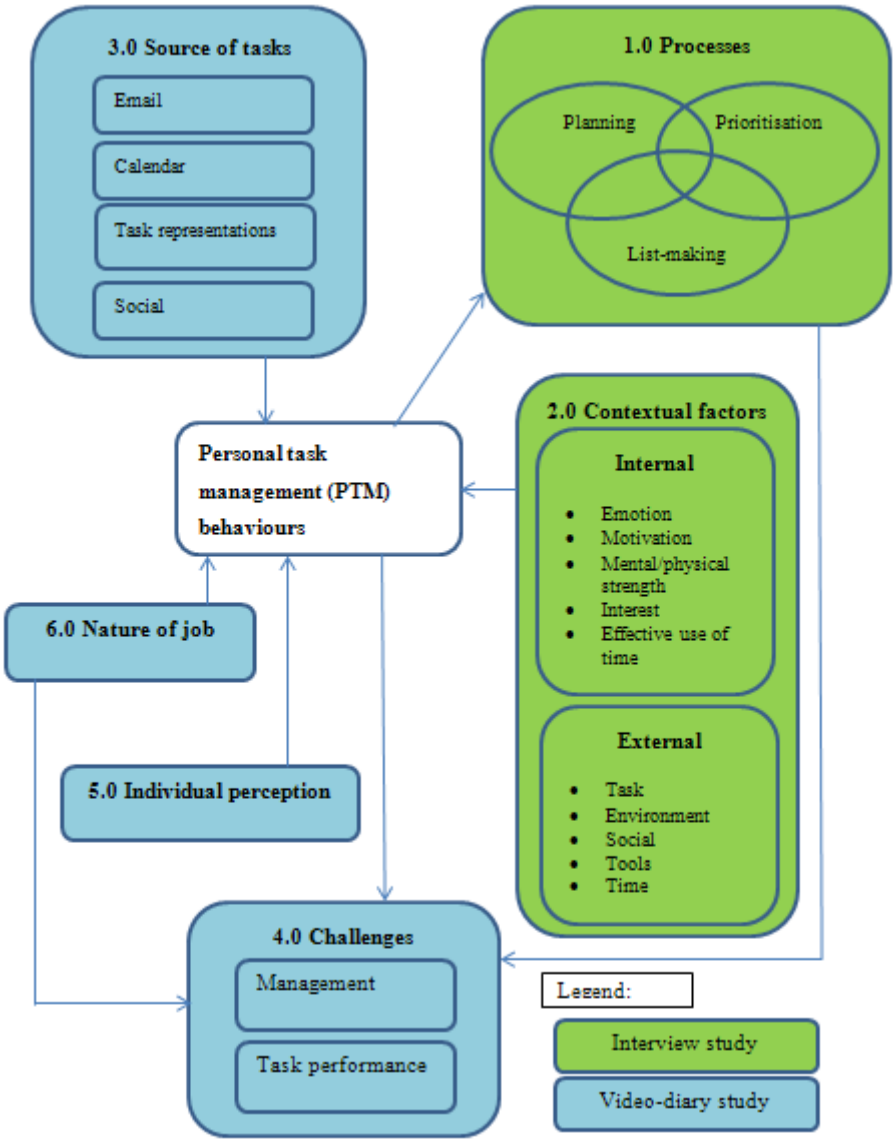



Figure 5.1 Personal Task Management (PTM) framework (version 2).

### 5.3.4 Sources of tasks

This concept can be divided into two categories (see Figure 5.2, p. 171): media and elements. The study identifies that the sources of tasks involve an overlap among four different media: email, task representations, social and calendars. The media are used to deliver and remind about possible tasks to be done as well as to manage them. It is worthwhile to mention that most of them have been discovered in the previous study but they were not presented explicitly. More importantly, the relationships among those media strongly emerge from the video-diary study. Before providing an explanation of this, it is important to first describe the different types of media that people use to manage their tasks. People highlight that the email inbox is one of the most important media that present a list of tasks that they have to do (V3).

> *V3: you have a lot of emails sitting there, which you go through… and it's almost like the first... task of the day, just to look if there's anything urgent.*

Some people tend to create other types of media to represent tasks that they need to do. For instance, they rely on to-do lists, notes or related materials that pile up on their desk (or exist virtually in their computers) to remind them of their tasks (V2).

> *V2: Task management is basically distributed across the diary…and the to-do list and the mailbox. Um, there's also some note I made about, um, phone messages and, um, some of them I've basically dealt well then followed it up. […] and a whole pile of papers here that all represent some form of work to do.[…] In the old days, you know, the piles on your desk, the paper piles would have got bigger and it wouldn't have got until the point where you say like, look, you know, I can't have it anymore. I need to basically go and work on… But a lot of this stuff is represented, you know, in a virtual way, not in a physical way.*

It is also apparent that social relationships and communications provide another potential avenue for people to initiate certain tasks (V2).

> *P2: So these basically, um, these are, um, business cards of, um, people who I met at the conference two weeks ago, and where we had some really interesting discussion conversation and agreed some action.*

Table 5.2 Evidence from the video-diary study to validate the findings from the interview study.

| **Concepts** | **Categories** | **Sub-categories** | **Sub-categories** | **Evidence (from the video-diary study)** |
|---|---|---|---|---|
| PTM activities | Planning | | | *V4: The white board is generally good for um the kind of longer term planning um and things that might easily be forgotten and perhaps not kind on the kind of radar for the weekly time scale. So there's a lot on there about things that I need to do over the next year or so or things that a kind of overall goals, my job.* |
| | Prioritisation | | | *V1: I have planned to start by processing my email and clearing it. In fact, I've decided to try to clear the pile of coursework marking. It's probably a higher priority because if I don't finish that today, then it's gonna be a problem for [Colleague A] to moderate in time.* |
| | List-making | | | *V5: So here I've got a new email [...] it looks like it needs some time to deal with, so I might write it in my diary that I need to respond this.* |
| Contextual factors | Internal | Emotion | | *V3: So for a half of the train journey I was wondering about that and feeling quite frustrated. Um so I think that's a certain amount of mood or emotion also impacts um working schedule what you feel like doing.* |
| | | Mental/physical strength | | *V3: So if you can't concentrate, and it's not worth trying to read anything* |
| | | Motivation | | *Researcher (i.e. the author): So what makes you tend to do so?*<br>*V3: Um I think it's self-motivation* |
| | | Interest | | *V3: Yeah I probably have to read a couple of chapters of my interaction design text book and those lecture slides over the weekend and maybe Monday to prepare myself for lectures Tuesday and Thursday um which is not fun.* |
| | | Effective use of | | *V2: I need some quiet time to* |

| | | | | |
|---|---|---|---|---|
| | | time | | *prepare for the interview.* |
| | External | Task | Urgency (Importance) | *V2: I try pick it up... pick up myself which one is important and do them in the order of importance.* |
| | | | Urgency (Deadline) | *V2: I've got a deadline to submit um edited paper um next Wednesday so I wanna get that out the way today* |
| | | | Size | *V2: But then there's always that... pressure I suppose... to get the main job done. But then all these little things like you shouldn't just say no.* |
| | | | Complexity | *V6: So now I wanna get on with this dissertation and see how it gets on. I sort of worked through it last night It was supposed to take two hour each but it takes a little bit more because I'm not quite sure. It's quite difficult to read.* |
| | | | Accomplishment | *V2: I need to block out the time that I'll be travelling because I can't schedule a meeting []. But on the other hand, you can do things while you're travelling right.* |
| | | | Duration | *V4: I guess it's so important to kind of not lose focus on this long term objective. It's just caught up in um the mayhem of the day. (duration)* |
| | | Environment | | *V3: I just got home um from the train and I managed to read one of the papers for the reading group tomorrow… and um... yeah so that leaves me just one to read on the train on the way in.* |
| | | Social | | *V2: This is a person I've got a relationship so, I just don't have the nerve to say 'No'.* |
| | | Time | | *V3: I had a meeting with [person y] and [colleague x] so I could just feed in a bit of reading and lunch between those two [tasks].* |
| | | Tools | | *V3: I... noted down a few things um to do on my [mobile phone] because it was next to my bed.* |

Calendars (or diaries) also appear to be one of the more important personal task management media. They inform what people have to do within a certain period of time. They also allow people to identify an explicit and finite representation of time in which to perform their tasks (V2).

> *P4: one aspect that perhaps some of the things that um we kind of rely on so much you know online calendars to plan our time.*

Returning back to the discovery of the relationships among those media, it is perhaps due to different elements that the media contain (which were not particularly examined in the previous study). This will be discussed in the following section in detail, suggesting their importance in assisting people in managing their tasks.

The study identifies three important elements that are contained in that the media previously discussed:

1. Task details.
2. Materials.
3. Time representations.

The task details might include description (i.e. what needs to be done), time requirements and period/organisation involved. The media (for example email or to-do lists) record the description of tasks that people might need to do at a certain time. These include events, appointments and solo tasks (for personal or social goals). The media may also underline unexpected issues or interesting ideas that people would like to solve or pursue (V2).

> *V2: It works reasonably well so, um, at the beginning of the year, the people here will coordinate exams, will send out a list of events... basically deadlines and events. […] On top of tasks that are visible here, there's an ongoing crisis with somebody else's doctoral student in my research group, um, which basically just brought up yesterday and, um somebody made a mistake, and something needs to be done. […] This is basically a meeting to discuss, um, our project proposal and we had a physical meeting about this last week, and generated some texts so basically by today, we're supposed to have filled in, um, our work.*

The media also contain some information regarding the time requirement to do the tasks. For example, the diaries might delineate the expected length of time required (or scheduled) or when they have to be done (V1). Additionally, they include specific time constraints, in particular, the important dates (for example pre- or actual deadlines) or times that people need to remember and adhere to (V4).

*V1: My day is gonna be very full- from 10 o'clock is meetings solidly until I go to [hobby X] this evening.*

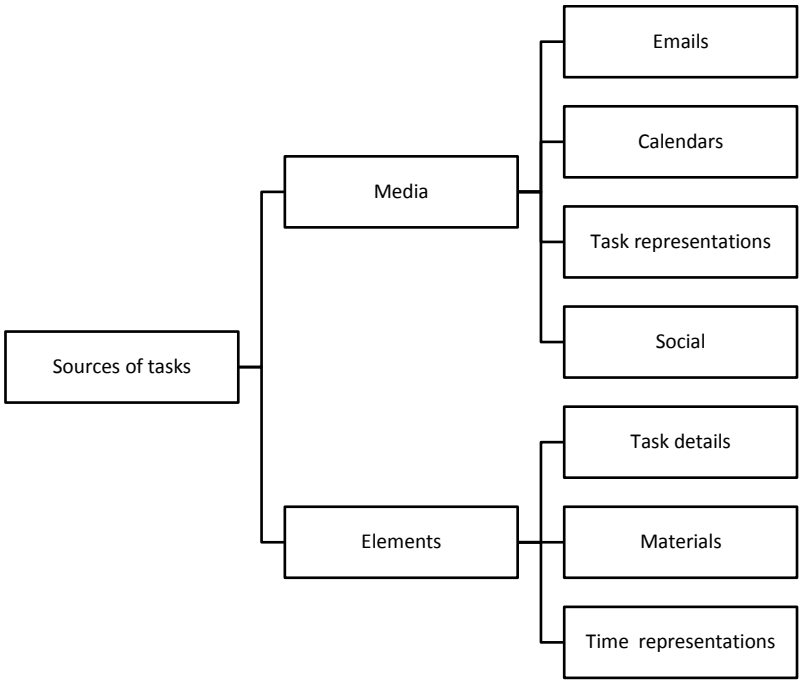



Figure 5.2. Sources of tasks.

*V4: The calendar is just deadlines and appointments.*

The media also let people identify people or organisations that are involved in a certain task. For instance, the email might include contact details of the person or organisations (V5) that people are dealing with or for whom the tasks are done.

*V5: Sometimes if a student emails me and actually I could leave it for a few days prior respond to the student. Um other things, if it's an email from your manager or someone higher up than you, then actually I should try to respond to this.*

Some of the media (in particular emails) may contain related materials (e.g. documents) attached to them. This reminds people to identify necessary tasks that they have to do with the documents or use them as supporting materials to perform a certain task associated (V2).

*V2: Somebody emailed me... a collaborator emailed me, um… So basically he asked me, um, he sent me something and said, I need your feedback really, really quick. Could you please do that? […] The student, where basically I now realise I've actually got here [email inbox] um, she sent me something.*

Finally and more importantly, this study reveals that some of the media are vital to people due to the time property that they contain. The diaries for example, show the current

time commitments (what tasks to be done and how long it would take to complete) and available gaps that people have in a certain time-frame (V4).

> *V4: And we had to coordinate a lot of diaries, to get everyone in at the same time. So we had like several [colleagues] from different universities. People from different background and disciplines and areas. So that's what that one is important.*

They also determine the constraints that people have during a certain time period (for example while travelling abroad), and therefore limit what tasks could be done at that time (V2).

> *V2: I need to put it into my diary that I won't be here, um, so that I, say, you know, say I need to travel to [Country X], so I need to block out the time that I'll be travelling because I can't schedule a meeting. But on the other hand, you can do things while you're travelling, right?*

So far, the author has described the main sources of tasks that people use to manage their tasks. The following section will identify the challenges that they faced in order to both manage and do their tasks. Some of the challenges identified can be related back to the limitations of the sources of tasks (e.g. email and calendar).

### 5.3.5 Challenges

Although there was no explicit description of the challenges that contribute to personal task management issues, there were a small number of participants who did highlight some of them. They highlighted that it is a challenge to undertake their planned or important tasks due to many small or less critical tasks that they have to perform on a daily basis. The majority of the participants interviewed, however, tended not to highlight issues that were associated with the challenges that they faced in managing their tasks. This was perhaps down to several factors: they had a limited timeframe (i.e. a one-hour interview) to recall specific problems that they faced; they were not willing to open up about the issues that might reveal their weaknesses in task management; the interviewer might not be able to capture and thoroughly investigate particular situations that the participants faced over time.

By contrast, in the video-diary study, it is evident that participants tended to recognise common difficulties that they face in order to both manage and perform their tasks. This is perhaps due to the nature of the study, which allowed people to spontaneously reflect on the

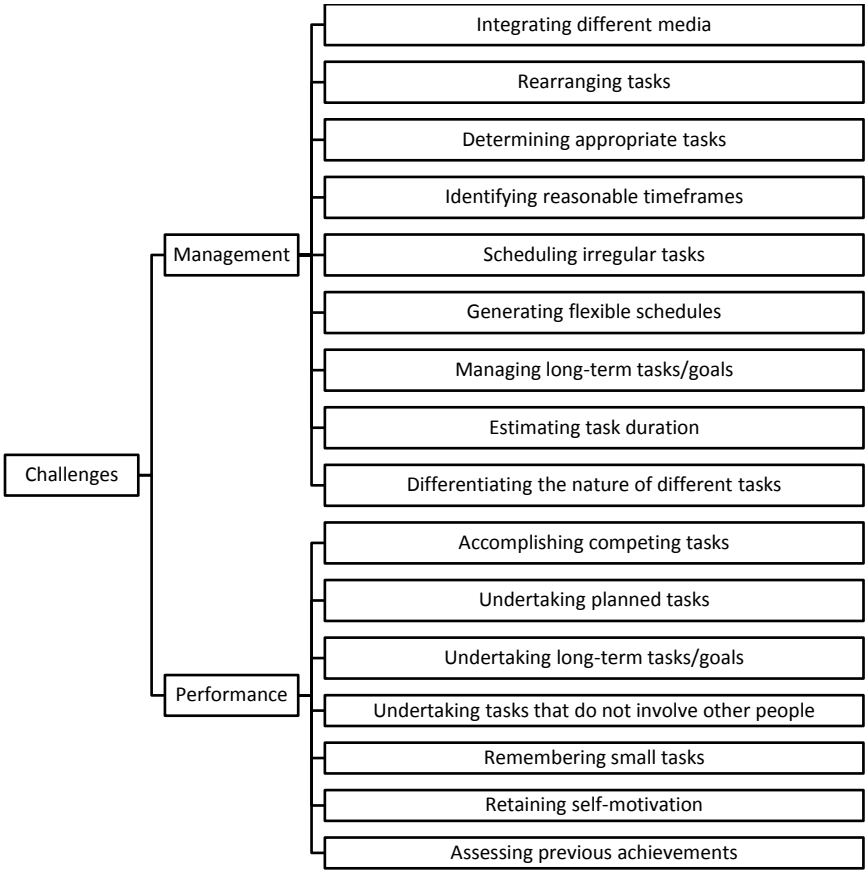



Figure 5.3. PTM challenges.

situations that they face at the time they occur, and hence explain them in more detail. For instance, they were able to describe what actually caused or contributed to the problems that they were facing. In this section, the challenges, which can be divided into management and performance (see Figure 5.3), will be explained in detail.

#### 5.3.5.1 Management

The author has identified nine challenges that people experience in order to manage their tasks. Before describing this section further, it is worth mentioning that more senior academic staff experienced challenges that related to management, compared to junior or early career academic staff. The author has identified some possible reasons for this. They described that they had a range of commitments (teaching, research and projects) or people they are obliged to work with, simultaneously. Another reason is that they had a limited time gap to do their own personal/solo work due to various meetings or events (e.g. seminars, lectures, conferences) to attend. In contrast, this condition seemed insignificant to junior staff (e.g. PhD student or post-doctorate researchers) who had one research project to manage and more

time gap to do it. Thus, this section (in particular), identifies that most of the management challenges were explained by the more senior academics.

First, it is a challenge for them to coordinate the different and distributed media used to manage their tasks. For example, there is still no adequate mechanism that allows people to link the tasks (preparation, for example) that people have to do prior to an event or a deadline that is recorded in their diary systems. There is also no facility that enables people to match the tasks in their email inbox (or to-do lists) with their time space or constraints. Consequently, they might not be able to determine the actual amount of time left for them to complete their tasks, and this could become more critical when the deadline to perform them is imminent (V2).

> *V2: The task management is basically distributed across the diary... and the to-do list and the mailbox, you know, which is full of like, lots of little tasks that you wouldn't bother book into the diary but which still need to be done... You should put the task preparation time in as well and that often fails. […] So you really need to have a way of unifying these two [-email inbox and electronic diary].It's always when something comes in an email, you know, the deadline seems very far away. You look at the schedule, it seems to be open but actually it isn't. And this is.... and the problem then starts to build up. And the closer you get to the date [~chuckles], the more… you know, the more, um, problematic it would become.*

It is a common problem for people to have to constantly rearrange their tasks due to unexpected situations or changes (for example issues or requests) that arise over time (V2). It seems more challenging when the situations require an immediate response and the time to do both unexpected and planned tasks is limited. Consequently, people are inclined to postpone or abandon existing tasks that have been scheduled in their diaries, way in advance (V1).

> *V2: So basically he asked me, um, he sent me something and said, "I need your feedback really really quick. Could you please do that?" He really needed an answer, you know, so basically he sent it to me… late on the previous day.*

> *V1: Because of the problem with printing this page of one of the students' scripts, I've had to divert into getting another copy of it in order to be able to finish marking this one this morning which was not on my original agenda. On the one hand, the train being late means that I've actually done a bit more marking than I expected today. On the other hand, that means I haven't done the other thing that I have planned to do before 10 o'clock this morning.*

Due to the increasing number of tasks that people need to do over time and the limited time-frames that they have to perform them, it is a challenge for people to decide the best or most appropriate tasks to be done at a certain time (V1).

> *V1: And there's a pile of stuff that come in on email and a whole pile of papers here that all represent some form of work to do. I'm having difficulty just working out what to do next.*

Identifying an available and reasonable time for people to do their tasks has arisen as an issue as well. People have limited time alternatives for when to do their tasks. Thus, they tend to fill any gaps that they have doing appropriate tasks. However, it is not always easy to form a strategy because current diaries still lack a mechanism that recommends reasonable time options for people to perform their tasks (V2).

> *V2: I've got to fit in preparation for... for a webinar event that I'm doing tomorrow. I need to edit slides... and... the problem is...that...I can't really, um, really find any... any time to do it, um, unless I do it now. […] You've said it's gonna take me two hours to do this preparation. The next question is "where [are] these two hours gonna go?"*

It is also demanding for people to schedule irregular tasks in advance. In contrast to fixed meetings, personal tasks usually have less explicit time requirements (i.e. they do not necessarily need to be done by or on a particular date or at a specific time). Existing diaries are usually divided into hours or minutes. This discourages people from including their tasks in their diaries (V2).

> *V2: I know how to deal with, that is like, for things like, recurring regularly, you know, in that the academic year, I've learnt to block out time for those things... but I don't know how to do that with events that are not regular.*

It is also a challenge to maintain the flexibility of a schedule. For instance, the activity of blocking out a specific time to do existing tasks might leave them with a small amount of time to do tasks that they would be more keen to do in the future (V1).

> *V1: If you accept too many things and you fill in your diary, that means something you might, you know, when something comes up… later that you might really want to do, you know, then you... at the moment you only have the, um, opportunity to yet over-commit more.*

Existing diaries are still unable to differentiate the nature of users' tasks or events. Although their diaries might be blocked with a few days' activity (e.g. attending a conference abroad), people are still able to carry out certain types of tasks throughout the time period (V2).

> *V2: But it's difficult. Ok, so if I need to travel somewhere, right? I need to put it into my diary that I won't be here, um, so that I... say, you know, say I need to travel to the [Country X]. So I need to block out the time that I'll be travelling because I can't schedule a meeting. But on the other hand, you can do things while you're travelling,*

> *right? So you don't really have the secondary layer where you can say, like, yes, I'm booked in terms of, like, you know, I won't be able to make another meeting or whatever but I can do phone calls, I can do some readings, I can do some reviewing... but you don't have in the diary. You don't have the two layers of things, you know, where you can schedule.*

Similarly, if their time is scheduled to big tasks (for example marking examination scripts), they can still spend this time doing small tasks in the middle. However, using existing systems for this is a challenge (V2).

> *V2: So for instance, for things like exam marking, I do that. Um, I would basically, literally and, look, um, and then just block out days for doing it. Again, at that point, I often would go like, well, yes the work needs to be done, but it doesn't need to be done exactly at that day and time. And it doesn't mean I cannot see anybody during that date... you can still... slot in some other short things, you know, that has a specific timing. And at the moment, that is not really possible in... the diary.*

It seems apparent that people face a challenge with managing tasks that need to be done over a long time (e.g. a month or a few months in advance). Existing tools do not adequately support people to easily anticipate the upcoming and overall tasks that lie ahead (V3).

> *V3: It's maybe the more long-term planning that I haven't got… any appropriate support that I… use. And that might be better as well because then I can actually see the bigger picture. Because at the moment it feels like I do a lot day-to-day, week-to-week but then I don't see… you know, maybe appreciate what I'm achieving maybe over a month or two months.*

Most participants highlighted that it is difficult to estimate the amount of time it will take to complete a task. This suggests why most of them tend not to schedule their tasks for a specific date and time (V4).

> *V4: So yeah, again, it's very hard to, um actually keep [] on sort of how long things take to do and how long it should take to do…*

The nature of their tasks makes this even more challenging. For instance, some tasks are more flexible and can be done at any time or anywhere, but others are more rigid and time-critical, and thus need to be done at a very specific time or place (V2).

> *V2: You know, because everything is flat in the diary. Everything, you know, a meeting, tasks and everything looks the same when really they are different. The nature [of] each of those tasks is different, you know, because some are more flexible than others. And at the moment I don't know how to express that.*

#### 5.3.5.2 Performance

The previous section explains issues which busy people face when managing their tasks. This section explains challenges that arise when they intend to do their tasks. The author has discovered seven challenges related to performance. People find it difficult when they need to complete a number of tasks within unreasonable time gaps. For example, they might have to finish a few big tasks within the same day or week, in which case they just need to go through each of them one after another. Consequently, they are inclined to compromise the quality of the task output in order to get them all done (V2).

> *V2: I've still got on my to-do list, um, which is in the file over here, um, I've still got um, two...papers to review which I should really put into the system today and I've got to edit another which we're submitting somewhere and I'm basically, I'm going like... ok, so… um, that means I would really have to get those things done tonight but I've also got to cook dinner for my husband because it's his birthday tonight, and so [] and I'm thinking like, "Oh damn! How am I gonna get these done?" because I haven't really got, you know, sort of like entering the review will take half an hour each. Um, editing the paper will at least takes two hours, um, and there just isn't enough time to do it, um, between now and tomorrow.*

Participants' responses showed that it can be problematic undertaking a planned task for several reasons. Over time, they constantly face a number of unexpected tasks, which usually require them to react immediately. This hinders them from doing or finishing existing tasks as planned. (V4).

> *V4: Today has gone spectacularly wrong as far as, um, time planning is concerned. So um... much of it is to do with unanticipated and unplanned tasks. Um, I got a few phone calls in towards the end of the day, which really pushed me out. And what I was thinking I was gonna be able to complete… Tomorrow is looking like a complete nightmare. I've got a proposal to rewrite. And also um, I get to go over to [University X].*

Such issue can affect their feelings or state of mind and hence, make it difficult to concentrate on difficult tasks that they have already planned. Consequently, they tend to switch to something else that is easier (V3).

> *V3: Something cropped up this morning which is really frustrating and that's the boiler seemed to be going wrong again at home, so for half of the train journey I was wondering about that and feeling quite frustrated… So if you can't concentrate, then it's not worth trying to read anything.*

Alongside their planned tasks, people pointed out that they have to do many small tasks. As explained previously in Chapter 4 (i.e. external factors) that people tend to divide their sizes of tasks into two categories: small and big. These small tasks are usually not

recorded explicitly and only take a short amount of time to deal with. But due to the high number of them, they can often take up most of a participant's time throughout the day (V7). In relation to the internal factor (i.e. Interest) described in Chapter 4, it is evident that Sometimes participants mentioned that they tend to abandon their planned tasks particularly often when they get distracted by things that fascinate them (V3).

> *V7: Um, so because it's just a little task, so I didn't bother, like, making it into a to-do.*

> *V3: I suppose I planned to do something else and then I got interested in another idea so I saw it's a distraction from the tasks that I'd planned to do.*

People find it hard to focus on fulfilling long-term tasks or goals. They easily get caught up focusing on short-term tasks (e.g. daily or weekly tasks) as they come up rather than doing tasks that contribute to their own long term goals (V4).

> *V4: So I guess it's so important to kind of not lose focus on this long-term objective. It's just caught up in, um, the mayhem of the day.*

People also have a tendency to disregard tasks where they do not necessarily have to report back to anybody. Instead, they tend to perform tasks that involve other people (for example, tasks which they have to do for their colleagues) (V6).

> *V6: And I think what suffers are the tasks that I don't have to report to anybody. It seems to happen that the one that you have outside commitment takes higher priority than the stuff for your own research.*

Due to the high number of small tasks, it is also a challenge for some of the participants to remember them (V4).

> *V4: The kind of bits and bobs often get forgotten. Um, you know, such as admin duties. Um, there's a lot of them at the moment.*

Some people explained that sometimes they find it difficult to perform their tasks, rather than identify what they need to do. As highlighted in Chapter 4, Motivation is one of the internal factors that may influence what people tend to do at a time. In this video-diary study, the deterioration of their level of motivation challenges them to stick to doing (or completing) a certain task (V5).

> *V5: I don't really struggle in knowing what I have to do. But I struggle in terms of am I motivated to actually doing it, to start… yeah.*

Due to the limitations of his existing tools, one participant expressed that it is difficult to reflect on tasks that he has completed within a certain period of time in the past (V3). This perhaps can highlight to what extent they contribute to people's main or long-term goals.

> *V3: I think… valuing work that you've already done is a challenge. It would be nice to… you know… have a list of things that you've achieved.*

It is a challenge for most of the participants to disregard unexpected requests from their colleagues, which usually requires them to perform other tasks or attend ad-hoc meetings (V7). Sometimes, they tend to put their own planned tasks aside in order to fulfil those requests first, particularly the ones that come from higher-ranking people (e.g. their director or manager).

> *V7: It is difficult to say no if somebody, for example, [Colleague X] asks me for a favour.*

### 5.3.6 Context awareness

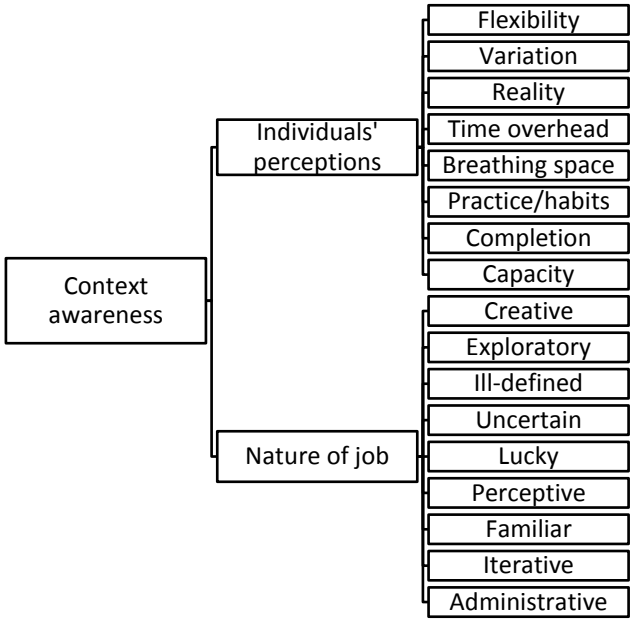



Figure 5.4. Context awareness of users.

The previous section has highlighted the PTM challenges that people experienced. Some of them can be related to the limitation of existing tools, which seem to disregard user's context. To provide tools that can better assist busy people in task management, the user's current context should be taken into account. This context can be categorised into two categories: individuals' perceptions of their task management strategies/practices and the nature of the

job (see Figure 5.4). Individuals' perceptions refer to a set of personal rules/tactics that people employ in managing and performing their tasks.

#### 5.3.6.1 Individuals' perceptions

The author has identified that people tend to have perceptions towards their PTM behaviour. The author has identified eight aspects of individuals' perceptions that emerge in the video-diary study. It is apparent that most of the participants prefer to maintain **flexibility**. They are inclined to switch between different tasks, depending on their circumstances at a given time (V6). This can be related back to the findings described in Chapter 4 which suggest that people tend to gauge both the internal and external factors in order to decide which tasks to do next (e.g. the urgency of task, time gap, social, etc.). To be flexible also means that they can easily modify their existing plans as a result of changes in their tasks and chances to perform a certain task in the future (V5).

> *V6: There was a university internal conference […], we didn't notice there... and I had like, three days to prepare the poster and get it printed. So um, all of a sudden, everything else had just to stop and I had to do that.*

> *V5: Meeting people usually takes priority over writing a report... You can't really tell them, "Oh, I have in my diary that I want Tuesday to be a writing day." You have to be flexible when it comes to the writing... Tasks are always changing. So you need to be able to change your plan according to how the tasks change.*

The **variation** of their current conditions tends over time. For example their priority of getting an article done might be higher the closer it gets to the deadline (V3).

> *V3: I might... wanna write a paper for the end of November. And that might be low priority at the moment. But at the end of November, it's gonna be very high priority.*

To decide what they should do, people are always inclined to evaluate the **reality** of their current situation (the overall activities that they have to do as well as the task and circumstances or level of pressure that they might experience during the day) and social engagements with other people. For instance, they themselves could perceive what the most pressing tasks are (e.g. who will be shouting louder or who will be the most affected if they fail to do a particular task at that time). In contrast, existing tools seem incapable of capturing this essential aspect of planning, which can show users what the most appropriate tasks that they have to do are, and which need rearrangement (V4).

> *V4: So for instance, tomorrow- I'm flying to [Country X]. Now, if I were to… forgotten to… I don't know, print out tickets or something like that, then it's no doubt*

*about it. Definitely I want the reminders... there's something that's really, really critical. So if you have a look at my task list in Outlook, a lot of it is like, responding to email. A lot of it, um, you know, a kind of administration stuff in future. And… the fact that... you've got in your head, like, the really urgent things that need to be done. And…somehow that task list doesn't really tally with what the reality of [the] situation [is] here at the moment.*

Due to hectic lifestyles and unexpected situations, people often factor a certain amount of **time overhead** into their planning (V4), helping them to follow and adjust their schedule more realistically.

*V4: You know, because that's the way London is like. Everywhere you go, anyway, there's an hour overhead really. And it's a variable hour. So it might be half an hour. It might be an hour and a half.*

People also prefer to have adequate **breathing space** in between their tasks, allowing themselves to be more realistic (V3) and react to unexpected things that they need to do in the future (V2).

*V3: For next week, I'm planning to do observation studies, um... possibly trying to do too much again. I might get rid of one of them just to give myself a bit of breathing space.*

*V2: You shouldn't plan up all your time. You should basically leave ten percent of the time unassigned because, you know, something important will come up to fill up that time.*

People have a tendency to comply with a certain **practice** when it comes to how they prefer to manage their tasks. For instance, they implicitly know the time that they will need to spend on a certain task, and it can vary from one to another (V3).

*P3: I'm not gonna spend too much time investing in it. So I give myself sort of like a timeframe- not an explicit one but, you know, work through and just see how far I get.[…] Maybe something to encourage more realistic time frames for jobs. Maybe there might be a rule. I think they have a rule in project management in industry. If someone says, "Oh, it will take them a week to do something," then you give them three weeks. That doesn't happen here. If you say it'd take two weeks, then someone tells you, "Oh, it should take you a week" [~laughs]. It goes the other way [chuckles]. Like marking- you might say, "Oh, that's gonna take me a week to do marking. And they go, "no, it shouldn't take you more [than] two days." And you say, "Oh, I've got to prepare for a presentation and that will take me two days." And they say, "Oh, you shouldn't really spend more than half a day [~chuckles] so you're always... you know, there's a bit more pressure I think… to do things.*

Some of the participants mentioned that the decision to begin or postpone a certain task depended on the extent to which they could afford to do so (e.g. V3) (i.e. **completion).** The choice whether to complete a task in work time by postponing another task or to do that

task in a participant's spare time and give up something in order to do so was dependent on to what extent this might cause undesirable consequences later. For example, a participant might give up doing a certain task (e.g. writing a conference paper) in order to do other tasks on the assumption that he would still have sufficient time to complete it in the future, without the risk of reducing the quality of the paper or failing to complete it by its deadline.

> *V3: And then there might be a certain day where you just feel you don't like doing something. And if you can afford it, then you can, you know, put it off and do something else.*

In relation to this, it is evident that people tend to gauge their **capacity** to work when deciding whether or not they choose to continue doing a particular task or move on to other tasks (V4).

> *P4: This is getting on to about a kind of eighty percent of capacity, so... But yeah, this is not, this is beyond the comfort zone, definitely.*

#### 5.3.6.2 Nature of the job

The previous section has identified the perceptions that people have towards their PTM behaviour, showing aspects of how they would prefer to manage their tasks better. This section will further explain examples of the nature of their job that can also contribute to the PTM challenges (as described previously) and provide nine examples (see Figure 5.4, p.180). For instance, they have to be **creative** in order to produce good research or produce an article. It is quite impossible for them to be exact in terms of the amount of time they need to achieve this (V4).

> *v4: If you look at creative people work, an artist work or whatever, they're not gonna be able tell you… but generally my feeling is a lot of them wouldn't commit to the amount of time it's gonna take them to produce a painting. And it just depends on where you lie on your spectrum.*

To do their research, people also need to explore any possibility that can contribute to it. This might require them to try new things and change their plans over time (V4). Writing a research grant for instance, is a continuous and **ill-defined** activity, in which they need to perform an adequate amount of reading during their spare time. Hence, it is not easy to represent this as a specific task (or divide it into sub-tasks), nor is it easy to determine a quantifiable outcome from it (V7).

*V4: But… there's also that kind of… to just be a bit more exploratory and also to try things out at risk, you know. It might not work out. So that you can kind of come up with something that is a bit different to… maybe what's your plan.*

*V7: I don't really count this kind of ill-defined reading as something that I put in my task as it's kind of difficult to break down into concrete chunks. Um, so that's just something that I do when I have some spare time. Although it's actually one of the most important things that I do because I'm trying to write grants at the moment.*

People explained that their job involves a lot of **uncertainty**. At a specific moment, they might not be able to immediately determine further tasks that they need to do following a particular issue or task they face (P4). Sometimes, they might not be sure of the best sequence of tasks that they need to perform due to the huge number of tasks that they have to do simultaneously (V5).

*V4: You're not quite sure like, sort of, what you can do about it.*

*V5: Um, also at this point I'm kind of just… write everything that needs to be done. So I'm not sure which one I'm going to do first.*

The majority of the participants agreed that it is hard to be certain about the duration of time that they need to complete a particular task (V5). It is also demanding for them to schedule a time to begin their main tasks due to routine or unexpected tasks that need to be dealt with on a daily basis (V3), which is part of the challenges described previously.

*V5: I guess one of the things [is] that I'm not sure how long it would take to do the tasks.*

*V3: To say that you're gonna do something from nine till ten, it might be… you know, just wrong because you realise that you've got emails to deal with. It takes longer and then someone asks you to do something else and then all of the sudden, you get to ten o'clock and you haven't started yet. It's quite easy to happen.*

Their job also depends on how **lucky** they are at a given time. For example, they might be able to produce a research paper much quicker if they can easily gather and synthesise a sufficient amount of information from their readings and obtain immediate feedback from other people (e.g. other co-authors) that they need (V5).

*V5: The amount of time that paper takes will depend on feedback that you get from [people]... It'll depend whether you're lucky... it's always a kind of... different things that are very, very hard to predict.*

Their job also often requires them to making sense of their readings. For instance, in order to mark research reports and review articles, they have to make some effort to understand them. And the amount of time that they need to do this depends on how well the

documents are written as well as how familiar they are with the subject. Sometimes people might need to spend a little bit more time than they previously expected (V6).

> *V6: It was supposed to take two hours each but it takes a little bit more because I'm not quite sure. It's quite difficult to read… I'm trying to read through that and I've already spent one and a half hours, trying to make sense of it.*

Quite often their job requires them to produce a report. The amount of time they need to complete it will depend on how **familiar** they are with the material. For example, some people might take a little bit longer than they previously expected if they have never written about it or anything similar to it before (V5).

> *V5: I hadn't done it before. I don't have a template so I kind of just tried to think, "Ok, so this is how I think it needs to go."...it was how unfamiliar [it was] which made it stressful.*

The activity of writing a document is also **iterative**, allowing people to go through it for a few times before coming up with the final or most refined version (V5).

> *V5: You have to take their opinion into account. So I might write something I'm totally happy with. They might say, actually, "I'm not sure about this. I'm not sure about that. Can you recheck that?" so then… you kind of get a bit [of a] review during the way.*

**Administrative** tasks are a part of many participants' responsibilities as well. People highlighted that these tasks are considerably less important (i.e. provide insignificant contributions to their personal goals/achievements), but it is compulsory for people to do them. The quantity of such tasks is usually much higher than that of other big or main responsibilities. Thus they might take up a certain amount of time and prevent people from getting the most important tasks done during the day (V4).

> *V4: The problem is that it gets mixed with other stuff that is kind of not so critical and you're not quite sure, like, sort of what you can do about it. So if you have a look at my task list in Outlook, a lot of it is, like, responding to email. A lot of it, um, you know, a kind of administration stuff...*

Previous section has explained the main challenges that face busy people, highlighting a rich understanding of the common work scenarios and requirements. It has also identified how the nature of the job contributes to some of these challenges. The following section demonstrates both usability and functional requirements for future tools that aimed at addressing challenges that are critical to users.

### 5.3.7 Usability aspects

The video-diary study identified six important usability criteria that future tools need to satisfy. These include:

- Flexibility.
- Simplicity.
- Physicality.
- Context sensitivity.
- Visualisation..
- Proactivity.

The majority of the participants explained that tools should be **flexible**, allowing them to sketch or draw some figures. Future tools should be semi-structured rather than fully structured in order to suit the complexity and nature of their job (which has been elaborated upon in the previous section). The tools must allow them to semi-schedule their tasks and define their tasks in a semi-formal representation. This will prevent them from a need to produce and follow a precise planning as well as avoiding excessive information associated with their tasks (V4).

> *V4: It's flexible because I can… so at the top left hand quadrant, for example, I can actually start… drawing the kind of figures and diagrams that I'm doing. […] So, for what I'm doing at the moment, I think, any form of… like really clearly-defined system isn't gonna work. But the whiteboard is kind of the middle ground. So… it's slightly defined and it kind of supports… The task list on Outlook… the only useful purpose at the moment is getting you to follow up emails and not forget about them. But for almost everything else, it's useless.*

Some participants explained that it is essential to use tools which can keep tasks visible. This will help them to be aware of the tasks that they need to do at some point. Some of the participants are inclined to record these in their diaries instead of keeping them in a to-do list or email inbox that has no explicit time allocated to them in which they are going to be done (V5).

> *V5: It's just one of many emails in your inbox. So especially there's a situation where maybe it gets to Friday and someone sent me an email on Monday, which wasn't priority so I didn't bother to respond to it on Monday. By the time it gets to Friday, I might have forgotten all about it. If it's in my diary, then I remember actually there's an email which I need to respond to at some point... So when I'm looking at my email inbox, there's always a mass of emails. If I write in my diary, it helps me to keep track of this is an email that I actually need to respond to. And it shouldn't be seen as part of the collection of emails.*

The tools should also be **simple**, providing easy steps for people to follow. It should not impose a complex structure linking them between different applications or interfaces, which users have to remember before they organise their tasks (V6).

> *V6: So maybe if you could have the simplicity of, like, just writing on a sticky note which just stays on your window and you can, you know, just check through it and if it's linked back. It's a very simple application compared to using your entire email client and then switching between views and things like that. That kind of thing I think is very helpful. Um, it's for me because it's just simple.*

Most of the participants have a preference for tools and methods where they have the ability to physically manage their tasks by writing or sketching instead of typing them down (i.e. **physicality**). This activity can easily trigger them to identify related tasks that need to be done, as well as the relationships between them. They can also immediately use their pen, for instance to tick off tasks that they have done in their diaries, and furthermore, feel better about what they have already achieved (V6).

> *V6: In my diary, I'll write [that] I need to respond to some messages or I need to try to speak to this person today or it's just more of a general list of things I need to try to remember to do that day. And you can kind of tick things up in your diary, as well, which I can't really do on the calendar.*

Some of the participants explained that in order to assist them with managing their tasks, existing tools should be able to recognise the **context** of their experience with task management. The tools should be more sensitive to the individuals' perceptions (as previously described) and reality of life that they face throughout a certain period of time (e.g. in a day or a few weeks). For instance, where they will be and what activities they have to do today or in the next few days/weeks; how their time availability will be; whom they are dealing with or whom they are doing a particular thing for; the level of pressure or emotion that they will experience; what they perceive as the most pressing task; when they would prefer to do a certain type of task. This is essential because only then can existing tools better understand and match with users' reality at present and hence, proactively recommend to them appropriate decisions that they could take at any given time. The tools should understand the time constraints of the users, and occasionally remind them of their current progress with regards to existing tasks that they need to do (V4).

> *V4: That's also helpful. But what it doesn't do is sort of have enough context in there that it can kind of work out what's gonna really get you within the next twenty four hours. And what are the things that are gonna end up with someone shouting at you? So, um, the MSc project marking, for example that… I always knew what the deadline...and that's in my computer. There's a task in there probably with a deadline attached to it. But it's kind of… so the deadline is tomorrow for a start, which isn't*

*helpful because I'm going to [Country X], anyway. And the flight is in the calendar. But it's not in the task list. So this sort of… just a lack of... generally a kind of sufficient picture in the system to actually relate to what's going on.*

As explained previously, it is a challenge for people to coordinate between different tools that they use to manage their task. There is still no mechanism to link the information between them (e.g. to unify between their email and diary). In order to assist people to make better decisions, it is important for future tools to represent information in a **visual** form. For instance, instead of listing their tasks and their respective deadlines as well as time constraints for a few weeks in advance (in the form of a wish list of all tasks they have to do), future tools should be able to provide a mechanism that visualises and explicitly relates these critical and different types of information at a glance. This will help them to be more aware of their tasks and be more realistic. It also can support them to look at all the constraints involved at once, helping them to make necessary adjustments (V6).

*V6: Instead of a lot of numbers, you know, I'm a visual so I want to see visually but, um, for somebody else [it's] maybe different. But somewhere you can see at a glance... you can sort of comprehend how it's going to...to me that is a very nice way of seeing, um, a mind map for the month, you know, like, the end of the month, you're really, really busy and maybe I need to move something over now and finish them... It seems to me if I could see that, ok there's dispatch in the middle which is absolutely blocked with all red stuff, then I need to, you know, move things across and see if I can reschedule them now rather than getting to the area and realise, "Oh my god, this week is going to be completely nuts."*

Another important criterion for people is that the future tools should be **proactive**. Most of the existing tools have still not satisfied this requirement and hence failed to prompt people to do what they should be doing with regards to their current situations or changes that they face. One participant articulated that her tool does not immediately remind her to specify possible tasks or preparations and allocate a time to perform it once a particular meeting has been recorded in her diary (V2). Some participants explained that existing tools have not provided adequate feedback on how well or badly they have planned their tasks (V3).

*V2: On that task I failed because the system doesn't force me to answer a question about, um... when you're gonna do the preparation.*

*V3: So my tools are all paper-based so they don't talk back to me. And maybe it's up to me to be stricter you know... yeah, trying to get better feedback, I'm not sure.*

Existing tools also seem unable to keep track of their planned tasks/goals and time constraints alongside what they have actually done or spent their time on. Future tools should be able to provide necessary precautions, so that users can make necessary changes with their current plans or practice in order to ensure that their planned tasks/goals are achievable (V6).

> *V6: I think that's the kind of thing that I would look for in a system, like, where you just type your things, it tracks them and at the end of the day, it links them back to what you do. I think that link back is missing from me now because I just get rid of it after I finish. Um, so things like that I think would be useful.*

This section has explained usability criteria that future tools should consider. The tools should not only be flexible, simple and quick but more importantly, they must be more aware of the user's current context, proactive and expressive. The following section highlights opportunities to improve the usefulness of future tools, based on the suggestions raised by some participants.

### 5.3.8 Design suggestions

Suggestions made by the participants can be divided into the following five categories, highlighting design features that can be potentially useful for them:

1. Interaction.
2. Interface.
3. Feedback.
4. Recommendation.
5. History.

The study has identified examples of design **interaction** that future tools should provide. Participant 2, for example, explained two key activities of interaction that could help her to manage her tasks. The tools should allow her to move her tasks around, depending on their flexibility. The tools should also help her to identify a reasonable period of time (for example doing readings or small tasks while she is travelling somewhere) or time gaps (for example a half-day gap) to do big tasks where she could slot in (or match) the tasks that she wanted to do with the time she had available (V2).

> *V2: And, you know, you can then try and move them and, you know, some of them are fixed. They can't be moved. They have to be done at that specific date. But others are moveable and you can then try, you know, move them around until you find a reasonable fit. […] you can still... slot in some other short things, you know, that have a specific timing. And at the moment, that is not really possible in... the diary.*

Most of the participants would prefer to have a feature that allows them to naturally write down their tasks rather than typing them. This allows them to record their tasks more quickly, and more importantly, can better satisfy them in making sense of their planning (V5).

> *V5: I need something that's quick. Something that's flexible. I like the idea of having something like a paper diary which I can use handwriting. I don't know why but it's nicer to see something in your own handwriting.*

It is also essential to have a feature that enables people to re-order their tasks according to their preference at a given time. For instance, some people explain that the tools should be able to move their related task horizontally or vertically in order to show the order of preference in which they are going to do them (V6).

> *V6: If you try to move this back here, and it just says these two tasks are linked. Are you sure that this can be done before this? So you know, it's just...it doesn't need to be...because you're still going to be doing the work, it's just that you can see at a glance, what is...or even if you've broken your tasks into four things and it sort of tells the system, these are the sub-tasks and there's a main task, and then you try to sort of move that behind... Ok, so these are the four sub-tasks. You should deal with them here. So how are you going… How is the main task going to happen here? So it's more basic than getting the system to prioritise itself.*

The author has identified some interface design opportunities to improve existing tools. They are based on the suggestions made by some of the participants in relation to their needs or limitations of their tools (that they had discovered). For example, participant 2 (video-diary study) highlighted that it would be useful to represent tasks as objects floating within a certain period of time, rather than simply represented as a long or endless list. One participant pointed to properties that are associated with post-it notes. For instance, people can write something down (e.g. tasks) on a post-it note and move it around. The concept implies that users can schedule (or semi-schedule) their tasks and at the same time have some flexibility in specifying when they need to be done. Rather than scheduling tasks at a particular date/time, the floating concept allows a number of possible tasks to 'float' within a certain period of time. This means that any one of these tasks has the potential to be completed within the scheduled time period. For example, users can identify a number of tasks that can float around (i.e. should/can be done at any possible/available time) within the period Monday-Thursday. It is not necessary to do a specific task at a specific time as there is the possibility for users to do other tasks which also seem appropriate to complete within the time period. This is in contrast to current tools where users are forced to assign exact dates and times to the completion of each task. It is apparent that there is no electronic mechanism to allow users to float their tasks in available timeslots within the specific timeframe/boundary.

> *V2**:** I'm thinking about, like, what would be instead of, um, you know, having this list of tasks to do or list of the emails to do, if there were like post-its and they be kind of floating around, you know, you look at the diary in the middle there but, you know,*

*you've still got stuff on the periphery, it keeps reminding you of the other stuff that still needs to be done.*

In relation to this, the same participant also used the metaphor of a big board around which she could move the post-it notes. The tasks could also be represented in different sizes to help her distinguish between them (V2). The participant further suggested that each task or period of time could be represented by different colours, highlighting the amount of time that they require to do their tasks or the remaining time to complete them.

*V2: I mean I would almost like to have, like, a big board where you have each of the tasks you have to do, represented by objects of different size. […] So again, I would actually like to have a different colour that basically would say like, if I block out those two days, it means I need, um, you know, fourteen hours, you know... or more, like probably eighteen hours to do this work...*

Participant 2 added that it would be useful to have different layers to represent the differing natures of tasks (for example flexible or rigid) or locations/conditions (for example, away or in the office) where she would be within a certain period of time. For example, the tools should allow her to identify a timeframe in which she would be away (i.e. travelling) or in a meeting. This would help her to slot in appropriate tasks that she could do during the period even though it would have been specifically reserved for a certain task or event. Additionally, this would also help her to be aware of time periods (for example meetings) where she could not do any other tasks at the same time.

*V2: Right, and that would actually help to organise... but you don't have it in the diary. You don't have the two layers of things, you know, where you can schedule. You really want when you start doing something like travelling, you want to actually have a different colour for it because you know you'll be able to do some kinds of things during that time whereas for other tasks if you're in a meeting, you can't do anything else.*

One participant recommended that future tools would be useful if they provide a heat map. This feature would allow her to visualise and hence be aware of how busy she will be throughout a certain period of time in line with the amount of work that she needs to do. This will assist in her deciding when she could or could no longer accept or schedule any new tasks (V6).

*V6: I think that looks like a heat map. Um, you know, this is [an] orange area. This is a green area- you should make full use of it. You know, then there's orange and another is going into red, so you've got to really start planning now because you're going into the red very soon.*

Alongside useful interaction and an insightful interface, the study has shown that it is important to using tools that can give them **feedback**. First, users might need to know the use of their time throughout a day. The tools should also be aware of how well people manage their tasks. For instance, which tasks they have rescheduled many times or put off in the schedule or what causes them to begin a certain task

> *V6: It would help to see where I waste my time. It might even help to see how much time I waste just looking through the email.[…] So if something would attract how long I have been rescheduling this thing, then I might... if I could sort of, you know, at some point I'm trying to figure out how better to schedule my time. If I could see that kind of thing, oh my god, I have been doing this because of a certain thing.*

It may seem useful if the tools can monitor what tasks users actually have been doing and relate them back to what tasks or goals they had planned, particularly the ones that feed directly into their personal achievements. This will demonstrate to them the extent to which they have fulfilled their own targets. In addition, future tools should alert them to tasks that they have neglected for a long time (V6).

> *V6: I think if something could alert you if you were sort of missing a lot of those and saying like, you're really neglecting this. You seem to be taking on too much because you're neglecting the things that keep you ticking over. So if I'm not... say I think it's very important, I can put it in somewhere that it's very important for me to do two hours of writing a bit. And suppose for a consistent period of time, I'm not doing that- maybe it would help to say that, you know, you're probably working too much on things which are not, um, feeding directly into your research, um, you're just doing a lot of extraneous... attending meetings and other things. So you seem to be doing a lot, but not doing the things that you prioritise as important for you.*

Some people described that future tools can be useful if they can facilitate them to look forward (for example in a week or months' time), by highlighting all the respective tasks, deadlines and time constraints that they have throughout that period. This will enable them to be vigilant and more realistic about what is coming up and the actual amount of time left for them to achieve their plans. Participant 6 (video-diary study) suggested that it would be useful if future tools could provide **recommendation facilities**. For instance, the tools at any given time or situation, would recommend what the most appropriate tasks that she could do would be. It would be also beneficial if the tools could highlight the most reasonable periods of time in which she could perform her tasks (V6).

> *v6: It is when you put it in your calendar, if you're aware that there are so many important things or if, um, you know, like, something flags up that you have so many deadlines coming up or you can see all the deadlines coming up at one go- just the deadlines. You know... you can see ok what are the really urgent deadlines that I have, you know. And it all just flags up and you kind of, can see, you know, how you*

> *can look through your month or your week or something.[…] I think it would be helpful when I sort of put a new task in my calendar, and I happen to sort of... look at the way I work and I don't look at all the deadlines that I already have. If it could suggest that something like, 'Are you aware that you already have three deadlines on the weekend? Would you like to reschedule this?'...So when I'm putting a new task, if it can just flag up, you know, how overall work of a particular week is getting. Because until you reach, like, within two weeks of all the deadlines, you kind of, you know, you're kind of just doing whatever to do it.*

In addition to the feedback and recommendation facilities raised by the participants, it is also useful for them to reflect on their current practice and achievements. Hence, it is important for future tools to keep historical records that can remind users of tasks that they have achieved at any given time, and how long they took to finish them (V3). This is to provide a mechanism that shows users' performance, showing when users have managed their tasks badly. For instance, when they were less productive or undertaking tasks or activities that were not contributing to their personal benefits or goals, the tools can alert and motivate them to improve their current PTM strategies or achievements (V7).

> *V3: I don't, like, look back and appreciate maybe what I've done. So that would be good support to have. For example, someone advised me that if you have a list of things to do and you go around ticking them off, then if you do something that's not on the list, then you should write it on the list and then tick it off. And that… you know… that shows you a record of what you've done.*

> *V7: Monitoring where you badly manage your tasks.*

So far, the second part of the findings has discussed all the additional five concepts emerged in the video-diary study. Prior to this, the first part has validated the findings from the interview study. Table 5.1 further compares the findings from both the interview study and video-diary studies, summarising the similarities, extensions and differences identified between them.

Table 5.1 The comparison between the findings from the interview and video-diary studies.

| **Similarities** | **Addition/extension** | **Differences** | |
|---|---|---|---|
| Interview and Video | Video | Interview | Video |
| Identified PTM activities that people perform to manage their tasks. | Identified sources of tasks and their importance to participants in managing their tasks. | Identified the usefulness or strengths of existing PTM tools/strategies. | Discovered key challenges and limitations of their existing PTM tool (i.e. the extent to which they can address the problems identified). |

| | | | |
|---|---|---|---|
| Identified PTM factors that participants considered in order to manage their tasks. | Explored the nature (or characteristics) of participants' job that contributed to the PTM challenges identified. | | |
| | Revealed individual perceptions of their PTM behaviour (i.e. how they preferred to manage their tasks). | | |
| | Identified potential design solutions that may be useful in tackling the limitations of existing tools/challenges identified. | | |

## 5.4 Discussion

This study has extended the understanding of how academics manage their tasks by identifying the main issues that they face based on their daily experiences in situ. The study has also validated the Personal Task Management framework version 1 (see Figure 4.3). The study has also provided an in-depth insight into personal task management behaviour from different perspectives. At present, there is still a lack of evidence to show the problems people face with managing their tasks and to what extent their existing tools (for example calendars or task lists) assist them with task management. The discussion on the key aspects highlighted above will be explained in the following section.

### 5.4.1 Comparisons with the previous interview study

There are some differences between the findings derived from the interview and video-diary studies. The video study reveals in detail more challenges that people face with task management, which can be divided into management and performance (as described earlier). To recap, firstly, it is a challenge for people to schedule their tasks more specifically and flexibly. Existing tools lack a mechanism that matches up their tasks (e.g. to-do/email lists) to their actual time constraints (e.g. calendars). This leads people to underestimate the amount of time needed to do their tasks. Secondly, people face a range of difficulties in doing their tasks. For example, people find it demanding to begin and complete their planned tasks due to unexpected requests or tasks, particularly when time is scarce. People believe that they tend to get caught doing daily or short-term tasks or tasks for other people instead of concentrating on

their own tasks, in particular, the ones that contribute to their long-term achievements or benefits.

The interview study provides a detailed understanding of how people manage their tasks, highlighting a wide range of strategies that people use. The study also identifies the reasons for people to implement the strategies and how useful they are to them. However, the limitations of their strategies (e.g. systems they used to manage their tasks) were not uncovered in any significant way. Thus, the specific problems that people faced in managing their tasks in relation to real situations that they faced could not be ascertained.

The strengths and limitations of the methods taken as well as the goals of each study contribute to these differences. The interview study aimed to understand how people manage their tasks. People described this based on the reflections of their past experiences during an hour-long interview, giving them little chance to recall the real problems that they face when managing their tasks. Instead, they tended to highlight how well they managed their tasks and their satisfaction towards the existing systems that they used, allowing the researcher to describe their behaviour in detail.

In contrast, the video-diary study aimed to further understand how people manage their tasks, but more importantly, capture their experiences of managing them over a longer period of time (between one and three weeks). This allowed them to record specific situations where they found it difficult to manage their tasks and how they dealt with it, giving opportunities for the researcher to investigate how well they managed their tasks. It also further highlights to what extent their existing systems satisfied their needs and what caused the difficulties.

The findings from both studies have enabled us to understand academics' personal task management behaviour and important requirements for tools to assist the behaviour better. The interview study provides a detailed understanding of the underlying activities and contributing factors involved in managing tasks. This provides a detailed insight into how future systems should be designed in order to meet them, whereas the video-diary study reveals the nature of their jobs and the limitations of existing systems that lead to the challenges they face in managing their tasks. Both findings highlight important criteria that future systems need to address.

### 5.4.2 Comparisons with previous literature

#### 5.4.2.1 Challenges

The findings have identified key challenges facing busy people in managing their tasks. Firstly, they find it difficult to estimate the number of hours they need to complete their tasks, supporting previous findings suggested by (Newman, 2004; Hazzan and Dubinsky, 2007). They often face unexpected tasks or situations, which cause them to postpone or reschedule their existing planned tasks. People also often experience uncertainty, also highlighted by (Eldridge and Newman, 1996), who point out that these indecisive periods are common amongst people and can affect their plans. Our study extends this by showing that during those periods, users are unclear about what would be related tasks that they need to do. They are also uncertain about the amount of time needed to complete the tasks and where to fit them into their schedules.

Some of the participants explained that scheduling (i.e. matching up between their tasks and time constraints) is a demanding activity. This confirms the findings reported by Palen (1999) and Lee (2003), which assert that scheduling is a complex activity, in which people need to manage competing demands and balance multiple constraints and priorities simultaneously, way in advance. We suggest further to this that the different nature and complexity of people's jobs contributes to this challenge. For instance, preparing a research article or grant is a complex and ill-defined task; it does not necessarily have a specific structure of where to begin or which tasks need to be done now, and which later, and choosing when to stop; instead, people need to investigate the current state of their research area by performing extensive and continuous reading and exploring interesting and possible directions (which might focus their research or goals that they aim to achieve, and furthermore, tasks that they might embark on); making sense of them and creatively writing several versions of a proposed solution and then discussing or obtaining feedback from their colleagues. All these interrelated activities require them to spend a huge and continuous portion of their time. It is a great challenge to schedule a task alongside other tasks (e.g. teaching, examining, meetings, social-requests, routine, unplanned tasks, private leisure time, etc.) or unexpected situations which are equally important.

Most of the participants seem to have difficulties with managing tasks that fall in between medium and long periods of time (e.g. between a few weeks' and months' time). Many explained that they struggle to finish planned tasks over those periods. Quite often, they get caught doing daily or unexpected tasks or dealing with requests, and therefore they are

prone to neglect the medium or long-term tasks until they become short-term urgent ones (i.e. needing less than a week or so to complete). Most of these tasks are relatively big or difficult, and consequently this tends to reduce the quality that users expect to achieve or might lead users to abandon them due to limited time towards the end of the available periods. At present, there is no feature that can monitor their tasks and time constraints and compare them against their actual performance (i.e. what they actually planned and have done). There is no mechanism that can remind them of necessary changes, actions or possible re-scheduling that they might need to consider in relation to their current situation. In the following section, the limitations of existing tools will be discussed further.

#### 5.4.2.2 Limitations of existing tools

Bellotti *et al.* (2004) highlight that people face a challenge managing and fulfilling various commitments due to time limitations rather than due to the weaknesses of their strategies. On the other hand, our study discovers that the limitations of existing tools also contribute to challenges that face busy people. Existing calendars seem unable to adequately address the key challenges explained. They still lack the flexibility to assist people to schedule their tasks according to current situations. This validates previous research that claims that busy people involved in different tasks (or demands that come from many people) at the same time find it difficult to schedule their tasks in advance (Lee, 2003). Instead, existing calendars seem more useful for them to schedule events (for example, appointments or activities) that have a specific timeframe (i.e. that have a start time or end time) rather than personal tasks (i.e. solo activities), which have a more implicit timeframe, for when they need to be done (Blandford and Green, 2001). To address this, previous research has long suggested a more flexible calendaring application to help people manage their tasks (Kincaid *et al.*, 1985; Blandford and Green, 2001; Tullio *et al.*, 2002), yet little improvement has been achieved.

Although Palen (1999) suggests that calendars which contain personal information and task lists are indeed useful for reminding people of their intentions in advance, our study shows that there is still no mechanism in existing calendars that has an awareness of users' current context and can adapt to it. For example, if a meeting gets cancelled, there are no features that immediately highlight or recommend what would be the best task to do instead or what would be the possible changes that they can make to their existing plans. In another example, if a task exceeds its original schedule time, how it would affect a user's other planned tasks and they could be rearranged. Also, tools lack understanding of the relationships between tasks and relevant meetings or people that they are associated with, as

well as of what it would mean if a user blocks a big chunk of time to perform a particular task or goes away for a conference. If the calendar can be aware of this, then it can provide a more reasonable recommendation of an appropriate time to complete a particular task by. It could also identify and suggest possible time gaps or constraints in which users can perform other tasks.

The findings show that most people tend to use diaries or to-do lists to manage their short and long-term tasks instead of leaving them in their email inbox. This can prevent them from losing track of important tasks that they have to do among the mass collection of emails every day. The findings identifies that some people prefer to transfer their tasks into their diaries because it allows them to commit a specific period of time (e.g. a day or week) in which they could perform them. In contrast, email inbox lists do not provide any specific periods of time in which they are going to be or could appropriately be done. The findings, however, have shown that email is particularly useful as a means of information storage (e.g. what things users need to do and whom they should submit the completed task to) where people can refer back to it as they do their tasks, confirming the previous findings highlighted by (Whittaker and Sidner, 1996; Ailamaki and Gehrke, 2003).

Electronic tools still do not provide enough flexible interaction and this explains why people still find it difficult to manage their tasks using these tools. This validates a study done by Blandford and Green (2001), which asserts that existing tools fail to provide adequate utilities and features that they need. Existing tools provide no adequate feedback/warning system exists that documents current habits and performance in relation to their planned future tasks and their respective time constraints. This validates a claim by Fertig *et al.* (1996) and Whittaker and Hirschberg (2001) who highlight that existing tools are still inadequate in terms of reminding people what they should be doing at a given time.

#### 5.4.2.3 Context awareness

The findings have identified that the limitations of these existing tools are strongly related to their weakness of being not fully aware of user's current context. This is in line with Hooff's findings (2004), which highlight that the use and implications of electronic tools (e.g. calendar) are dependent on a combination of task, user, and system characteristics. To provide usable tools, these tools should be able to understand and adapt to both user and task properties, and changes in their underlying conditions. The findings from the video-diary study suggest that future tools should also be aware the relationships or dependencies of tasks with other events (e.g. meetings, deadlines) or persons that the task is related to (e.g. co-

authors, colleagues, etc.). Blandford and Green (2001) showed that existing tools provide no clear distinction between meetings and personal tasks. Existing tools fail to recognise and adapt to the different natures of activities or tasks that people have to face. Thus, they seem unable to suggest alternatives for people to decide when they could or should schedule their tasks. It is essential to know which task is related to which meeting, event, deadline or people. More importantly, existing tools could constantly relate users' current tasks with their time or other constraints (e.g. what activities they will be doing in the next few weeks) and their present situations (e.g. changes in their plans or meetings, or cancelled journeys).

Existing tools proposed by (Ailamaki and Gehrke, 2003; Gil and Chklovski, 2007; Richard and Yamada, 2007), focused around the limited parameters/properties: importance, priority and deadline. The previous interview study (Chapter 4) suggests that overarching internal and external factors influence participants' decisions in managing tasks. This video-diary study has further revealed that existing tools also seem unaware of users' individuals' perceptions and the nature of the job. They fail to understand and adapt to these aspects adequately. They also tend to ignore the patterns of how or when people prefer to plan the different tasks that they have and which tasks or activities they have actually done during the day. This is in line with Payne's (1993) findings, which suggest that existing tools provide little representation of the actual narrative structure of people's time. The findings from the video-diary study validates a study done by (Blandford and Green, 2001) that has highlighted existing tools fail to understand how people manage their tasks and provide adequate utilities and features that they need.

Existing proposed tools give little attention to understanding the differences between the nature of tasks, and their time constraints, too. They also seem unable to understand how individuals manage and balance them, as well as capture the reality of their work-life experience at a particular time. For example, some small or easy tasks can be dealt with while they perform their big tasks or are away somewhere (for a conference).

The findings reveal that most people have adapted to a more flexible way of managing their tasks. They tend to switch between their tasks depending on their current context. Moreover, people's priorities actually change over time in relation to their current or future situations (e.g. their preference to undertake a task gradually increases as it approaches its deadline). In other cases, some tasks have no explicit deadline, but again, their priorities can increase due to the need or high pressure of getting it done for other people (e.g. superiors, colleagues or external organisations). This priority can also decrease as their

emotions or mental strength changes or new, unexpected tasks arise. In relation to writing a paper, for example, it is a challenge to determine when and where to begin and end. It is evident that people's emotions and motivation influences when they decide to write, which is difficult to predict, schedule and estimate how long they would take to complete. It often requires continuous and long interrupted periods of time to complete. But, often, busy people have very limited space in which they can easily fit them. In contrast, this might be slightly different to teaching preparation tasks, in which people might not necessarily require such mental preparation. For example, they can divide and schedule them into any available time gaps (e.g. 2 hours) within a week.

Due to this nature of time conditions, people need to have flexible schedules to ensure the best use of their time. For example, people are inclined to undertake small tasks or easy tasks if they can no longer continue their writing task, or they might be inclined to do less important tasks if they have a little spare time to do them. Although there might be time blocked out for an event (e.g. attending a conference) or travelling (e.g. on the train), people might still be able to do some types of task.

The previous section has discussed the key challenges facing busy people and the limitations of their existing tools. It has also highlighted the important aspects of the user's current context, in particular, their individuals' perceptions and the nature of their job that existing tools still fail to address adequately. In the following section, the usability aspects and design opportunities (that can be further explored) will be elaborated.

#### 5.4.2.4 Usability Requirements

The findings reveal that some participants assert that they would prefer to use tools that are not rigidly or fully structured or automatic. Instead, they should provide a mechanism that can allow them to manage in a more flexible way and allow them to engage with them as well when making decisions. This supports the findings by Campbell and Maglio (2003) and Taylor and Swan (2004) which highlight the essence of using paper-based task lists in assisting people to manage their tasks, which are not constrained by rigid structures or input formats.

People are inclined to manage and perform tasks in a more flexible way. They can easily switch between them with regards to changes in existing plans or time constraints, locations, feelings or mental/physical strength as well as due to unexpected tasks that they need to do. Most of the existing tools, however, seem unable to adapt to this. People require

future tools to inform them of relevant tasks they could do at any given time with respect to their current constraints, rather than highlight a list of tasks according to limited properties (e.g. deadlines, importance or reminders).

Participant 4 (in particular) highlighted that existing tools seem passive and unable to capture the user's current reality, thereby presenting a richer picture of tasks and actual situations that they experience. Hence, it is a challenge for tools to recommend the most suitable tasks that users should do at any given time. For example, one task might have a high priority or low priority on a certain day or occasion depending on how many commitments and underlying time constraints that the user currently has. It is also crucial for future tools to be more aware of this mass volume of planned and unexpected tasks as well as changes to plans facing busy people. They also need to be aware of what tasks or activities people are doing and have to do both presently and in the future. This is in line with Guisti's (2010) findings which suggest that future tools need to be proactive by highlighting opportunities or possible actions users might or could take in relation to their current situation.

This study reveals that future tools need to provide more visual representations of users' commitments alongside their time constraints, rather than display them as texts and numbers (e.g. deadlines and importance). This is in line with Blandford and Green (2001) who suggest that tools should be expressive to assist people to better schedule their tasks. In our study, people highlighted some representations or visualisations of information pertaining to factors (or properties) that are associated with their tasks and time. These include task size, time-criticalness of tasks, time gaps or availability (i.e. the nature of different time allocations), location and deadlines. They believe that the representations of these could assist them in reasonably scheduling their tasks and being more aware of their actual time constraints and things that they need to do within certain periods of time. Future tools should also visualise users' schedules in advance, highlighting different tasks or commitments that are coming up and the busyness of their time (or remaining time left for them to do their tasks).

Future tools need to monitor people's plans and the actual use of their time. For instance, some participants stressed the importance of having tools to warn them if they plan too many big tasks during a period in which they are relatively very busy and should suggest alternatives (e.g. reschedule them). As we have mentioned previously, existing tools seem passive. Most are unable to assess and provide reasonable recommendations or feedback that can further assist people in managing their tasks. The study has identified important

functions/features that would make the future more proactive and useful for users. They should monitor and compare the actual use of users' time with their planned tasks/goals, feeding the extent to which they have progressed towards completing them. This is in line with Francis-Smythe (1999) who suggests that it is essential for people to both plan a schedule and stick to it. This involves the skill of predicting not just how long a task needs but also requires people to be able to estimate time in passing (prospective duration estimate) and retrospectively, how long tasks have taken (retrospective duration estimate).

#### 5.4.2.5 Design opportunities

It is important to re-state that the design recommendations (as described previously in Section 5.3.8) were based on 7 participants. They were identified from their experiences of managing their tasks over an extended period of time (1-3 weeks). This method gave the participants more time (in contrast to the one hour interview study), to reflect on the issues they faced and to identify potential solutions to address them. Although the suggestions may not be representative of a larger or more general population (as compared to 31 participants who took part in the main interview study), the author identifies that they are potential design opportunities which future research can investigate further.

As highlighted previously, the aspect of visual interface of PTM tools seems important to people. Some of the participants require tools that allow them to visualise and differentiate between different properties of tasks as well as identify appropriate timeframes before scheduling and moving them around. For example, each task has different characteristics (such as task size and time criticalness) and has to be matched with a reasonable timeframe. This supports Ohmukai *et al.*(2003), who implemented a personal task scheduling system that provides four important elements/functions: a visualiser (how many tasks, number of hours, overlaps within a week/month and which also warns the user if it detects overlapped or executable tasks), an analyser, an optimiser (for effective rescheduling) and a recommender. However, the tool still seems inadequate since it fails to recognise other contextual factors that might change over time and the natures of jobs or habits that people may experience or adopt. Some of the participants suggested that tasks should be represented as floating objects and time as a finite space. Tools developed by Bellotti *et al.* (2004) and Gonzales *et al.* (2008) however, did not provide explicit representation to show and suggest reasonable time gaps when users could schedule tasks. The study highlights that people admit that it is important to have an explicit representation of reasonable timeframes in order to ensure that when they could possibly be doing something, they are actually doing it.

With regards to this, some participants explained the need to have more insightful tools which allow them to look, visualise, and look forward to their commitments and time constraints a few weeks/months in advance. They should be able to see all the tasks, deadlines or meetings that they have to attend and highlight the degree of their busyness throughout that period using a heat map. For instance, a red cell might show that a certain week/day is already occupied with several meetings or big tasks whereas a green cell might denote a time in which they are relatively free. The tools should flag up all the deadlines and remaining time and possible timeframe to perform it in as well. This supports a previous study conducted by Bellotti *et al.* (2004) who implemented a visual bar in their task management prototype, but which only highlights the remaining time left for them to complete a certain task.

The findings identify that it seems useful if the tools could be aware of a reasonable number of tasks that one can complete within a certain period of time. This can be related back to the importance of the requirement of a visual interface. Such tools could warn users if they intend to schedule many big tasks within a limited period of time, and hence would suggest other alternatives for when they can perform them instead. Similarly, if there is a spare time, the tools could be able to identify the most appropriate tasks that users should/could do at that time. Otherwise, people would have to rely on their memory and intuition in order to decide when they are going to do their tasks. The limitation suggests the reason people struggle to identify what they should do during a particular time gap. A lack of a visual representation of tasks and time might lead them to be less aware of the available time left for them to complete the tasks.

The findings also reveal that there is a need among people for a system that can allow them to match up tasks (e.g. task lists) with their calendars. At present, there is no mechanism that suggests/recommends an appropriate time in which the user can perform a task, or that suggests reasonable tasks that they can do within a certain period of time. We suggest that there should be a mutual relationship between both representations. In order to achieve this, future tools must first be able to be more sensitive to the important aspects of the context of users.

## 5.5 Limitations

Because participants were given a video-diary to record in their own time, there might be an interesting situation for the researcher to interpret, but it might not be recorded (either deliberately or unintentionally). This method gives flexibility and freedom for participants to choose what aspects or experiences they have with managing their tasks they

want to record. This might only lead to a partial understanding of the real situations or problems that people face. To address this, the study was done over a relatively long period of time (over 1-3 weeks), allowing them ample time to record interesting issues or needs to be brought up. It is believed that the period was adequate to discover some of the common problems they face in managing tasks. Furthermore, there was a one-hour interview conducted at the end of the study to clarify and further investigate any interesting or ambiguous points captured in the video-diary entries.

This study has not focused on a method for capturing or differentiating the nature of different commitments that people undertake. The study also has not suggested how users' actual activities can be monitored and compared with their existing plans. These are among the important aspects that can be further investigated in future research.

## 5.6 Summary

To conclude, there are a few important findings of the study. The study has verified the Personal Task Management (PTM) framework (i.e. version 1) that was developed from the previous interview study. In particular, it validates the underlying activities of personal task management (planning, prioritisation and list-making) and the factors (internal and external) that influence behaviour.

The study has explained a set of challenges facing busy people. It is challenging for people to rearrange or schedule existing tasks (for example, determining appropriate tasks to do at the right time or vice versa) in order to react to unexpected situations (future contingencies or opportunities) that they face. This is particularly apparent when time is scare and multiple tasks need to be done at the same time. Most people highlight concerns of not having adequate time to schedule and do their medium or long-term goals or tasks due to unexpected tasks or requests arising on daily basis.

It is evident that existing tools lack the ability to recognise and adapt to individual practices and the nature of a job and time constraints. They fail to monitor people's current reality (e.g. existing and upcoming commitments) and the use of their time. This study has explained important aspects of users' perceptions of task management that future tools must address in order to improve their usability. They must be able to understand and match with the flexibility and practice that people adopt in managing their tasks. Future tools must be able to recognize and adapt to the nature of the job, which influences users' decisions in

choosing which tasks they should do with respect to their current situations and time constraints.

The findings have identified critical usability requirements that future tools must satisfy: context sensitivity, proactivity and visualisation. They should be able to adapt to users' current realities and changes or unexpected tasks that they have at any given time. The tools should suggest which tasks would be appropriate for them to undertake or reschedule. The tools should also monitor people's performance or habits, showing what they have achieved in the past and what is coming up. They must be able to monitor users' actual activities, relate them to their current time limits/opportunities and planned tasks, remind users of necessary tasks that are neglected, and encourage them to be more aware or realistic of their capacity to deal with existing tasks. Also, the tools must be aware of how much time users have spent on a certain task, motivating or suggesting them to control the use of their future time. The tools should be able to recommend users reasonable tasks that they should or could do and suggest how they could be rescheduled (for example, if a meeting gets cancelled or timeframe allocated to a task has been exceeded). There is also evidence that people need more insightful tools that can visualise and highlight the bigger picture of their commitments (in particular, big or important tasks) and their respective contextual factors (e.g. deadlines, busyness, remaining or opportune time and task size or complexity), providing more insightful understanding of the reality of their present and future schedules.

# Chapter 6: CASSM Evaluation

In Chapter 5, the author has identified key challenges that academics experienced in using existing PTM tools to manage their tasks. This suggests inconsistencies found between what they needed and what functions/features provided by the tools. To further determine this, this chapter presents a usability study that identifies to what extent existing tools support a conceptual understanding of personal task management using CASSM. The chapter explains the justifications for selecting particular tools, and the guidelines to evaluate them. The chapter highlights the potential usability problems and some suggestions to improve them. It also shows the strengths of the tools and discusses useful concepts that users can learn or implement. To conclude, the chapter discusses how well the existing tools can likely support users in managing their tasks. The chapter is divided the following sections:

- Objectives of the evaluation.
- Justification of selection of tools to be evaluated.
- Evaluation phases.
- CASSM guidelines.
- Findings.
- Discussion.
- Summary.

## 6.1 Objectives

There are many personal task management tools on the market, but, as highlighted in Chapter 1, take-up has been lower than one might expect given the number of people with busy, demanding lives who have to juggle many different tasks and activities. The question addressed in the study reported here is: how well do existing tools support users, and how could they be improved? This inspired the author to conduct an expert evaluation study which aimed at the following objectives:

- To assess the conceptual misfits between users and tools and investigate how well existing tools match people's conceptual structures for managing their tasks.
- To identify and suggest how easily people can express their personal task management needs and be supported by the tools.

- To highlight the strengths and limitations of existing tools.
- To inform potential users' concepts that can be implemented in future systems.
- To explore useful systems concepts that users could learn or implement.

## 6.2 Considerations made or steps undertaken to evaluate existing tools

It is important to highlight that the evaluation was done in two phases. The findings gathered from the first (i.e. preliminary) phase led the author to conduct in-depth evaluation, which was put forward in the second phase. This section explains the important considerations and steps made throughout both phases, giving an overview how the former evaluation informed the latter one.

### Phase I

The author took important steps before selecting and evaluating possible PTM tools. The author identified the website Priacta (www.priacta.com) as the main source of information for the latest update of existing PTM management tools available on the market. Some of these tools were free to download and trial versions of some were available. Since there were over a hundred potential tools, the author decided to narrow down the number to be evaluated and focused on those which satisfied the following criteria:

1. Reviews and comparison of the PTM tool by Priacta (see Figure 6.1).
2. PTM tool description (available online or in a user manual: see Figure 6.2).
3. A free trial version of the PTM software.


Figure 6.1 Reviews/comparisons of existing PTM tools by Priacta (Priacta, 2009).

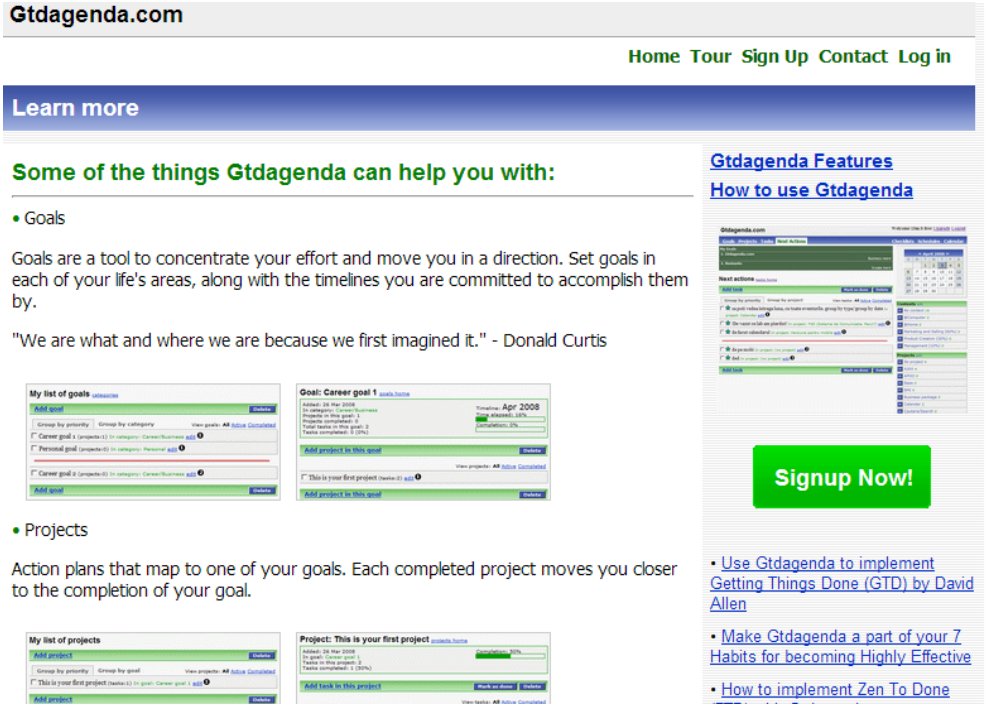



Figure 6.2 Online tool description – implementing Get Things Done (GTD) and Put First Thing First (PFTF) (Gtdagenda, 2009).

Based on the resources, the author identified possible tools and their strengths, benefits, features and functions, and identified whether they included the user concepts described in Chapter 4. To assist the author in further narrowing down the selection of tools to evaluate, the author considered the following factors:

- **Method** – Getting Things Done (GTD) has been identified as a well-known PTM tool (Bellotti et al., 2004; Galicia et al., 2007; Gonzalez et al., 2008; Priacta, 2009), suggesting that it is important to evaluate tools that allow users to implement this method. Priacta provided the latest update and review of existing PTM management tools available on the market which can support GTD (see Figure 6.1).
- **Purpose/Focus of Interest** – Chapters 4 and 5 explain that task management, in particular prioritisation, is the key issue facing busy people rather than project or appointment management. Thus, the author scrutinised and selected only those tools that enabled users to address this issue. Priacta highlights tools that can support task personal task management and reviews their key functions and features. This assisted the author in selecting targeted tools to analyse (see Figure 6.1).
- **Comprehensiveness** – It was also important to select tools that addressed most of the users' needs. Although the findings from the user studies showed that the majority of participants tended to rely on paper-based tools (e.g. diaries or to-do lists) to manage or

prioritise their tasks, these tools were not analysed as they did not address most of the users' needs. For example, it was difficult to take into account the size and complexity of tasks based on written lists. In contrast, even though there were very few participants who used Outlook Manager and none who used Achieve Planner, both tools were analysed as they had the potential to address more of users' PTM needs compared to other tools (see Figure 6.2).

As previously explained, evaluating tools using CASSM assisted the author in identifying and comparing similar needs of users and highlighting the potential features or functions of PTM tools which may give users problems while using them. Through the analysis, the author was able to suggest possible solutions of how to deal with inconsistencies between the tools and the users and how to address them. The author disregarded tools that provided similar functions or features as they were likely to show similar drawbacks. To illustrate this, Table 6.1 shows three tools that provided the same features or functions e.g. creating a project or task, assigning a deadline or context, setting a reminder, etc. and therefore produced the same disadvantages. It was more relevant to the study to select and evaluate tools that provided similar groups of tools but which also contained additional or different features. Given that Gtdagenda included more features and was similar to two other tools (i.e. Swift To Do list and Getitdone), the author chose to evaluate it instead of evaluating all three. The author found that Gtdagenda was more comprehensive than the other two tools and would potentially reveal disadvantages which were common to the three tools. The author identified seven tools which were representative of existing PTM tools, and chose to evaluate them in the first phase of analysis.

**Phase II**

The author evaluated three tools in the second phase of evaluation. Based on the analysis from the first phase, the author determined that Gtdagenda was the tool which best represented most of the features used by participants and showed the least disadvantages. The author selected two other rival tools to evaluate: MS Outlook GTD Add-in and the Intelligent Calendar. Participant 15 was the only participant who used MS Outlook GTD for managing her tasks. She recommended that the author considered additional features which the author had not explicitly evaluated in the seven tools in the first phase (e.g. converting an email into a task, deferring a task, sorting tasks). The participant agreed to be further interviewed and demonstrated how she used the tool in detail, highlighting its features and functions. The third and final tool, the Intelligent Calendar, was chosen for its additional features which were not

identified in the previous tool analysis. The paper describing the tool was presented in the CHI workshop 2012 and its prototype was available online.

Table 6.1 Similar features/functions implemented within the potential PTM tools (for evaluation).

| **Features/functions** | **Tool #1: Swift to-do list** | **Tool #2: Getitdone** | **Tool #3:Gtdagenda** | **Similar system features (to be compared with those used by participants)** |
|---|---|---|---|---|
| Creating a task/sub-task/project | / | / | / | Task |
| Setting a deadline/reminder | / | / | / | Deadline |
| Setting a priority to a task | / | / | / | Priority |
| Marking a task as 'done' | x | x | / | Done |
| Creating a goal | x | x | / | Goal |
| Moving a task to 'a someday/maybe ' folder' | x | x | / | Someday/Maybe |
| Setting 'a next action' to a task | x | x | / | Next action |
| Setting a context to a task | x | x | / | Context |
| Categorising a task (into a certain priority, project, context, etc.) | / | x | / | Group |
| Creating checklists | x | x | / | Checklist |
| Schedule a task | x | x | / | Schedule |

It is important to summarise key differences of the tools selected in the first and second phases. The tools inspected in the first analysis did not include information about how participants used them whereas the tools evaluated in the second analysis were used by target users and thus contained user data, except for the Intelligent Calendar which was populated with dummy data. The Intelligent Calendar was not a complete system, as it was still in the development and testing stages. To prevent users from experiencing any difficulties or their task management being adversely affected, the author decided to use Intelligent Calendar by himself, rather than asking participants to use it, by inserting dummy data and checking its functionalities. In the second phase, the author identified the similarities and differences between both user and system functions, and suggested potential solutions to address the disadvantages identified and the rationale for them. These are explained further in the

findings section. The findings gathered from the first/initial phase, (as highlighted earlier, which was used as a basis to inform the evaluation of the second phase), are presented in Appendix M.

## 6.3 Evaluation phases

The author conducted two phases of analytical evaluation: preliminary and in-depth. The first evaluation was undertaken in November 2009, whereas, the second evaluation was done in June 2012. Table 6.2 summarises both evaluations, showing the similarities or differences between them. The next section describes evaluation approach undertaken.

## 6.4 CASSM guidelines

### 6.4.1 Introduction

Before describing the findings from the CASSM evaluation, it is important to reiterate the justifications for the use of CASSM to evaluate existing tools, as described previously in Section 3.3.2.1. The author chose the method both for its strengths and method. Firstly, in terms of its strengths, CASSM focuses on identifying the lack of 'fit' between users and the system concepts rather than looking at the design of the interface (e.g. whether the user can find the position of the button or recognise the labels and colours used). The method assists the evaluator to easily and quickly identify the misfits, without a need to be expert in using the system. The misfits highlight specific elements of the system that can potentially cause difficulty to the user and therefore need some modifications. The purpose is to bridge the gap between users and the system. This can be achieved by highlighting inconsistencies found between them and suggesting potential rationales or potential solutions to improve them.

Secondly, to conduct the evaluation, the method compares related concepts informed by users i.e. participants and those which are implemented in the system i.e. tools. This helps the evaluator to determine whether there is a misfit between them. To investigate this, the method requires the evaluator to have access to both users and the concepts of the system. User concepts may be gathered from user interviews whereas system concepts can be collected from user manuals, running the system, reviews or descriptions of it.

Each of these justifications for the use of CASSM matches with the aim of this thesis and the findings gathered from the interview study. It is important to recap that the key strength of the thesis or findings gathered from the interview study was the detailed description of users' concepts when describing PTM; in particular, external factors (see

Figure 4.5) and internal factors (see Figure 4.4). The second justification provided a clear opportunity for the author to test whether existing PTM tools implemented these users' concepts adequately. It also assisted the author in identifying the strengths and limitations of existing tools and to provide specific suggestions to improve them.

### 6.4.2 Approach

CASSM is described by Blandford *et al.* (2008a) as an approach to conceptual analysis that can inform redesign. They describe the process of conducting a CASSM analysis in terms of identifying and comparing user and system concepts. A concept may be an entity or an attribute. They define an entity as something that can be created or deleted within the system, or that has attributes that can be changed. An attribute is a property of an entity – usually one that can be set when the entity is initially created, or that can be subsequently changed.

To assess the quality between user and the system, (Blandford *et al.*, 2008a) provide the following guidelines:

*"For every concept, the analyst determines whether it is present, difficult or absent for the user, at the interface and in the underlying system. A concept is considered to be present for the user if users naturally and easily think in terms of it. Concepts might be difficult for the user if they are hard to learn, discover or work with: these difficulties may be of different kinds and levels of importance; it is up to the analyst, working with user data if possible, to assess the severity of difficulties. Concepts may be absent for the user if users show little recognition that the concept has been implemented in the system; this may result in users not using the system as intended (e.g. missing features of it) or having great difficulty in getting the system to work as desired. Similarly, for the interface and system, concepts may be present, difficult or absent. Concepts that are present in one place but absent or difficult in another are potential sources of misfits between the system and user, and might be triggers to consider re-design possibilities."*

As noted above, a CASSM analysis requires access to both user and system data. The user data needs to be verbal (for identifying concepts), and should relate to the user's understanding of the domain of application and not just the particular interface being used. For the analysis reported, in this thesis, the user data was gathered through semi-structured interviews with 26 participants explained previously in Chapter 4, describing the factors that influence their personal task management (PTM).

Table 6.2. A summary of the evaluation phases undertaken.

| | **Phase I - Preliminary** | **Phase II – In-depth** |
|---|---|---|
| **Aims** | • To identify conceptual misfits between the users and system concepts. | • To identify conceptual misfits between the users and system concepts.<br>• To highlight the similarities or differences between the users and system concepts.<br>• To identify potential users' concepts that the systems can redesign/implement, and system concepts that users can learn.<br>• To determine the adequacy of the existing tools. |
| **Method** | • 7 tools were analysed (The author believed that they provide most of the PTM concepts and can support users to implement GTD):<br>1. What Do I Need.<br>2. Toodledo.<br>3. Gtdagenda.<br>4. Achieve Planner.<br>5. ToDoList v5.9.<br>6. Microsoft Outlook 2003.<br>7. Vitalist v3.1.1.76.<br>• Users concepts were derived based on Prioritisation ontology (see Appendix R).<br>• System concepts were gathered based on the observation or test of the running systems and documentation (user manual, website and book). | • 3 tools were analysed:<br>1. Gtdagenda (used by target user/expert 1).<br>2. Microsoft Outlook (GTD Ad-in) (used by target user/expert 2).<br>3. Intelligent calendar prototype (Bank *et al.*, 2012).<br>• Users' concepts were derived based on PTM framework version 2- Contextual factors which include internal and external factors (see Figure5.1).<br>• System concepts were gathered based on a more detailed understanding through the interview with an expert user or observation/testing the running systems (which have been used by experts) and documentation (user manual, website and book). |
| **Outcomes** | Reported in Appendix M, which suggests:<br>1. Potential usability problems (i.e. concepts that are present to users but absent or difficult to systems), and hence need to be redesigned.<br>2. Two best tools (that include most of the users concepts and contain less conceptual misfits). | Reported in this chapter which includes:<br>1. Potential usability problems which are based on the following findings:<br>- Concepts are present but different between the users and the system, and concepts that are difficult to users.<br>- Absent concepts to users or systems.<br>2. Similar/related concepts.<br>3. Recommendations - concepts that systems can redesign/implement or users can learn.<br>4. The strengths and limitations of existing tools. |

### 6.4.3 Identifying misfits

As outlined above, for the user model and for the interface and system models for each of the systems evaluated, entities and attributes were identified. Each was coded as being present (P), difficult (D) or absent (A) for the user, at the interface and in the underlying system (Blandford *et al.*, 2008a) based on the judgements made by the analyst on behalf of users rather than their own direct feedback from their actual experiences. However, it is important for the analyst to obtain detailed understanding of both users and the system concepts to be compared against each other. Next, possible surface misfits were identified based on one of the following three classes (Blandford *et al.*, 2004b):

1. Concepts which are relevant to the user but not represented within the system (i.e. absent to system).
2. Concepts represented by the system but not understood by the user (i.e. absent to users).
3. User and system concepts which are similar but non-identical.

These surface misfits analyses were done systematically, supported by the use of the Cassata analysis tool (Blandford *et al.*, 2004a).

## 6.5 Findings

This section is divided into three sub-sections to present the findings of the evaluation of three different tools as follows:

1. Gtdagenda (denoted by G).
2. The Intelligent Calendar (denoted by C).
3. MS Outlook Add-in (denoted by O).

These notations will be used throughout the discussion of the findings to refer to the respective tools. Each of these tools is explained in separate sections, and each contains the following sub-sections:

- Tool description.
- Categories of Comparison:

1. Present (or similar) concepts but not identical (denoted by P-P- X) (for example, see Table 6.3).

2. Absent concepts (concepts that are not implemented by users or adequately represented by the system) (denoted by A-P or P-A respectively).
3. Present (or similar) concepts and identical (denoted by P-P- √).

The first two categories, in particular, highlight potential usability problems. These may suggest two opportunities: concepts that need to be redesigned for the system and concepts that users need to learn. The third category shows no mismatches between conceptual representations informed by users (i.e. interpreted by the author) and those implemented by the system, both have the same meaning/intention.

It is worth clarifying that the following terminologies will be used frequently and interchangeably throughout this section:

- **Users/People** – refer to participants in the previous user studies or member-checking or target users.
- **System/Tool** – refers to a specific tool that is being described or general tools being discussed.
- **Users' concepts** – refer to concepts informed by the participants.
- **System concepts** – refer to concepts represented/implemented by the system.

### 6.5.1 Tool #1: Gtdagenda

#### 6.5.1.1 Description

Gtdagenda is a personal task management tool that provides useful functions (see Figure 6.3). The system allows users to create and organise the following items, and provides respective definition/description for each of them (Gtdagenda, 2009):

1. **Goals** – "Goals are a tool to concentrate your effort and move you in a direction. Set goals in each of your life's areas, along with the time lines you are committed to accomplish them by."
2. **Projects** – "Action plans that map to one of your goals. Each completed project moves you closer to the completion of your goal."
3. **Tasks** – Break out each project into specific tasks (actionable items), and decide what the next action is going to be.
4. **Contexts** – "Context is where or how a task is accomplished."

5. **Checklists** – "Use checklists for your repeating/recurring tasks, things that you must handle weekly, monthly, quarterly, etc. as well as action items that may be tied to a specific month (e.g. wax car every April and November)."

Users can assign each of these items, in particular, their tasks with some actions as follows (see Figure 6.4):

- Mark as done.
- Set as next action.
- Move to active tasks.
- Move to someday/maybe.
- Move to archive.
- Set priority (1-5).

This assists users to review their tasks regularly. The tool's main feature is that it allows users to filter or sort their tasks according to specific criteria. Based on the testing of the running system, the author has identified the overall system concepts which are provided in Appendix J.

Figure 6.3. A screenshot of Gtdagenda – List of goals, projects and tasks.

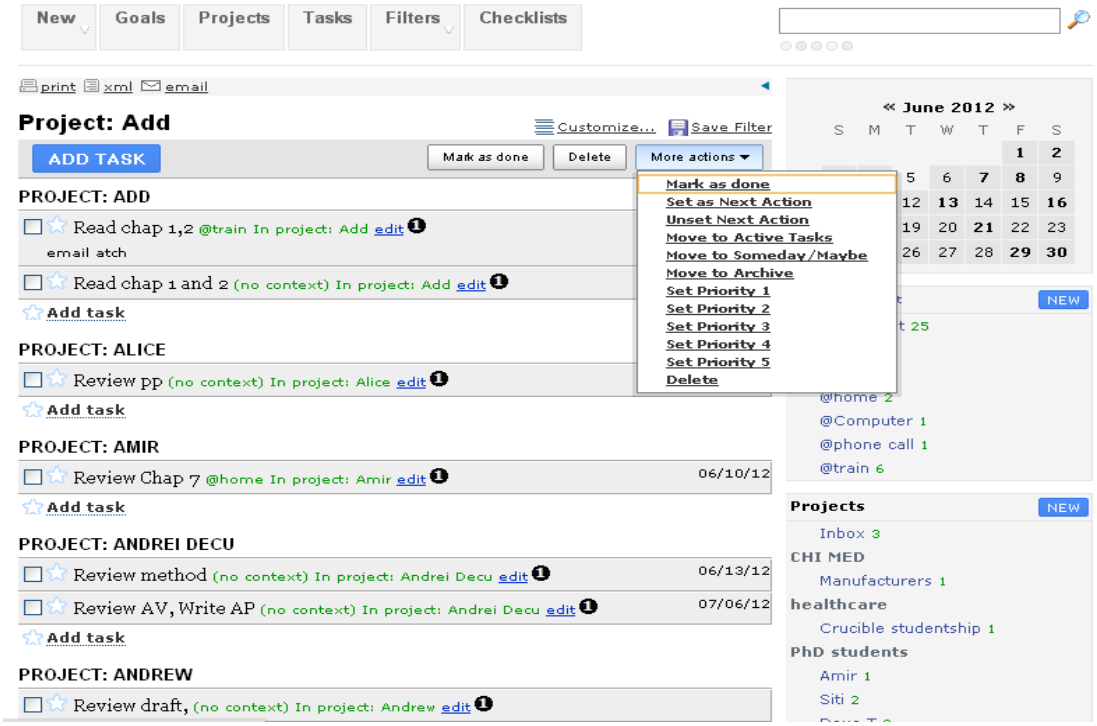



Figure 6.4. A screenshot of Gtdagenda – Assignment of actions to tasks.

The following section shows comparisons between users' and system concepts of personal task management. The users' concepts are based on the findings gathered from user studies explained in Chapter 4. To determine the system concepts that are related to PTM, the author refers to Appendix J and selects the concepts that are related to PTM, which can be compared against concepts informed by participants.

### 6.5.1.2 Comparison

Figure 6.5 shows an overview of the conceptual comparison between users and Gtdagenda, which is derived based on the detailed comparison presented in Table 6.3. The figure is used to show the overlap between the users' and the system's concepts.

Legend

- User concepts
- *System concepts*
- Shared concepts
- (Similar/Related concepts)

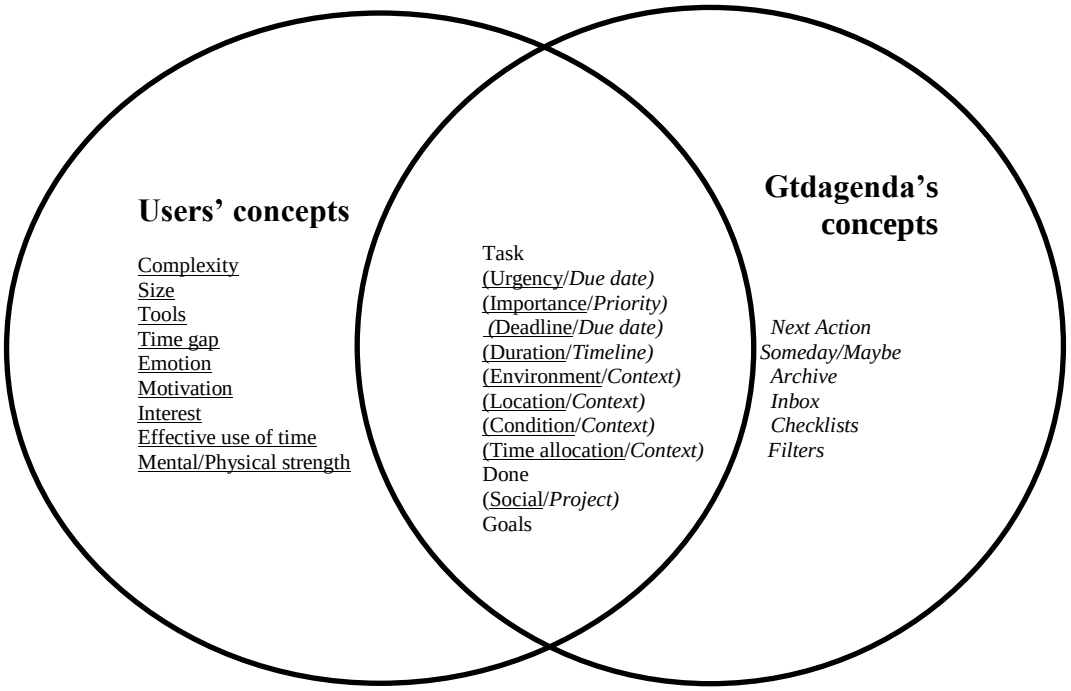



Figure 6.5. The similarities or differences of Personal Task Management (PTM) concepts between users and Gtdagenda.

**Present (or similar) but not identical.** The author identifies two concepts which are present (or similar) but different between users and the systems, which are denoted by [G2 and 3] (see Table 6.3). For instance, users highlight the urgency of tasks depends on two factors (importance and deadline) but it seems there is no relationship between the similar concepts implemented by the system (i.e. due date and priority) [e.g. G2]. If a user modifies the due date, it will not automatically affect (i.e. change) the priority value assigned earlier. In reality, users tend not to rank the importance of tasks explicitly. They explained that their priorities are relative to current tasks/many factors (i.e. change over time). In contrast, system requires users to rank/assign absolute priority (e.g. 1-2) to their tasks [G3]. Some of them explained that it seems difficult to weigh their priorities or the importance of their tasks explicitly [G2].

**Absent concepts.** The author discovers some concepts which are present to users but absent to the system, which are denoted by [G5, 6, 11, 14, 15, 16, 17, 18 and 19]. Some of these concepts are important in assisting users to choose tasks that they want to do at a certain time. For example, users tend to do small tasks when they have a short time gap or before

beginning or concentrating on bigger or more difficult tasks [G5 and 6]. Also, they are inclined to switch to small or easy tasks when they feel stressed, bored or in the middle of doing big tasks. On the other hand, they are inclined to do difficult or more enjoyable tasks when they have a long time gap or their motivation or mental/physical strength is relatively high. However, none of these concepts seem well presented in the system, and thus may suggest a possible difficulty for users in reviewing or choosing the right task to do particularly when they have competing and huge tasks to do within a limited time.

From the system point of view, the author reveals some concepts that are significant to the system but absent to users, which are denoted by [G22, 23, 24, 26, 27, 28 and 29].. For instance, the system provides a feature (i.e. action) that allows users to identify a task that can be classified as the 'Next action'. The idea behind this is to assist users in getting a certain project or overall task to progress or move on. This concept however, seems not obvious among the majority of the users. Instead, some of them highlighted that it is a challenge to identify the next task to do among overall projects/tasks that they have, rather than to determine the next action (i.e. next task/first thing) to do within the same project or task (e.g. sub-task), particularly when they have competing deadlines and a limited period of time.

**Present (or similar) concepts and identical.** There have been some concepts that seem to have different representations but have similar meaning or intentions. They are denoted by [G1, 4, 7, 8, 9, 10, 12, 20, 21 and 25]. For example, users tend to first identify their current location or condition before deciding what to do there and then. Some participants tend to do certain types of tasks when they are at home, in the office or away (e.g. on the train). The system provides a function which encourages people to identify the context (which refers to where or how they intend to do their tasks – e.g. home, computer, phone call, etc.) [G9, 10 and 13].

Table 6.3. A detailed conceptual comparison between users and Gtdagenda.

| ID | Concepts | U: User (Related Concept) | S: System (Related concept) | Identical? |
|---|---|---|---|---|
| G1 | Task | P | P | √ |
| G2 | Urgency | D | P (Due date) | X |
| G3 | Importance | D | P (Priority) | X |
| G4 | Deadline | P | P (Due) | √ |
| G5 | Complexity | P | A | - |
| G6 | Size | P | A | - |
| G7 | Duration | P | P (Timeline) | √ |
| G8 | Environment | P | P (Context) | √ |
| G9 | Location | P | P (Context) | √ |
| G10 | Condition | P | P (Context) | √ |
| G11 | Tools | P | A | - |
| G12 | Social | P | P (Projects) | √ |
| G13 | Time allocation | P | P (Context) | √ |
| G14 | Time gap | P | A | - |
| G15 | Emotion | P | A | - |
| G16 | Motivation | P | A | - |
| G17 | Mental/ Physical strength | P | A | - |
| G18 | Interest | P | A | - |
| G19 | Effective use of time | P | A | - |
| G20 | Goals | P | P | √ |
| G21 | Projects | P | P | √ |
| G22 | Next action | A | P | - |
| G23 | Someday/Maybe | A | P | - |
| G24 | Archive | A | P | - |
| G25 | Done | P | P | √ |
| G26 | Active | A | P | - |
| G27 | Checklists | A | P | - |
| G28 | Inbox | A | P | - |
| G29 | Filters | A | P | - |

### 6.5.2 Tool #2: The Intelligent Calendar

#### 6.5.2.1 Description

The Intelligent Calendar (Bank *et al.*, 2012) is an active personal management tool (see Figure 6.6). The tool enables users to record and schedule their intentions, which can be divided into two categories: tasks and events. Its key features are as follows:

- Classification of intentions based on their time constraints (i.e. when they can possibly be done). For example, events can be divided into three types: simple, float and multiple choices.
- Schedule recommendations (which assist users to automatically allocate time to pursue their intentions).

Based on the testing of the running system, the author has come out with the overall system concepts which are provided in Appendix K.

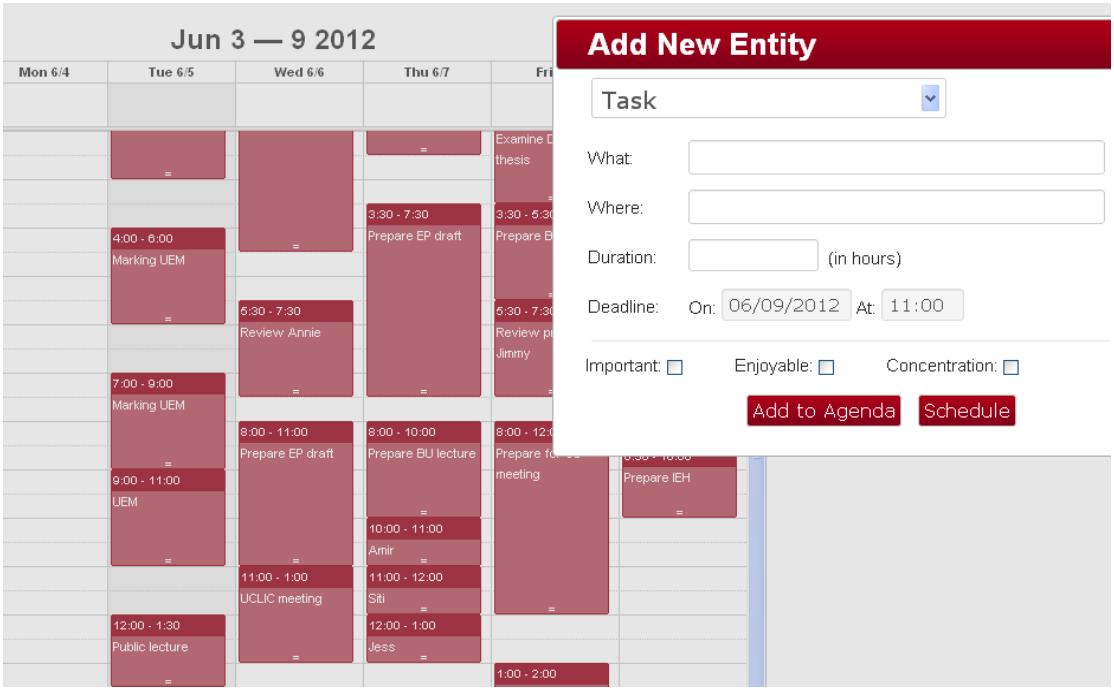



Figure 6.6. A screenshot of The Intelligent Calendar – Assignment of a new task.

### 6.5.2.2 Comparison

Figure 6.7 shows an overview of the conceptual comparison between users and The Intelligent Calendar, which is derived based on the detailed comparison presented in Table 6.4.

**Present (or similar) concepts but not identical.** The author identifies some concepts that are present (or similar) but are not identical. For example, users explained that the urgency of their tasks is based on how important their tasks, or the respective deadlines are. Although the system does provide these two similar key properties: importance and deadline, it seems that there is no connection between them, which can inform how urgent a particular task is [C2]. In another example [C7], users explained that the duration of a task refers to the available period of time to do it: short, medium or long term. In contrast, the system defines the concept as a precise time representation required to complete the task.

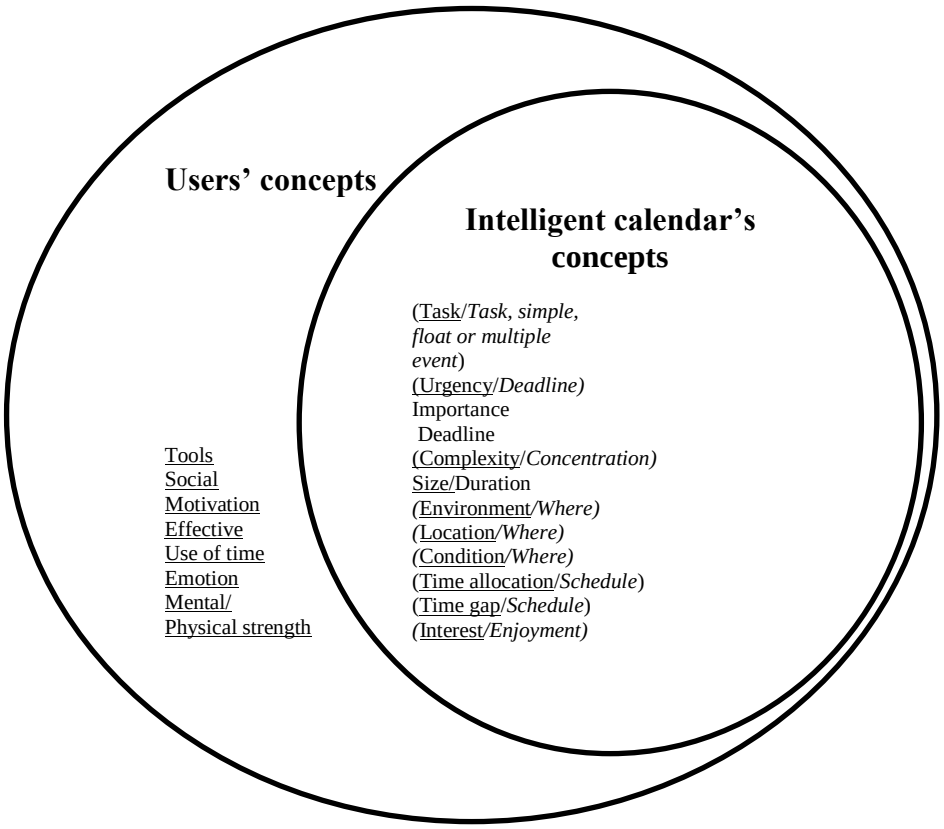



Figure 6.7. The similarities and differences of Personal Task Management (PTM) concepts between users and Intelligent Calendar.

**Absent concepts.** There have been a few concepts which are present to users but absent to the system. They are denoted by [C11, 12, 15, 16, 17 and 19], which are slightly fewer if compared to the absent users' concepts found in Gtdagenda. Among these, it is essential to highlight concepts that are essential to users. For example, the social factor (i.e. relationships with other people – superiors, colleagues, students, peers, etc.) does influence what tasks they choose to do at any given time [C12]. Some of them further explained that they have a tendency to prioritise or do first tasks that come from their superior (e.g. dean or head of department) more than any other tasks. Some of the users feel more productive doing big or difficult tasks in the evening [C19]. In contrast, some of them feel it is the other way round and therefore prefer to do those kinds of tasks in the morning. Their current state of their mental or physical strength also influences their decision. They tend to continuously do their writing task (e.g. research articles) when their ideas flow very well [C17] and they feel motivated [C15 and 16], rather than switching to less important, small or easy tasks. The system however, seems to fail to take these important users' concepts into account.

Interestingly, the author finds that this system is simpler than Gtdagenda. It includes most of the users' concepts. It seems that there are no systems concepts that are absent to users.

**Present (or similar) concepts and identical.** The author discovers concepts that have different interpretations between the users' and the system concepts, but may have the same purpose/meaning. Users have a tendency to identify the complexity and size of their tasks before deciding when they are going to do them. For example, they are inclined to prioritise to do difficult or big tasks when they have a long and uninterrupted time gap or whenever they are at home. Similarly, the system requires users to identify the duration of their tasks and whether they need some concentration to do them [C5]. Based on this information, it will automatically schedule those tasks for users, assisting users in allocating a time to do their tasks [C14]. In addition to this, the system also asks users to identify tasks that are enjoyable to do to improve the appropriateness of their recommended schedule. This seems in line with users who show a tendency to prioritise tasks that they have interest in or would enjoy doing at a certain time (e.g. during the weekend) [C18].

Table 6.4. A detailed conceptual comparison between users and Intelligent Calendar.

| ID | Concepts | U: User | S: System (Related concept) | Identical? |
|---|---|---|---|---|
| C1 | Task | P | P (Task, simple, float and multiple event) | √ |
| C2 | Urgency | D | P (Deadline) | X |
| C3 | Importance | D | P | √ |
| C4 | Deadline | P | P | √ |
| C5 | Complexity | P | P (Concentration) | X |
| C6 | Size | P | P | X |
| C7 | Duration | P | P | X |
| C8 | Environment | P | P (Where) | X |
| C9 | Location | P | P (Where) | √ |
| C10 | Condition | P | P (Where) | X |
| C11 | Tools | P | A | - |
| C12 | Social | P | A | - |
| C13 | Time allocation | P | P (Schedule) | X |
| C14 | Time gap | P | P (Schedule) | √ |
| C15 | Emotion | P | A | - |
| C16 | Motivation | P | A | - |
| C17 | Mental/Physical strength | P | A | - |
| C18 | Interest | P | P (Enjoyment) | √ |
| C19 | Effective use of time | P | A | - |

### 6.5.3 Tool #3: MS Outlook GTD Add-in

#### 6.5.3.1 Description

MS Outlook GTD Add-in is a well-integrated personal task management tool. It allows users to manage their tasks and link them with their calendar, email and notes. Below are some of its main functions/features:

- Creating tasks/actions (i.e. contexts/categories) and specifying other details (e.g. project, due date, priority, etc.) (see Figure 6.8).
- Sorting tasks by due date/project/action (see Figure 6.9).
- Converting email into task/action, and linking between task/action and its respective email (see Figure 6.10).
- Converting tasks into appointment (task scheduling/time blocking).
- Deferring email into appointment.
- Copying details from email or its attachments to OneNote notebooks application.
- Linking between notebooks and tasks/email.

The details of these are provided in Appendix L, which are used to identify system concepts.

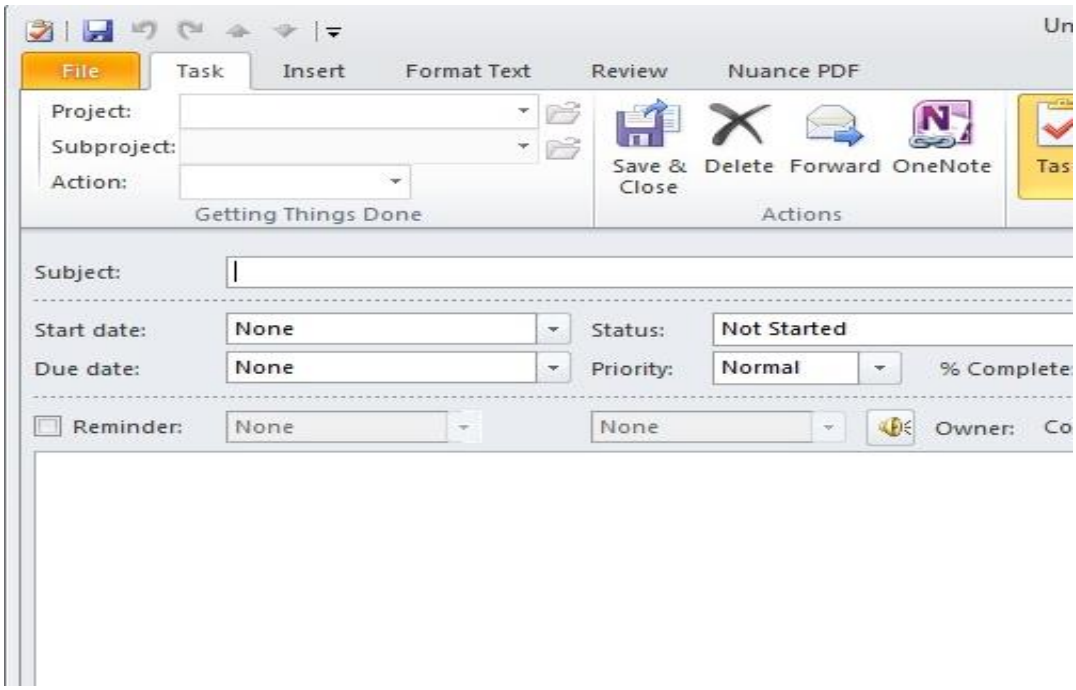



Figure 6.8. A screenshot of task creation.

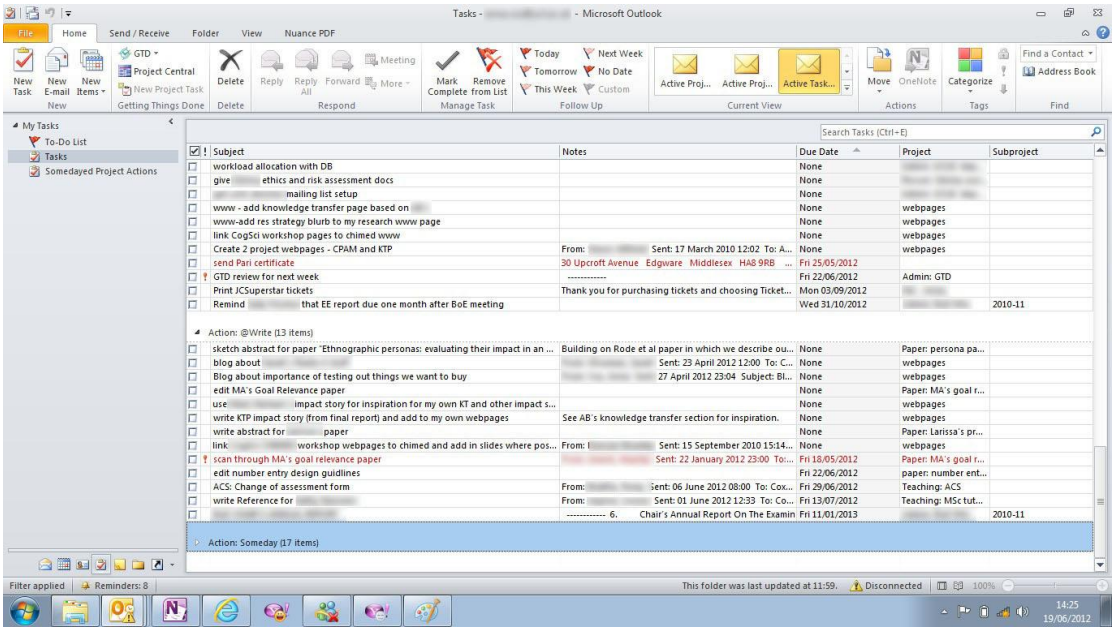


Figure 6.9. Task view option by project.

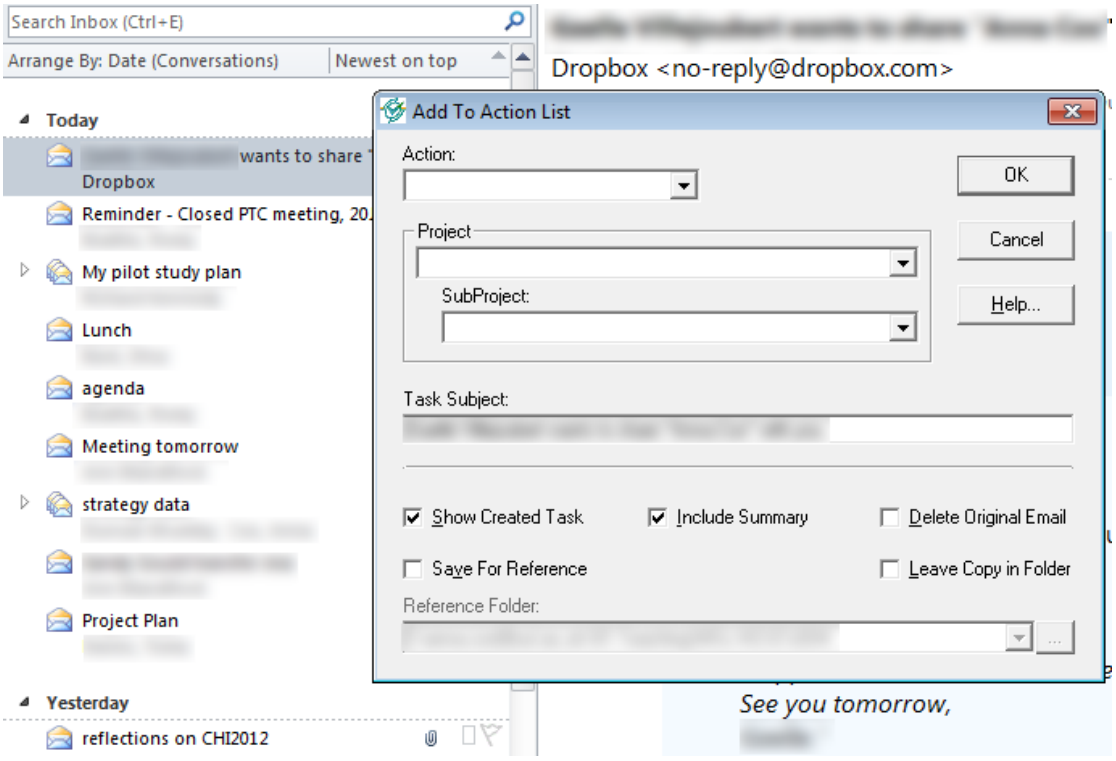



Figure 6.10. A screenshot of conversion of email into task.

#### 6.5.3.2 Comparison

To begin, Figure 6.11 shows an overview of the conceptual comparison between users and MS Outlook GTD Add-in, which is based on the detailed comparison provided in Table 6.5.

**Present (or similar) concepts but not identical.** The author has identified a few concepts that are present/related but not identical. As previously found in Gtdagenda, MS Outlook also provides a feature that enables users to assign an absolute value to represent their task priority [O3]. Unlike Gtdagenda, MS Outlook provides three different levels of priority: low, normal or high. In contrast, according to users, priority is determined against which tasks or situations they are currently considering, and therefore it tends to change over time. They added that it seems inappropriate to assign priority with a fixed value or notations (e.g. flags, asterisks, etc.).

As highlighted previously, it is important for users to identify the size of their tasks and match it with their time gap. They tend to classify their tasks into two categories: big (i.e. something that requires from a few hours to a few days or weeks to do) or small (i.e. something that can be done in less than an hour or so). Some users explained that it is a challenge to estimate the amount of time needed to complete their tasks. Conversely, the system provides no representation to differentiate between these. Instead, it shows a property - total/actual work, allowing users to define the exact number of hours required to do their tasks [O6].

MS Outlook provides a calendar that is used to book a time and show users' time availability (gap), but it appears that there is no representation to differentiate small or big time gaps [O14]. According to users, it is essential to be able to easily identify an appropriate time gap to match with appropriate task (e.g. a 1-day time gap should be allocated to do a big or difficult task).

**Absent concepts.** There have been some concepts that are important to users but seem not well presented by MS Outlook. There is no representation to distinguish the complexity between their tasks [O5]. Similar to Gtdagenda, MS Outlook also has not provided any representation for emotion, motivation, mental/physical strength, interest and effective use of time [O15-19]. As highlighted previously, users are inclined to take these into consideration before deciding which tasks they choose to do at a given time. For instance, they prefer to do difficult tasks when they have a big time gap or when they feel excited, motivated or mentally prepared.

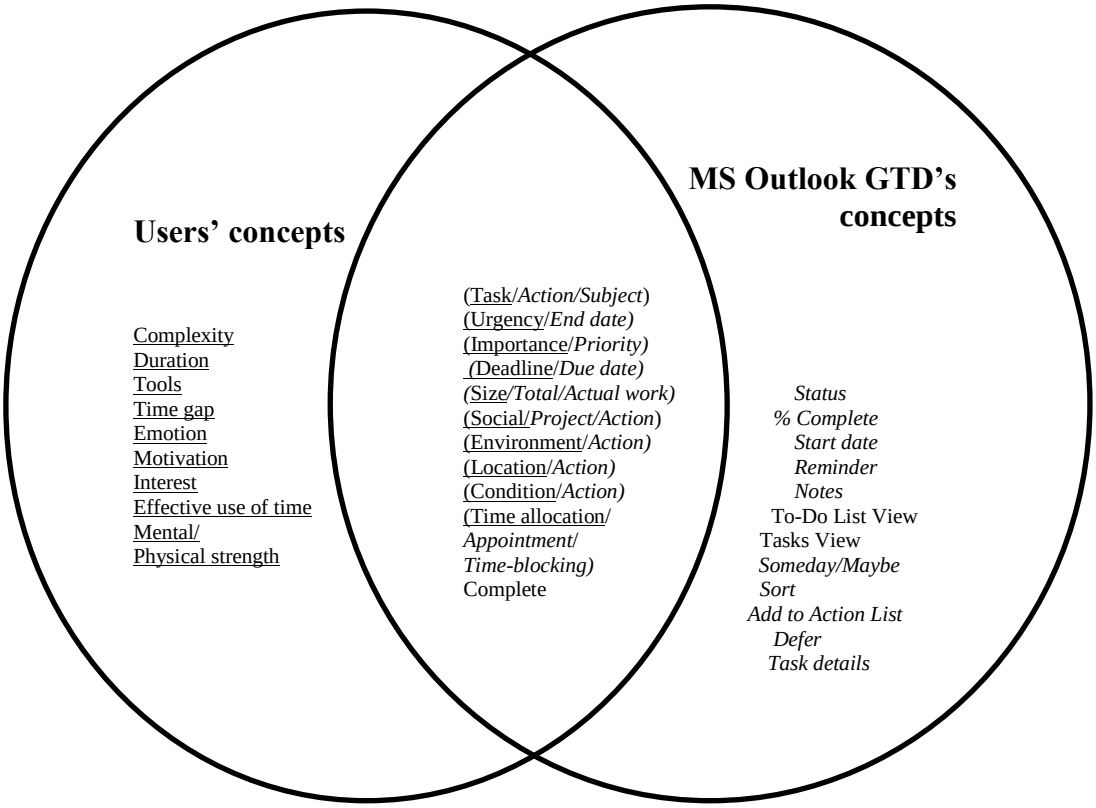



Figure 6.11. The similarities or differences of Personal Task Management (PTM) concepts between users and MS Outlook GTD Add-in.

From a system perspective, there have a number of concepts represented by the tool which are not apparent to users. Outlook provides a feature where users can sort/view their tasks with two categories: To-Do List (i.e. by Due date) [O27] and Tasks (by Action)[O28]. This seems useful for users to look forward to tasks that are coming up alongside with their other details. They can also easily identify what types of tasks/actions that they have to do, and which project/subproject or other context they belong to.

However, the author identifies that some system concepts appear to be unnecessary to users. The majority of users tend to define their tasks as briefly and quickly as they can. They may write tasks or subtasks that they have to do or deadlines for when they need to be done by, rather than provide more details that go beyond these. By contrast, the system supplements with a feature where users can specify other properties; task status [O22], % complete [O23], start date [O24] or other details (date completed, total/actual work, mileage, billing information and company [O34].

**Present (or similar) concepts and identical.** Previously, the author has highlighted the misfits identified between users and the system. In this section, the author explains a few

concepts that informed by users and implemented by the system may have different representations, but both imply the same meaning or purpose. Users have a tendency to do certain types of tasks while they are at certain locations; work, home or away (e.g. travelling on the train). The system encourages its users to identify related action or context (e.g. @Work, @Computer, etc.). They may use this to define a location of where a particular task needs to be or can be done [O8, 9, 10].

Users also explained that they have different types of commitment and people to deal with. Similarly, the system provides a feature that allows people to create a different project or action. This may assist them in organising their tasks into certain categories. Later, this may assist them in remembering what their tasks are about and which people are involved with them [O12]. Similar to the Intelligent Calendar, MS Outlook also enables users to block their time to do a particular task or show that they are at a certain location. For example, they are away on holiday, at a conference, working from home or not in the office. The system also provides a feature that allows users to convert their tasks into appointments, allowing them to allocate a time to do them. This is in line with users who explained that they think it is important to allocate a specific time or floating period in which they intend to do their tasks [O13].

## 6.6 Discussion

Previous section shows the misfits identified between the users and the system concepts represented by those three tools. The results also highlight the differences and similarities between them, suggesting potential improvements that can be done to those tools and useful features that users can learn from them. This section discusses the findings in detail.

Table 6.6 summarises the key findings and recommendations made based on the evaluations of all the tools (represented by Tables 6.3, 6.4 and 6.5). This section is divided into the following subsections, allowing the author to highlight the most important concepts that existing or future tools need to address or users can learn respectively:

- Concepts that have been adequately implemented by the tools.
- Potential concepts that need to be redesigned by the tools.
- Potential concepts to be implemented by tools.
- Useful concepts that users might benefit from.

Table 6.5. A detailed conceptual comparison between users and MS Outlook GTD Add-in.

| ID | Concepts | U: User | S: System (Related concept) | Identical? |
|---|---|---|---|---|
| O1 | Task | P | P (Action/Subject) | √ |
| O2 | Urgency | D | P (End date) | X |
| O3 | Importance | D | P (Priority) | X |
| O4 | Deadline | P | P (End date) | √ |
| O5 | Complexity | P | A | - |
| O6 | Size | P | P (Details-Total/Actual work) | X |
| O7 | Duration | P | A | - |
| O8 | Environment | P | P (Action) | √ |
| O9 | Location | P | P (Action) | √ |
| O10 | Condition | P | P (Action) | √ |
| O11 | Tools | P | A | - |
| O12 | Social | P | P(Project/Action) | √ |
| O13 | Time allocation | P | P (Conversion of task into appointment/Time-blocking) | √ |
| O14 | Time gap | P | P (Calendar) | X |
| O15 | Emotion | P | A | - |
| O16 | Motivation | P | A | - |
| O17 | Mental/ Physical strength | P | A | - |
| O18 | Interest | P | A | - |
| O19 | Effective use of time | P | A | - |
| O20 | Project/Subproject | P | P | √ |
| O21 | Action-GTD Specification of context/type/ category of task) | A | P | - |
| O22 | Status | A | P | - |
| O23 | % Complete | A | P | - |
| O24 | Start date | A | P | - |
| O25 | Reminder | A | P | - |
| O26 | Notes | A | P | - |
| O27 | To-Do List-View Option(by Due date) | A | P | - |
| O28 | Tasks-View Option(by project, action) | A | P | - |
| O30 | Someday/Maybe Project/Action | A | P | - |
| O31 | Assign Menu | A | P | - |
| O32 | Add to Action List Menu-Conversion of email into task | A | P | - |
| O33 | Defer Menu-Conversion of email into appointment | A | P | - |
| O34 | Task Details | A | P | - |
| O35 | Complete | P | P | √ |
| O36 | Sort | A | P | |

### 6.6.1 Concepts that have been adequately implemented by the tools

Existing tools have implemented some of users' concepts. For example, they provide features with which users can easily define their tasks and their respective properties. These include deadlines, the importance (or priority) of tasks, location or context of where they are going to be done, the size (or duration) and complexity of tasks, time gap and the enjoyment or interest in doing them. This can help people in identifying the right tasks to do at a given time. For example, users might choose to prioritise tasks whose respective deadlines are more imminent or more important by a certain time. Also, they can estimate the size of their tasks and choose when and where to do them.

### 6.6.2 Potential concepts that need to be redesigned by the tools

The analysed tools are lacking three essential concepts, which can inform potential redesign opportunities. First, none of them provides an adequate representation to show the urgency of users' tasks. Instead, the tools tend to sort tasks based on a deadline or assigned absolute priority/important tag (e.g. numerical value, ranks or asterisk symbol). Gtdagenda, for instance, implement a feature where users can assign absolute priority to their tasks. Users can rank their tasks using a scale between 1 and 5. The idea behind this is that it will allow users to prioritise their tasks according to these values and perhaps assist them in categorising their tasks. The author suggests that this might be a problem for two important reasons. First, users highlighted that it is a challenge to weigh/articulate the importance of their tasks explicitly. Most of their tasks seem equally important and need to be done almost at the same time. Second, their task priorities are relative to other factors and therefore tend to change over time. Users have a tendency to gauge their current situations and decide what would be the appropriate tasks to make use of their available time. The importance of their task may vary over time and change accordingly with the tasks or situations they are considering or facing. Hence, the absolute priorities that they have assigned way in advance might not seem useful (i.e. make any sense to them) in the future.

Table 6.6. Concepts that the tools can redesign or implement and users need to learn.

| **Concepts** | **Recommendations** | | | **Rationale** |
|---|---|---|---|---|
| | Difficult for users to articulate or systems to implement explicitly | Potential for users to learn or implement | Potential for systems to redesign or implement | |
| Urgency/ Deadline or due date | √ | - | √ | The urgency of tasks depends on two factors: importance and deadline rather than just a deadline. It is a challenge for people to determine this explicitly because it tends to change over time based on people's current tasks/situations. Moreover, some tasks have no specific deadline. |
| Importance/ Priority | √ | - | √ | It is a challenge for people to scale (i.e. rank) the importance of tasks explicitly. It tends to change over time based on people's current tasks/situations. It appears that people's priorities are relative to their current tasks/situations, and thus they tend to change over time. People do not scale them explicitly. In contrast, systems impose the concept 'absolute priority' (e.g. 1-5) that needs to be assigned to individual tasks. There should be other more easy and effective ways of managing priorities. |
| Complexity/ Concentration | - | - | √ | People tend to do complex tasks at a particular time (e.g. when they have a big time gap or when they are mentally or physically prepared). |
| Size | - | - | √ | Similarly to complexity, people tend to do big tasks when they have a big time gap, allowing them to focus on them uninterruptedly. Some people are inclined to do small tasks in between big tasks or short time gaps. Some people have a tendency to do or finish all small tasks first, allowing them to concentrate the rest of their time on big tasks. |
| Social | - | - | √ | Some people tend to prioritise tasks which are done for/reported to other people (e.g. for their superiors, colleagues, post-docs, current or past students, etc.). It also has a connection with the 'importance' concept/factor. People are inclined to do tasks that can help other people to achieve their respective goals/deadlines. This allows people to maintain a good relationship or reputation with respective persons. For example, some people tend to treat tasks that come from their superiors (or people that they are responsible to) as very important and respond to them immediately even though there is no deadline assigned to it. |

| | | | | |
|---|---|---|---|---|
| Time gap | - | - | √ | People tend to do small tasks during small time gaps or while taking a break in the middle of big tasks. They prefer to do big tasks when they have a big time gap (e.g. between a few hours to a day time gap). Some of them tend to finish the current small tasks before beginning or continuing their big tasks. Some tend to allocate adequate/free space in their schedule, allowing them to use it for unexpected tasks and adjusting their schedule. |
| Emotion | - | - | √ | Some people tend to choose or switch to a different type of task when their mood changes. For example, some people tend to do big tasks or complex tasks when they feel happy or excited, motivated or stressed. However, they tend to do small, easy or more exciting tasks when they feel bored, annoyed, frustrated or too stressed doing a certain task (e.g. a difficult or big task). |
| Mental/ Physical strengths | - | - | √ | People's current mental or physical state tends to influence them in whether to stick to doing a certain type of task (e.g. big or difficult tasks). For example, people tend to continue doing these tasks if they have a clear mind and the ideas flow very well. Thus, they tend to prioritise these over other tasks (e.g. small or less important tasks). Instead, they tend to switch to small or less difficult tasks when they feel tired. |
| Interest/ Enjoyment | - | - | √ | Some people tend to do tasks that interest them most at a given time. For example, some people tend to do tasks that interest them most during the weekend. They are inclined not to do less exciting or tedious tasks at that time. Some people also tend to put off this kind of task until the last minute (i.e. when the deadline is imminent, and thus it becomes very urgent). |
| Effective use of time | - | - | √ | Some people feel more productive (or mentally prepared) at a certain period of time throughout the day. Thus, some tend to do 'writing' or other difficult tasks in the morning while others tend to do them in the evening. To assist users to prioritise their tasks and suggest appropriate scheduling recommendations, perhaps future tools can understand this potential aspect too. |
| Goals/ Projects | - | √ | - | Some users however, have not externalised their goals/projects or tasks explicitly. The creation of them may help users to prioritise their tasks/time better. This perhaps can encourage/remind them to regularly review and choose to do tasks that can contribute to their stated goals/projects. Otherwise, they may be distracted by other less significant tasks/activities. |
| Next action | - | √ | - | The concept encourages users to identify tasks that need to be done first in order to get a particular project or main task progressed/moved on. This perhaps can assist people with a huge number of tasks at a time, which may cause them to feel overwhelmed. |

| | | | | |
|---|---|---|---|---|
| Action/ Someday/ Maybe | - | √ | - | This concept encourages users to identify a context of a particular task. For instance, users can associate certain things to their tasks; for example type of tasks, location of where they need/can be done, person, project, time possibility to do them (someday/maybe), etc. This may help them in classifying/sorting their tasks according to those contexts. This can also assist them in choosing or concentrating on a certain task at a time, and avoiding a risk of being overwhelmed by their overall tasks. |

In relation to this, it is a challenge for users to identify the urgency of their tasks too, particularly when they have a long list of tasks to do. Some of their tasks have no specific deadlines but still seem very urgent to them. They explained that the urgency of tasks depends on two underlying concepts: importance and deadline. However, none of those tools provides any feature that can distinguishes the urgency of users' tasks explicitly. Most of them instead are inclined to focus on a deadline for sorting the tasks.

Secondly, existing tools do not provide enough support to both schedule users' tasks, and reassess them. The Intelligent Calendar and MS Outlook provide a feature that allows users to schedule or book a time to do a particular task. It can automatically schedule users' tasks (based on certain parameters, for example, its due date, estimated time to do them, how important or enjoyable they are). However, it appears that none of the these tools provide a feature that can review and match between users' current time gap and tasks, or more importantly suggest possible recommendations/changes that can be done in accordance with users' current situations and tasks that lie ahead (e.g. time constraints, coming up deadlines, unscheduled tasks, etc.). There is no feature that links between tasks and related scheduled events (e.g. meetings, conferences, important dates, etc.). This is important because some events imply there is something to be done by then. Also, there is no feature that provides repetitive notifications at certain time intervals (for reminding users of a particular task to be done) before those events.

Thirdly, the analysed tools provide limited representations for assisting users in distinguishing the complexity and size of their tasks. MS Outlook and the Intelligent Calendar do provide a property where users can specify time (in hours) to complete a task. In reality, most of the users are inclined to classify their tasks into more general categories (as either big or small, or difficult or easy), rather than represent them numerically. It may be beneficial for users to have a feature that can visually differentiate their task sizes. This may help them to filter their overall tasks and choose the possible or right tasks to do at a time. For example, some users explained that they tend to do all their small tasks before beginning bigger or more complex tasks. Some tend to do small tasks whenever they have a small time gap in between their big tasks or scheduled events (e.g. meetings).

### 6.6.3 Potential concepts to be implemented by tools

There have been a few concepts that are essential to users but not implemented by the tools at all. These include emotion, motivation, mental/physical strength and effective use of time. These concepts may seem less defined as compared to deadlines, size of tasks, location or time gaps, but they do tend to influence people in deciding what tasks they choose to do at a given time or in switching between them. When people feel happy, motivated and mentally prepared, they are inclined to do tasks which are more exciting, big or difficult, or rewarding. But when they feel stressed, annoyed or demotivated, it appears to be a tendency to switch to other tasks, which are perhaps more easy, small or even less important. This might allow them to take a break in between and make use of their time before continuing to complete those difficult or less interesting tasks. However, it appears that most of these tools have not addressed these concepts well. There seems a potential for future tools to provide a feature where it can sense the changes of these psychological aspects and suggest the right tasks to do, allowing users to flexibly switch between their tasks. This perhaps can encourage them to optimise the use of their time according to their current state of mind or feelings.

### 6.6.4 Useful concepts that users might benefit from

From the system point of view, however, the author has identified some system concepts which seem absent but may be potentially useful to users. For example, Gtdagenda features concepts that require users to create goals (e.g. career or personal) and the respective projects or responsibilities associated with them. Each of them may contain individual tasks that contribute to the completion of their respective projects and goals. This may encourage users to be more organised and get involved in doing tasks that help them to achieve their specified goals and projects rather than do other irrelevant tasks.

Moreover, the tool also introduces other concepts that seem helpful in assisting users to review their tasks. The tool provides some possible actions that users can choose from: ‘move to next action’ and ‘someday/maybe’. The former allows them to identify tasks that are more critical to be dealt with first, ensuring that the whole project or big task progresses. The latter appears to be particularly useful in assisting users to reprioritise their less important or less time critical tasks to other days, separating them from the overall tasks that need more attention or have to be dealt with at a specific time. Also, based on this and other customising options, users can filter their tasks and concentrate on certain tasks at a time rather than being

overwhelmed by the overall tasks that they currently have on their plate. In general, these system concepts may help users in overcoming the difficulties they face in identifying and choosing the next task that they should, want or could do for a particular time or context.

Similar to this, MS Outlook GTD Add-in provides a feature where users can associate a certain context/action to their tasks; For instance, users may define what a particular task is about (e.g. @Writing/Editing, @Marking); who is the person or what project that a task belong to (e.g. @Robert, @IED project); where they needs/can be done (e.g. @Work, @Computer). The contextualization of these may help them in classifying and choosing the right task to do at a time. Additionally, the tool enables user to assign action to users' email messages (i.e. to create a task based on the email) and link between them. This seems useful because users explained that email usually contains details that are associated to a particular task that they need to do.

Among those tools, the Intelligent Calendar appears to be the only one that assists users to automatically schedule their tasks and optimise their time. Based on certain concepts (e.g. time constraints or options to undertake tasks, the importance, duration, enjoyment and complexity of tasks), the tool will allocate a time in which users can do their tasks.

The previous section has discussed the mismatches found between the users and the tools, suggesting two important opportunities: concepts that can be redesigned or implemented by the tools, and concepts that users can learn and practise. The next section will briefly explain the limitations of the findings and followed by a summary of the evaluation.

## 6.7 Limitations of the findings

The author has identified some limitations of the findings. Although the findings have identified mismatches between users and the systems and suggested key recommendations, they have not shown how easy it is for users to learn, remember or use/maintain the tool. The findings have not explained how satisfying, useful, efficient or effective they are to them, particularly in relation to their actual experience with managing their tasks. The findings have not revealed potential issues that individual users themselves might encounter. For instance, it cannot be identified how well the tools fit users' individual needs or preferences, and co-exist with their other tools (e.g. email, calendar, etc. which maybe also used to manage their tasks).

To address both limitations, the author suggests that it would be essential to perform a user study, which allows users to use the tools for a certain period of time. This perhaps not only reveals other usability issues but also determines the usefulness or limitations of the tools. This can also be used to validate the potential usability problems (i.e. conceptual misfits) that the author has identified.

## 6.8 Summary

This chapter has explained the evaluation of existing personal task management tools using a CASSM approach. It shows the justification of the approach as well as the tools chosen to be evaluated. It also explains the underlying steps taken to identify the potential usability problems based on the identification of conceptual misfits between users and system concepts.

The results show the adequacy of the tools in terms of three perspectives: Concepts that are present to both users and the systems but seem different or contradicting (e.g. priority); Concepts that are difficult for users to articulate and therefore will be a challenge for systems to implement (e.g. importance, emotions, mental/physical strengths, effective use of time); Concepts that are present to users but absent to systems – so users may find it difficult to use the tools in managing their tasks (e.g. task size or complexity, social). These highlight some potential opportunities for system redesign or implementing these concepts.

The results also reveal important concepts that are present to systems but absent to users. For example, ‘next action’ and ‘action’ concepts allow people to identify and mark tasks that should be done first (in order to let the main task or project progress) and to associate a meaningful context to their tasks respectively. These perhaps can be useful for users in classifying and choosing the right task to do at a certain time rather being overwhelmed by all the tasks that they have to do.

Most of the important concepts that are present and important to users have been implemented in the systems. The author has identified that there have been no perfect tools for users. They rather complement each other. For instance, both Gtdagenda and MS Outlook GTD Add-in provide features to allow users to be more organised by encouraging them to create specific goals, projects and tasks. More importantly, the tool requires people to review their tasks by providing some concepts (e.g. assignment of the possible actions highlighted previously). They also provide a ‘customise/filter’ feature that enables users to sort/view their

tasks by a certain category. On the other hand, the Intelligent Calendar seems useful in terms of automatically scheduling users' tasks based on certain properties (e.g. time constraints, importance, duration, complexity and enjoyment of tasks).

# Chapter 7: Individual differences in PTM behaviours

The findings from the user studies described in Chapters 4 and 5 have allowed the author to develop a detailed model of PTM behaviours, describing how different categories of academics manage their tasks and their underlying issues and needs. The author further analysed the data from the interview and video-diary studies to identify PTM strategies employed by different groups of academics. Based on this, the author developed personas to describe the characteristics of the target users. The personas provide useful tools for both developers and users to understand and redefine what function the tools provide and to what extent they match users' needs. This chapter is divided into the following three sections and ends with a conclusion to highlight key differences in PTM behaviours:

**Section 1** identifies 30 PTM strategies that academics employ, based on the data gathered from the previous interview and video-diary studies.

**Section 2** provides evidence for each of the PTM strategies presented previously in Section 1, and further describes diverse PTM strategies that academics implemented over time (i.e. as their careers progress). Before explaining this, the author provides a description of each academic category identified. The section also covers the importance of each strategy and highlights some of the strategies that have been continued or conversely lost over time. The section further identifies how or why some of the strategies change over time. Section 3 ends with the identification of the similarities and differences of PTM strategies across different categories of academics.

**Section 3** focuses on elaborating four personas to represent the four respective categories/groups of academics described in Section 3. The personas exemplify important matters, including their detailed background, their main PTM strategies, problems/challenges that they experience with managing their tasks including the limitations of their current PTM tools, as well as their needs and preferences in the use of specific tools in the future.

## 7.1 Section 1 - Description of PTM strategies employed by academics

The research question #1 (i.e. *How do academics manage their personal tasks?*) described in section 1.2 on page 6, was used to guide the author to analysing the data. Based on the question, the author focused his analysis on identifying types of academics and strategies that they used in managing their tasks. The data were gathered from both the interview and video-diary studies (see Table 7.1). To identify and differentiate the types of academics, the author used two criteria: the nature of their jobs and their academic achievements. The author concluded that academics can be classified into the following four groups, and the background of each and the respective strategies undertaken will be described in Section 3:

1. PhD students.
2. Post-doctoral researchers.
3. Junior academics.
4. Senior academics.

To summarise (based on the two criteria described above), both PhD students and post-doctoral researchers shared similar roles in that both had to manage research projects. In contrast to post-doctoral researchers, however, most PhD students had less experience in conducting professional research. Both PhD students and post-doctoral researchers needed not to undertake two additional tasks: teaching and administration tasks. Conversely, both junior and senior academics had to carry out both of these tasks as well as undertaking research projects, and the proportion of the first two tasks, compared with research, was higher. The difference between senior and junior academics was that senior lecturers had relatively more experience in both undertaking teaching and research responsibilities, and had already received a promotion (for example as senior lecturers, readers and professors). Most of the academic institutions used promotion as a mechanism to reward the achievements of their academics as well as their seniority (Metcalf *et al.*, 2005; CQUniversity, 2011; Sidek *et al.*, 2012). Promotion was also used to indicate success and accomplishment within a specific academic sphere (Papaconstantinou and Lairmore, 2006). The institutions used guidelines or criteria to assess whether promotion should be awarded. For example, they may require academics to demonstrate the significance of their achievements on research, publications and/or teaching excellence, and their influence or impact, as well as their leadership and engagement contributions (Metcalf *et al.*, 2005; Ismail and Rasdi, 2006; CQUniversity, 2011). Furthermore, senior academics had little time available due to a range of onerous

commitments that they were responsible for and which came from their staff and junior colleagues, RAs and PhD students.

Three of the 31 participants involved in the study were excluded from the findings as they could not be classified under any of the four groups identified. They were a manager, a member of the admin staff and a programmer.

Table 7.1 Categories of participants

| | **Interview study** | **Video-diary study** | **Total (31 participants)** |
|---|---|---|---|
| **PhD students** | P10, P11, P12, P21, P22 | V6 | 6 |
| **Post-doctoral researchers** | P1, P3, P6, P7, P23, P25 | V3 (was P3 in the interview study), V4, V5 | 8 |
| **Junior academics** | P9, P17, P18, P19 | V7 | 5 |
| **Senior academics** | P8, P13, P14, P15, P16, P20, P24, P26 | V1 (was P8 in the interview study), V2 | 9 |
| **Unclassified** | P2 (administrator); P4 (manager); P5 (programmer). | | 3 |

Based on the analysis of the data from the interview and video-diary studies, the author has identified 30 strategies that academics implemented (see Table 7.2). The PTM strategies identified can refer to any activities, techniques, tactics or systems that academics use to better facilitate their management of tasks or to tackle challenges/issues that they experienced. It is important to highlight that the author only included strategies (as shown in Table 7.2) if more than one participant - either from within the same group or across different groups of academics – was described or mentioned, rather than including a strategy that was unique to one particular participant. To guide the discussion later in Section 3, the author has assigned a number for each strategy identified to represent its strategy number (for example, ‘writing task lists’, is referred to as strategy number 1). Throughout the findings described in Section 3, the author used the following terms to provide an understanding of how many participants from each category referred to a particular strategy:

1. Most – a significant number of participants (half or more).
2. Some – more than one but less than half of participants.

Table 7.2 PTM strategies

| Strategy | Description |
|---|---|
| **S1: Writing task lists** | Writing down what tasks need to be done using paper notebook, craps of paper, Word/Notepad, electronic task list applications. |
| **S2: Breaking tasks into sub tasks** | Identifying sub-tasks or related tasks to be completed in order to begin/complete the main/big tasks. |
| **S3: Setting deadlines** | Identifying/recording a deadline by which tasks need to be completed. |
| **S4: Creating Gantt chart** | Creating lists of tasks/sub-tasks and their respective timeframes (i.e. time bar) within which tasks have to be completed. |
| **S5: Putting notes in important places** | Placing notes as reminders of tasks to be completed (usually written down on scraps of paper, post-it notes) on noticeable places (e.g. computer monitor, keyboard, on the door). |
| **S6: Switching tasks** | Changing from doing one task to undertaking another due to internal factors (e.g. people tend to switch to do other tasks when they feel bored, demotivated, frustrated, unproductive, etc.) |
| **S7: Matching between tasks and location** | Deciding to carry out an appropriate task at a particular location (e.g. choosing to do reading tasks while commuting to/from workplace or travelling abroad). |
| **S8: Reviewing and revising task lists/diaries** | Revisiting and updating tasks recorded in task lists/diaries in relation to current or unexpected situations or additional/related tasks/requests. |
| **S9: Assessing achievement** | Reflecting on the status of their tasks at a particular time e.g. at the end/beginning of the day/week to identify if they have been completed, are ongoing or still have to be completed. |
| **S10: Categorising/labelling tasks** | Assigning a certain title/label to their tasks e.g. projects, persons, types of tasks, priority. |
| **S11: Scheduling meetings on the same day** | Allocating a particular day to arrange all or most of their appointments. |
| **S12: Creating separate task lists** | Creating different lists to differentiate between short-term (e.g. daily or weekly) or small tasks and medium/long-term or big tasks. |
| **S13: Crossing off or ticking completed tasks** | Crossing off or checking through tasks that have been done |
| **S14: Visualising or looking forward to big/important tasks or deadlines projection** | Looking forward to big/important tasks that need to be done by a certain time or important deadlines that they need to be aware of. |
| **S15: Scheduling big tasks** | Allocating/blocking a time to do big tasks. |
| **S16: Compensating personal time** | Doing tasks outside official working hours (i.e. later in the evening at home during their personal time) due to limited time gaps available to undertake tasks during office hours. |

| | |
|---|---|
| **S17: Matching between tasks and time period** | Deciding to do appropriate tasks at a certain period of time e.g. choosing to do writing tasks in the morning/evening. |
| **S18: Controlling the amount of time spent on tasks** | Readjusting a time allocated to do a particular task in relation to their current commitments, time constraints or unexpected events. |
| **S19: Creating mind maps** | Drawing mind maps of tasks and their respective sub-tasks, deadlines or matters that they need to be aware of. |
| **S20: Determining actions on emails read/received** | Identifying clearly what to do or how to respond to email messages received. |
| | |
| **S21: Ignoring certain tasks** | Disregarding unnecessary requests or tasks that are not important i.e. little or no consequence if they are not completed. |
| **S22: Matching size of task and time availability/gap** | Deciding to undertake appropriate tasks within a certain time gap available e.g. choosing to do small tasks during an hour or half an hour gap. |
| **S23: Doing multitasking** | Undertaking different tasks in parallel due to similar/concurrent deadlines or if the tasks are similar in nature e.g. writing the method sections for two different articles. |
| **S24: Rearranging task lists/schedules** | Reordering the sequence of tasks to be done recorded in task lists/schedules to address current/unexpected situations. |
| **S25: Avoiding distraction** | Switching off or avoiding any sources of distraction e.g. email, Facebook which could act as a diversion from focusing on /undertaking a certain task. |
| **S26: Saying 'No'** | Rejecting a particular task/request due to current commitments or time constraints. |
| **S27: Reducing current number of emails (to read or act on)** | Leaving a minimal number of active emails (either to work on or to refer/respond to later) in their inbox by getting rid of irrelevant emails or emails to which they have already responded. |
| **S28: Scheduling 2-3 big tasks a day** | Allocating not more than 3 big tasks during a certain day. |
| **S29: Delegating tasks** | Delegating other people to undertake particular tasks on their behalf. |
| **S30: Extracting and transferring tasks from a master/main list into daily list/diary** | Identifying and picking tasks/sub-tasks from the main/big task list and putting them in short-term (daily/weekly) task lists that need to be done within those time-frames. |

## 7.2 Section 3 - Development of PTM strategies over time

This section is divided into seven sub-sections. The first four sub-sections describe the four categories of academics (as highlighted previously in Section 1). Each of these four sub-sections is explored in two ways. There is a brief explanation of the respondents'

backgrounds, describing the nature of their job and their degree of 'busyness'. This is followed by a description and the importance of the strategies that they employed to manage their job and busyness. Table 7.3 provides an overview and a structure for the discussion. It summarises common strategies used by a group of academics. The table also indicates that academics tended to develop additional strategies as their careers progressed but some may not necessarily continue to implement strategies that they used during earlier stages in their careers. The table was derived from the analysis table provided in Appendix R. The analysis table shows the PTM strategies implemented within and across different groups of academics. It is important to highlight that the table only includes PTM strategies which were mentioned by more than one participant, in order to avoid identifying strategies which were unique to only one participant. The fifth sub section elaborates why and how the participants altered their PTM strategies over time, explaining what made them change from one strategy to other strategies. The following sixth and final sub-sections discuss the key similarities and the differences in PTM behaviours across all those four categories of academics identified, respectively.

### 7.2.1 Group #1: PhD Students

#### 7.2.1.1 Background

The PhD students recruited for the study were conducting their research projects either in the department of Computer Science or in the Psychology and Language Sciences Division. Compared to other academics, most had little experience of conducting professional or large-scale research projects. This may have influenced them in setting unrealistic goals in managing their time or failing to allocate or control the use of their time in undertaking a certain task. They had to manage their projects on their own with the support/guidance from their supervisors:

> *P11: I think I have planned a lot last time but I did not manage to complete those plans because I was not being realistic. I was too ambitious. [..] For example, when I tried to complete reading in four days, given that I have like 10 articles, I was not being realistic enough to myself because there're a few articles that are pretty much boring. So that took me like a day to complete one article.*

> *P10: So there isn't really much structure or management, it's just basically prioritising. So obviously right at top would be the meetings… supervisor's meetings*

*and deadlines and everything else will take second priority obviously which is a wrong way to go about it. […] I have a weekly meeting with my supervisor and a monthly meeting with my second supervisor*.

While most PhD students are not required to teach or undertake administrative work, some voluntarily chose to teach a course or to supervise masters' or undergraduates' projects for a limited number of hours (P21):

*P21: But other things that came in between that I have to do, so a student sent her draft or a.. bachelor thesis and I have to read it and then send comments back.*

PhD students may have more gaps between tasks or a longer amount of time between them which they could use to focus on their research. They had a small number of meetings or fixed events to attend compared to lecturers. Their challenge, however, was that they needed more time to do their research since most of them were inexperienced in conducting academic research and they had little understanding of the subject:

*P12: Right now I'm just working in one particular thing so I don't really need to write it down because I know exactly what I'm doing but when I want to do more things, usually like for example I want to run an experiment three so what I need to prepare for experiment three?*

*P10: I don't think I have a busy schedule but because of the workload it's a busy schedule if I could get the work done very quickly I wouldn't have a busy schedule because it takes me a long time to do it.*

Table 7.3 Development of strategies for managing personal tasks over time and the frequency of the mentioned strategies within and across groups.

**Strategy Improvement**

| Strategies | | | | Senior (Total: 9) | Total (28 participants) |
|---|---|---|---|---|---|
| S30: Extracting and transferring tasks from master/main list into daily list/diary | | | | 3 | 3 |
| S29: Delegating tasks | | | | 3 | 3 |
| S28: Scheduling between 2-3 big tasks a day/ | | | Junior (Total: 5) | 2 | 2 |
| S27: Reducing current number of emails (to read or act on) | | | 2 | 2 | 4 |
| S26: Saying 'No' | | | 1 | 1 | 2 |
| S25: Avoiding distraction | | | 1 | 1 | 2 |
| S24: Rearranging task lists/schedules | | | 1 | 6 | 7 |
| S23: Doing multitasking | | | 1 | 2 | 3 |
| S22: Matching between size of task and time availability/gap | | | 1 | 4 | 5 |
| S21: Ignoring certain tasks | | | 1 | 1 | 2 |
| S20: Determining actions on emails read/received | | | 1 | 1 | 2 |
| S19: Creating mind maps | | | 2 | 0 | 2 |
| S18: Controlling the amount of time spent on tasks/ | | | 2 | 2 | 4 |
| S17: Matching between tasks and time period | | Postdoc (Total: 8) | 1 | 1 | 2 |
| S16: Compensating personal time | | 1 | 0 | 3 | 4 |
| S15: Scheduling big tasks | | 1 | 3 | 6 | 10 |
| S14: Visualising or looking forward of big/important tasks or deadlines projection | | 2 | 2 | 2 | 6 |
| S13: Crossing or ticking completed tasks | | 4 | 2 | 3 | 9 |
| S12: Creating separate task lists | | 5 | 2 | 4 | 11 |
| S11: Scheduling meetings on the same day | | 1 | 1 | 1 | 3 |
| S10: Categorising/labelling tasks | PhD students (Total: 6) | 3 | 1 | 4 | 8 |
| S9: Assessing achievement | 2 | 3 | 1 | 3 | 9 |
| S8: Reviewing and revising task lists/diaries | 1 | 5 | 5 | 9 | 20 |
| S7: Matching between tasks and location | 1 | 1 | 1 | 4 | 7 |
| S6: Switching tasks | 3 | 2 | 1 | 3 | 9 |
| S5: Putting notes at noticeable places | 3 | 3 | 1 | 0 | 7 |
| S4: Creating Gantt chart | 1 | 2 | 0 | 0 | 3 |
| S3: Setting deadlines | 3 | 4 | 1 | 3 | 11 |
| S2: Breaking tasks | 2 | 4 | 3 | 2 | 11 |
| S1: Writing task lists | 6 | 7 | 5 | 9 | 27 |

**Seniority**

**Legend**

| | | |
|---|---|---|
| | | **Strategy that has been continued** |
| | | **Strategy that has been lost or not yet developed** |

In addition to their research, most PhD students were frequently required by the university to participate in short courses, seminars or workshops throughout their studies:

*P10: At the moment it's just a matter of goals like I've got a piece of course [work due] or a deadline I just work until I achieve that. […] Every week I also go to a research seminar posted by [CENTRE] and then there's also a training programme I've involved on.*

### 7.2.1.2 Strategies

Some of the PhD students explained that they tended **to write task lists (S1)**, reminding them of things to do by a certain time. They also tended **to break down a particular task into sub-tasks (S2)**. This enabled them to make the task seem manageable or to indicate that it could be completed by a certain period of time:

*P11: Let's say this week I need to finish up reading ten articles so I will list down the articles inside my PDA so it will remind what sorts of the thing I need to accomplish by the end of this week. […] So how do I assign the […] task is that… so to achieve that particular objective, I will divide the task into maybe into sub-tasks.*

Most of the students explained that was important **to set or be given deadlines for a certain task (S3)**. The deadlines motivated them to work on their tasks continuously until they were completed by the specified due date:

*P10: I mean I have in my mind certain deadlines for example you know for example my viva exam is gonna be in June sometime so I need to be concentrate working towards that. […] I [can't] generalise but for me the rest of the time just you know priorities, deadlines and so on. […] So it's... if I have a deadline, I'd work on it even if it takes a weekend or night, I'd work on it and everything just focus is around that. As I said I have other things to do, things that I have to do during the time and I do those but obviously it's all centred around doing this one particular goal you know deadline.*

Some of the students said that they were inclined to **create a Gantt chart to manage their research project (S4)**. The chart tabulated a list of tasks and their sub-tasks and the respective time-frame in which they intended to do and complete those tasks:

*P11: So what I did is I just came up with like an Excel Gantt chart using only Windows and I just plan and see for this activity, how many days I'm gonna do it and*

*then... well it depends. Sometimes I didn't do it. Sometimes I did that. So if I'm not doing that, I'm gonna bring it forward to the next day. So the whole plan is for three years but given that there are a few times that I did not manage to complete it according to the plan.*

Some of the students explained that they tend **to put scraps of paper, post-it notes (containing some notes or sketches) or physical objects at noticeable places (e.g. monitor or keyboard) (S5)**. So every time they looked at their monitor and tried to move their keyboard, the notes would remind them what tasks they needed to do or what things they needed to remember:

*P21: Why I put the paper on my keyboard. Because I have to move the paper before I can access the computer so I need to physically touch the object and will be reminded hopefully. Um I have noted at least when I'm at home, sometimes if lay my... a piece of paper on my laptop. I do noted and then put it away and take my laptop. Go somewhere and forget about it. Um so mostly are urgent. I also sometimes I do make notes for do I want to do on the long term. […], so this urgent lists that I put on my keyboard, I will find them and I will read through them and then go, 'oh yeah, I really really need to do these before I go.' And then I will do them.*

Students also implemented a strategy whereby they tried being flexible in choosing a task to do at any one time. Thus, they had a tendency **to switch between different tasks (S6)**. For instance, if they felt bored, the task was difficult or if they got stuck, they would choose to do another task in order to fill the available time gap, to progress or make good use of their time:

*P22: Currently with writing my conference paper. If I'm writing up a discussion section or whatever and you know I need a break then I'll switch to reading a paper.*
*P12: But if I feel like I cannot concentrate then I move to something else... that maybe different from the PhD or may be is slightly related. Yeah... I tend to pamper myself a lot in that sense. That... if I'm unable to concentrate then I just change to something else. I don't force myself to try it.*

They also tended **to match tasks to be done and their current location (S7)**. For example, they preferred to do certain tasks such as writing academic materials or reading journal papers while they were at home or travelling back and forth to their workplace. This

enabled or motivated the students to focus and feel productive in doing tasks which were appropriate to their environment:

> *P22: and also what is suited to the environment. So something that suits to do it in the office and something that I just can't do in the office because I need to be at home and I need to be listening to my music and in my own area and able to work without interruptions. So what the environment is around me is like [laughs] definitely motivates me a lot to choose what to do especially when thinking about what to write about.*

Some of the participants spent time **in reviewing and revising their task lists/diaries (S8)**. This helped them to revisit their plans in order to address current/unexpected changes or situations, as well as extending the time that they needed to complete a certain task:

> *P11: Once every month because my supervisor requests the plan, so I have to come up with the new one almost every month.*

Some of the participants explained that, every so often, **they would assess their achievement (S9)**. This helped them to reflect on what tasks or things they had achieved. One student described creating a summary of daily achievements to compare the tasks that were planned to carry out on a particular day with the tasks that were completed by the end of it:

> *P12: I tend to use not always like I tend to use the summaries like at the end of each day, I write down what I did. And I put it in some kind of Wiki or My Computer so that I know like if I was... [] when I did this, what I was doing that day. I can check right away. […]I do the summary at the end of the day. And I start the summary and then at the end of the week, I check my goals. I check my daily summaries and I know what happened.*

### 7.2.2 Group #2: Post-doctoral Researchers

#### 7.2.2.1 Background

Like the PhD students, most postdoctoral researchers were also involved in a full-time research project. They also had more time or longer gaps between tasks to focus on their research. Additionally, most of the researchers supervised a number of Masters' research

projects. In contrast to lecturers, however, they did not need to switch between different strands of their role that often:

> *P6: If I'm supervising students, then I have to also manage my work and to manage their work as well so that would you know that would give me more kind of tasks*

> *P3: I'll have a meeting with [senior academics] and generally my supervisor project manager once a week and that's the way things go. Yeah… I don't think that there's immense amount of routines, it just depends on the project. For example, some nights I might stay really, really late depending on whether there's a deadline approaching.*

They also had to attend a small number of meetings and some of them were involved in some teaching responsibilities:

> *P25: I'm funded on the project called [X]. Um on the project my main role is to plan, design and run experiments. […] um I have had especially recently some teaching responsibilities so, I have um given lectures and had to plan them. So um yeah those two main things I think.*

### 7.2.2.2 Strategies

The postdoctoral researchers employed almost the same PTM strategies as the PhD students. For instance, they had a tendency to reassess their diaries or task lists and to change their plans according to current and future deadlines, or due to additional commitments, such as teaching, that they had to undertake (see S8):

> *P25: I check this list maybe at least twice a day. I'd say that's fair to say about twice a day. But for my Excel spreadsheet, maybe I don't need to check it if I have a meeting with [C] coming up. Just to say what I have done for example. So I wouldn't I certainly wouldn't check that. Maybe I'd do the excel spreadsheet on a weekly basis and on a fortnightly basis even. […] planning these long term goals for over the years, um maybe every three months I will look at it. It's not.. it just good to know I have that document there and reviewing every three months is fine really.*

Some of the postdoctoral researchers explained that it was important for them to undertake tasks associated with certain deadlines (see S3). They used deadlines to put pressure on themselves to complete their tasks by a certain period of time:

> *P3: What you'll do there is you'd go when the end of the deadline. Then from that deadline [you'd] work out the steps that you need to do to meet the deadline and then work back from there and make sure that all the steps are done by the time you get to the deadline and you have done the work but of course that would be fine if you didn't have lots of other things going on in between.*

> *P6: if I don't have a deadline, then... it's more difficult. So I feel like easier if I have a deadline. Motivates me more.*

The postdoctoral researchers had developed additional strategies compared to PhD students. For example, some of them tended **to categorise/label their tasks according to certain parameters/factors e.g. deadlines, projects, tasks, importance, people, tags, etc. (S10)**. This allowed them to organize, differentiate or sort the lists according to more insightful categories:

> *P7: I would have a way in my email of putting the things that are high priority at the top of my starred list and making a separate starred you know maybe there should be a starred list and a square list or something where square are the things I must make sure I don't forget like the elephant list right make sure don't forget this stuff, and then I use my starred there's priority and then I should be able to move, maybe move the thing that I want to.. the things that are the top priority towards the top so I can kind of move them around so I am aware that things are.. on a scale different priorities.*

Others preferred **to schedule all meetings on a particular day (S11)**. This enabled them to have a long uninterrupted gap e.g. half or day, to do or concentrate on their personal tasks such as doing research or writing academic papers or proposals:

> *P7: Part of managing my time... involves [coughs] trying to schedule things that can work well together […] at three thirty when I finished training my student, I managed to rush over to Bedford Way, and I still had twenty odd minutes which gave me enough time to rush into a cubicle, eat my sandwich and then be there in time in fact*

*ten minutes early, for our seminar where we just came from. So the idea was to fit things in that could all work well and like now I scheduled this. I scheduled this for that day because I knew that it's a lot easier than me coming in especially for it. So it's about a kind of... if I know if I've got lot and lot and lot of things on, I try and schedule it in a way that's gonna be more sympathetic to me by giving me as many whole days as clear days free to work at home as I can.*

Some postdoctoral researchers tended **to create separate main and daily task lists (S12)**. This helped them to differentiate between short-term/small and medium-term/big tasks and to focus on certain tasks at one time:

*P25: I think I use a very simple checklist stuff for everyday stuff and maybe stuff that I have to get done by the end of the week. Then I go up a level to my Excel spreadsheet which allows me to play around and calculate time of um various larger tasks which normally take two or three weeks to do or even a month. […]And then my smaller list my everyday list would be stuff that isn't tied down to a particular time. I guess it's tied to an opportunity. So I can't return my library book if I'm in my flat. […]And if it's not checked off, then it would remind me next time I see. […] then a lot of these smaller tasks would just be on the list.*

Most of the researchers explained that it was beneficial **to cross off or tick completed tasks (S13)**. This not only helped them to identify tasks that they had completed but also to appreciate progress or achievement:

*P1: Somehow writing them down seemed helpful and having said that sometimes I will go back and cross off the items [mm] [that I've done] and feel good about the fact that I've done something which I think is important because sometimes I… I [um.] I agonize over the things that I haven't done without thinking about how nice it is I've done... [um] the things you know some of the things I wanted to do…*

One participant tended **to visualise or consider big/important tasks in advance or deadlines (S14)** providing a clear overview of important dates which were coming up that needed to be addressed or to be aware of, acting as a motivator to prepare for them:

*P4: I printed up lots of month to view from Outlook; you can even month to view pages and then I put that on the wall and I could better plan my time like over a*

*series of weeks which you don't get from just writing the list down and [um] week to week view*

One particular post doc tended **to schedule large tasks (S15))**, such as writing a research article in her diary. This was to ensure that their available time could be devoted to finishing these tasks by a certain deadline, bearing in mind the tasks that she still had to fulfill:

*V5: I've got a conference paper. I know the deadline is in January. So I kind of have that deadline. It's a long term thing that you need to work towards. So in the back of my mind, I know that in December, I need to schedule some time to start planning for that paper. But until December comes, and then I can actually see which days I'm free to start planning. I don't want to start putting that into my diary yet. It's kind of it's in the back of my mind that is something so important to be done in December.*

Another post doc had a tendency **to use his personal time** (**S16)** in the evening to do their solo or personal tasks (P3). This enabled him to do, or continue doing, his own tasks which could be completed within office hours:

*P3: Some nights I might stay really really late depending on whether there's a deadline approaching and if there's not and I haven't got a lot on and there's more like social activities to do then I finish work early. Like Wednesday is a time where I use to play football with my friends so use to finish work early then and other than that, it depends on the project really..*

### 7.2.3 Group #3: Junior Academics

#### 7.2.3.1 Background

In contrast to PhD and postdoctoral researchers, junior academics had to undertake different kinds of tasks. These included teaching, research and administration. It was common for them to supervise students in doing their thesis/final year projects. They were also appointed to play an important role in administration or to join committees in their department. In addition to the hours spent on teaching and preparation and research, they had to attend a number of meetings, seminars or presentation and some were involved in consultation work:

*P9: I have a typical lectureship job… which consists of three strands... administration, teaching and research. […] It is not just the teaching and the admin here I'm also working for my professional society. I'm also doing consultancy. I've got about four different kinds of research.*

*P14: Well, I record events that I'm committed to participate in and that includes definitely events that I'm going to be involved in and then those that I will be involved in if I can. So it would include... it would record [um] lectures, seminars, supervision meetings, [um] research meetings and seminars... and the... yeah and administrative meetings like teaching meetings.*

As highlighted earlier, teaching was one of junior academics' main tasks and therefore they needed to spend more of their time meeting students and preparing for courses (including lectures and tutorials) and materials for them:

*P14: Certainly the time management is more severe during taught terms. So the teaching arrangements constraint [um] a major constraint to do on when actually has to deliver one's lectures and then to do with the preparation of the material for those lecturers. […] for example... well... teaching work particularly meeting with individual student... yes. There're other problems which arise trying to arrange meetings with a group of students which are qualitatively different and sometimes those problems can't even been resolved because of the constraint of my time and their time. For example there's tutorial group I'm supposed to run in term 2 and actually it tends to be impossible to run it because there's no point which I am both free and all the students are all free at the same time during a week.*

However, junior academics seemed to have more time gaps compared to senior academics who had considerably more demands to address concurrently. This will be further explained in the Group 4 section - senior academics):

*P9: I've got about four different kinds of research. […] Or you're somebody who's completely in control like [Senior academic X], who has... who owns ten times more work than me, doesn't work. She works at long hours.*

### 7.2.3.2 Strategies

Some junior academics pointed out that they tended **to match tasks with a time period (S17)**. This was done in order to ensure that they could make best use of their time and could be productive. For example, some felt more productive or effective doing tasks such as writing or reading academic papers in the morning rather than in the afternoon:

> *P17: From eight through to ten or eleven is my really good intellectual writing time, that's when I can really clear my mind [...] four o'clock in the afternoon I can't think, all I can do is like boring mechanical tasks like emailing and stuff like that. [...] else in my head and I can really focus on writing.*

Some participants described that they were **inclined to control the amount of time spent on a particular task (S18)**. This helped them to ensure this or other tasks that they had to address at the same time could be accomplished and to control them from going beyond the designated time allocated:

> *P14: The interviews can take longer or shorter [um] and then what I have to do is I have to write reports on those interviews, after the interviews, and submit them on that day. Now if I have to... so I might choose, if the interviews go on for a long time, I might then not make it to the teaching committee meeting. Or I might be able to do it and I'll just do um very brief reports, and so I make my reports much shorter than they might otherwise be and then I go to the teaching meeting. So that what I mean by controlling, it's about actually as you implement your activities you modify what they are to suit the time you've got.*

Some junior academics had a tendency **to create mind maps (S19)** in order to manage their tasks. This strategy seemed useful in order to get an overview of important tasks coming up as well as sub-tasks, important dates or related matters associated with the tasks:

> *P17: This [-mind mapping diagram] that was done in June this year, this was a plan for my fellowship plan for July till December. It does not make any sense to you but it makes sense to me. Where there's a clock drawn on this[-mind mapping diagram]!, THAT means that I need to make time in my life in these six months to do the work that I need to do. And on this date I can remember what I had here was so much in my head I need to do over the six or seven months. That I need a way to visualising*

*the whole top stream of tasks and figuring out what is important, so where there's a clock would have meant that THAT needs to get done.*

In relation to the management of emails, another important strategy was **to assign an action to their email messages (S20)**, giving them a clear understanding of what they should do or how to respond to email messages that they have received, as well as to decide when to do them:

*P17: So I read the email and then I either delete it, respond to it immediately or it get put in a file for actioning as it's a time that I've got to deal with it rather than keeping in email and reading it and thinking, "I'm gonna do this at some point." So again I try and process the information fairly quickly.*

Some participants pointed out that sometimes they tended **to ignore tasks (S21)** that were irrelevant to their goals and did not have a high impact on their career or job responsibilities if they failed to complete them. This allowed them to concentrate on other tasks that had high priority (P14):

*P14: I mean one strategy is to ignore things which can be ignored. So, for example emails that are sent to several people can often be ignored. Lots of people in business using this strategy, if an email is not sent to them exclusively then they can er... give it a low priority*

In contrast to PhD students, most senior academics however, tended not to switch between different types or sizes of tasks (see S6). They were rather inclined **to match the size tasks to the available time gap that they had (S22)**. This enabled them to carefully choose the most reasonable task that could be productively completed within the available time gap:

*P9: I can't do marking every day, something's happening. It really really really problematic because you know, I should be doing the marking. But I have this practical problem that if I have appointments at work in the office, it does... I don't do any marking. The two are not compatible. I can't take a few bits here and do them in between my appointments. I know it doesn't work for me. I have to clear the day and stay at home to do it*

Senior academics seem to have developed more strategies that were associated with maintaining their personal attitude towards tasks. Some of them explained that it was important **to multi-task (S23)**, working on different tasks concurrently rather than complete one after the other. This helped them to get a number of tasks done by a deadline at the same time. In contrast to PhD students, who preferred to work on one task before commencing the next:

> *P18: they have about the same deadline so that wasn't to prioritising them. [um] So... I dunno if I have. I've been doing them sort of in tandem. So I've been doing one... I spent last week on... what of them. The one I'm writing on my own. And then... the next couple of days, I'm gonna spend on the other one. So I think I'm actually sort of… doing it in parallel for those two tasks.*

One junior academic had a tendency **to rearrange their task lists/schedules (S24)** due to the broad range of tasks that they had to do within a limited time gap. This allowed them to address unexpected situations or opportunities they often experienced, and fit those into their current lists of tasks or diaries:

> *P18: I sort of give each one of them a number... in terms of which so I'll think about you know how urgent is it, how important is it... and try to put things in order... that way. And then think about how they fit on to a... time schedule you know... for the next month and so…*

Another strategy described by one junior senior academic when completing her tasks was that it was important **to avoid sources of distraction e.g. reading emails, etc. (S25).** For example, one respondent explained the importance of not checking emails for a certain period of time when working on another task (P18). This helped to focus on getting a particular task done:

> *P18: I find email a big distraction. And that's often the hardest thing to control... so I think one of my main strategies is actually having day when I don't even turn it on. Because I've tried to limit myself to say an hour in the morning just to check for the important emails or urgent emails and then I have another task to do say, "Writing a paper." or something but I find that I get so erupted up in the emails [laughs] I get very distracted from the task so I tend to [um] plan…*

One junior academic highlighted that sometimes, right from the beginning, he chose to **say 'No' as a way of declining new or potential tasks (S26**; P18). This protected them from failing to complete tasks requested by other people and to take account of their current or existing tasks and time constraints:

> *P18: I've also learnt to say "No" and not take on too many things, additional things even if they seem small because sometimes the small thing that you say "Yes" to it in the corridor[laughs] when somebody asks you turns into... bigger job than you think. [um] so I do feel that I've got better at actually saying, "No" nicely but say "No" to people if they ask me to do thing and it's just very short notice or [um] it's I have too much [] on.*

Some of the junior academics also explained that they preferred **to reduce the current number of email messages to read or act upon (S27)** at particular time in their inbox. Thus, they could also focus on a number of tasks at a certain time:

> *P19: Um well I guess the first protocol is email comes in, thousands of email [laughs] and I try and... sort of spend at least a couple of hours a day keeping my email inbox down to about ten or fifteen tasks, and so my email inbox is my to-do list, and I and continue to keep that down to a manageable level.*

### 7.2.4 Group #4: Senior Academics

#### 7.2.4.1 Background

Senior academics had been promoted to a higher position e.g. professor, reader or senior lecturer (P8) and shared the same types of task as junior academics, as they had three strands of job that they had to undertake: teaching, research and administration. For example, they needed to prepare for their course and deliver lectures (P8). In comparison to junior academics, however, senior academics had fewer time gaps. They had to supervise or manage a larger number of people e.g. Staff/colleagues, postdoctoral researchers, PhD and masters' students. Thus, it was common for them to attend a large number of meetings every week:

> *P8: I'm a Professor in [department X]. [...] I teach one day a week, only for two hours, which doesn't sound very much but the... so... the main routine I have is I obviously teach on Monday. The rest of the week is actually quite non-routine. So I have a lot of regular meetings with PhD students, with post docs, with [colleague X]*

*as our [job position x] and with the academic staff. […] I normally have about fifteen hours of one-on-one meetings with people a week. […] I still have teaching preparation, marking, papers to work on, proposals to write, external reviewing to do, etc., etc., etc., so it adds up to more hours than I care to think about actually every week.*

*P16: I guess that's here... amount of things... it's just... managing lots of demands you know I've got a lots of different things happening and it's managing... the demands from various different projects from various different people, from students, from colleagues, from people who... like RAs who work for me, from PhD students who all have their own... schedule. And they... obviously... you know want to access me and they don't know how complicated my schedule is.*

Senior academics explained that they were responsible for managing/or chairing a large number of committees and were also involved in consultation. It was a challenge for them to find a time to do their own solo/personal work due to a high volume of demands and different strands of their job:

*P24: Administratively, I'm [position X] of the graduate tutor, so I have an awful lot of tasks to do with administering, the running of the PhD programmes, we have different programmes here in [department a] but in sub-discipline of [field b]. Um I'm a [] of one of the Masters courses in MA, we call the subject [c] Masters in [c]. So that's another administrative task and um I see those students every week as well. […] the fact that I participate in a lot of different committees, teaching committees, research committees, staff-student committee, um [smiles] um general research staff committee of course I go to the next level which is [division]. Various committees of the similar sorts and then there's a faculty level committee.*

*P26: Um a sense of busyness I mean having um a lot of tasks to complete within a fixed time-frame. Um I guess things become busy when I sense that the number of tasks that I need to complete um are looking at [] the amount of time that exists [laughs] before they need to be completed.*

They also needed to manage and do their research and produce high quality academic articles/publication and had to give talks/presentations in seminars, conferences, etc., attend periodic seminars and entertain visitors. It was common for them to regularly prioritise their

tasks and rearrange their existing plans/schedules due to limited time gaps and to address unexpected circumstances that they often experienced throughout their day/week/time:

> *P24: One is to produce a certain volume of high quality research, written papers*.

> *P26: Well um I give you an example um yesterday um for example I had um two papers that I previously worked on research paper with different people that I had undertaken to get comments back to them by today. Um I had um some teaching to prepare for [Monday] week but we tried to get our teaching handout to our admin staff a week in advance and being director of group of the group I think I should stick to the timeline [laughs] that we're supposed to agree like that. A piece of teaching to prepare. And then very first thing in the morning I received an email from the departmental administrator asking me for information on the total fee income that um the faculty finance um department should have returned to us for the last two years. In order in relation to a programme that we had so that was an unanticipated and urgent task that suddenly came in the day when I had three quite substantial tasks at once I thought I could do within the day and it was then arrival of um an additional um high priority request um that made it busy*.

### 7.2.4.2 Strategies

Like the strategy of controlling the amount of time spent on tasks (see S18) employed by junior academics, some senior academics were inclined to control the amount of time they intended to spend on a particular task:

> *P26: I have any meeting and decide how much time is available that day and then schedule things according to the amount of time I think I'm going to take um into slots.*

Like PhD and postdoctoral researchers, senior academics also tended to review and revise their task lists/diaries at certain time intervals throughout the day (e.g. morning, afternoon) or week (see S8). However, in comparison with other strategies explained previously, one senior academic (P8) described avoiding simply writing (see S1) or categorising (see S10) task lists and preferring to create task lists which facilitated forward planning (see S14):

*P20: So y'know I will have um... at the end of the day I will have um... I will create a to-do list for the next morning. And then around one o' clock, I will see whether y'know... I will check the progress, and if there are any needs to revise them. And then at the end of the day I will look back.*

*P8: I mean I used to have a little table that had category of things I was trying to get done... kind of urgency and importance in it and it didn't really you know I reached a point where it didn't work for me anymore. […] I like the fact that I can use it for... a kind of forward planning... If I don't forward plan, I can get... I can basically get into a panic about all the things I've got to do you know if I just write a list, if I've got to write this paper and.. I used to just have a list... just had all the things I needed to do on it. And I just found it... you know... every time I had five minutes spare, I would start at the top of the list and work down and think: what am I going.. you know, what's the next thing to do... Whereas this, I can say, you know, OK, that reference has to be delivered by the twentieth. I'm gonna be working at home that week. I don't need to worry about it now. I can worry about it in two weeks' time. I can just forget about it now.*

Senior academics implemented similar PTM strategies to postdoctoral researchers and junior academics in scheduling tasks (see S11 and S15). In addition, they tended to specify a certain number of tasks to be completed within a certain period of time, for example during the day or week, allowing them to focus on or achieve a small number of tasks in addition to their larger tasks. Some of the participants explained that they were inclined **to schedule a maximum of 2 to 3 big tasks a day (S28)** if they had a half or full day gap, each usually requiring around 2 hours or more to complete, and also maintained dedicated task lists. This allowed them to set or focus on a realistic number of big tasks that could be done within the period:

*P8: and the advantage of them [-small post-it notes] is they fit widthways... nicely on one of these days and you can only fit about three of them on a day and that's the maximum that I'll ever manage to get done in a day because each job takes at least two hours, probably longer. I don't want to plan more than three or four of them in a day.*

Some of the participants also mentioned that a strategy for managing their tasks was to **delegate them (S29)**. This allowed them to ask other people such as colleagues, sub-ordinates or support staff to do tasks on their behalf:

> *P16: I mean in my... you know in a sense that I have RA and things like that.. so yeah I can't go out and do data gathering like [Interviewer] do... because I don't have time and that sort of thing I delegate to my research and PhD students*

Some senior academics kept two different task lists: a master list and a daily list. They tended **to extract some of the items, tasks or sub-tasks from the master list and transfer them onto their daily list (S30)**, reminding them of tasks that they needed to complete. This assisted them in focusing on a selected or small number of tasks at one time e.g. on that day:

> *P20: I can cancel that I have finished, and I can prepare for the next day or I can prepare for the next day meaning that I extract more things from my diary to the small... um to my daily list.*

### 7.2.5 Changes in PTM strategies

In the previous section, the background of each group of academics is described (e.g. the nature of work, the level or type of 'busyness') as well as the PTM strategies that they employed and the importance of those strategies. As their careers progressed or as they got busier, some academics explained that they tended to change or implement more diverse and idiosyncratic PTM strategies. This was essential in order to address changes in the level or type of 'busyness' that they experienced, as well as to suit their personal preferences in managing their tasks (P24). Over time, they changed or used different strategies in order to address their needs or to tackle the PTM issues that they experienced (P17). In addition, the different amount of knowledge needed in doing or managing their tasks, as well as varying perspectives on the value of certain tasks or information, also contributed to the differences in PTM strategies that academics employed (P3):

> *P24: Um the circle it's just so when I look back at the list, like we just did now, sometimes I look back at the list, it stands out. So it's um like a mnemonic maybe or you know it's eye-catching. The circle is eye-catching. I think, 'Oh ya! Ok.' That's important. […] Maybe it's very idiosyncratic.*

*P17: I don't think so... It's very interesting you know it's really nice to... it's very interesting reflecting on something that I don't really reflect on. I don't [um] you know obviously I think about this stuff to a certain degree but I don't spend my time thinking about my time management. [laughs] but I think I [] it down over the years so probably I've gone through lots of different phases and lots of ways of working. And I finally perhaps getting to the stage now I think this is probably the best way for me. It's clearly a very, very idiosyncratic thing. I dunno if that fixes the model.*

*P3: I mean this is personal stuff but everything that… equally applies to work environment. So a lot of the time you turn up in a meeting, one person won't turn up that they might know some kind of critical information that you need in order to make that decision. And the other thing that you'll get a lot of the time is like a kind of… varying perspective. So different people will have different amount of knowledge… like [friend x] who was not gonna make it. [ ] like in the work environment, that can be a situation.*

This section identifies the following changes or improvements in PTM strategies that academics used as their career stages progressed:

1. Depending on mental lists.
2. Creating simple task lists.
3. Categorising task lists.
4. Scheduling task lists.

### 7.2.5.1 Depending on mental lists

Most of the participants, and in particular PhD students and post-doctoral researchers, tended to use mental lists. As described earlier, this group of participants spent most of their time working on their research projects and did not need to manage other tasks such as teaching and admin. Hence, they were rarely required to switch between different tasks. They spent most of their time on their research projects and they asserted that they were able to remember what tasks they had to do. They seldom used their diaries to create task lists as they reported that there was no need to write down their tasks. Furthermore, according to one participant, if she wanted to change her lists, she just did it mentally and therefore did not have to edit or delete them explicitly as she would have done if they had been written down or recorded in an electronic document.

*P1: I just have a mental list of things which need to be done or I [sorry] I have a list that I write sometimes. If there's a lot of thing I might think I've never forget them and sometimes I write a list at work if there're a lot of small things and I think I'm going to forget them but generally I keep the mental log of the things that I need to do and attend to and I have a much clear picture of the things that I'll that need to be done […] I think it serves the purpose... I think that if my if I was… switching between activities more frequently I mean I can spend the day [um] a whole day working on a paper for example or working on something else I spend days [um] you know working [] without being interrupted which is great it's very important. My work doesn't involve chopping and changing from one thing to another and making sure all those things get done.*

*P10: By doing it mentally, you don't have, you don't need an effort to modify thing. You don't effort to modify whatever things to delete or whatever. And you just sort of like... you just do it you want to have it set in your mental before the day began.*

#### 7.2.5.2 Creating simple task lists

Most of the participants were inclined to make simple task lists by writing down their tasks, particularly when they had a number of tasks to do at the same time. Unless they made explicit lists, they found that it was difficult to make a start or to focus on their tasks, leading to them feeling stressed. The creation of lists made their tasks explicit, giving them a clear and written understanding of what they had to do. They explained that without having external task lists, they were also inclined to do whatever tasks they remembered and had a tendency to do less important tasks over more important tasks or to concentrate on working on certain tasks one at a time.

*P7: Before that, I didn't - I felt [as though] my head couldn't cope with anything I need to remember. And so it was either my head or a mixture of my head and just writing down on a random bit of paper. […] The only time I tend to do that is when I've got so stressed out, that I'm unable to do anything so if I feel the workload has got so much on top of me, that I can't even.. I can't even knuckle down and do anything that day or... it's only happened I think once or twice in my life where I don't even [feel I can] get up from bed that day I got so much work to do.*

*P11: So if I don't have the organiser, if I were do it mentally, then it will tend to mix up things... and you will intend to do whatever you remember and whatever that you remember might not be the important thing... it might not have the highest priority to be accomplished first. So if I have the organiser, I will be able to write down the tasks that I need to accomplish based on the priority but if I don't have one, if I were to do it mentally, then I will tend to jumble things up... and sometimes I will do not the important things first then the important things […] because you tend to recall whatever that you remember.*

They tended to create either simple paper-based lists (e.g. on scraps of paper or in a diary) or in electronic form (e.g. Word document, notepad, electronic organizer). They used the lists to specify tasks or sub-tasks, ideas that they needed to create, deadlines, etc. However, they did not necessarily need to look at their lists again since the process of making lists seemed to be effective in enabling them to commit their tasks to memory. They tended to tick or cross out the items listed in their tasks lists as they completed them. Most participants did not identify their tasks by using categories/labels alongside them or to make a note of the deadline for their completion.

P6: *So I just put in my diary like OK [Colleague X] wants me to submit the paper on Thursday. So send paper to [Colleague X] on Thursday that just to remind of the deadline.*

*P15: So the big things I think I would say like... writing a paper or writing a book. And if I just put on my list, "write that paper" or "write that book". I've learnt now, it would never happen. But if I say, if I'm gonna write this book, so I have to spend some time doing the planning, more time doing planning now than I used to I think. Because I say, if I'm gonna write this book, what is the first thing that I have to do? The first thing that's the real to do thing... so maybe it is... "Email my colleagues" and say, "I've got this idea for a book, would you like to write co-author it?" and if they say, "Yes", well... then that would start off the next slot of action. But that would probably be the first thing or it might be you know... "Contact the publisher", or it might be... "Sketch out the contents page" or... whatever.*

*P1: I tend just to write it down... perhaps the process of writing it down is important [um] for logging it in your mind amount you've done you can just go ahead it's like*

*writing notes [] at the at the lecture you know... you might never [um] never read those notes again but somehow writing them down seemed helpful.*

### 7.2.5.3 Categorising task lists

It was evident that some of the senior and junior academics had a tendency to further categorise their task lists. This helped them to organize, differentiate or retrieve their tasks according to a certain category since the number and variety of tasks that they had to manage was high. As explained previously, they had to undertake three different tracks of tasks simultaneously: teaching, research and administration. For instance, in their research role, they had to manage or supervise a number of projects or researchers. Compared with post-doctoral researchers and PhD students, it was more challenging for both junior and senior academics to manage or undertake these tasks in parallel. They had limited uninterrupted time gaps to pursue their solo tasks. To address some of these issues, some academics developed a range of ways of categorising their tasks lists.

Some participants divided their task lists into two types: short-term (e.g. daily or small tasks) and long-term (monthly or large tasks). In order to do this, most created separate lists. This was to enable them to identify and extract important tasks from their main lists and to slot them into their daily lists. This was to ensure that they could commit to or focus on the large task while undertaking small, less important or daily tasks. This also prevented them from spending their time on small or less important tasks and switching between different tasks.

*P20: So basically, I have a master y'know I have a master to-do list which y'know the master to-do list um... basically will list all the um.. Tasks that I have to do... it can go up to one month... y'know so these are the things and so, and then on top of that, I have this sub to-do list which is on a daily basis. So the five o'clock revision is basically I try to see whether I can pull any from I can start to pull any from... any tasks from my um... master to-do list.*

However, some participants used different lists to differentiate between their large or small tasks. For example, one participant used different sizes of post-it notes to represent small and large tasks. Others preferred to categorise their task lists by the nature of the task e.g. research, teaching and administration, deadlines which needed to be met, projects or meetings etc. For example, some of the participants were inclined to create tasks or sub-tasks

under a specific folder/name to represent the relatedness of the tasks to the project. This allowed the tasks to be sorted according to how the project was to be managed or to identify tasks that needed to be done in order to complete it. This also protected them from putting their efforts into certain types of tasks (e.g. administration or teaching) and disregarding others (e.g. research), which were more important and could contribute to her successful career. It was then easier to identify the tasks related to each of these categories and to allocate a balanced amount of time to undertake them.

> *P8: I mean... I realise they are a new thing. I didn't used to use big post-it notes at all. But big post-it notes cover little jobs so I'll write lots of little jobs on the big post-it note... just move it... kind of leave it on the page rather than writing it lots of little post-it notes for little jobs.*

> *P13: Well I... really list probably by I have the different category as I said there's the teaching, there's the research, there's a supervision, there's administration, and I list there all the things I have to do for that period that I am working on.. […] I'm not looking too much for managing the list for example something difficult then there's the teaching, the supervision for me something that help me not to... go over the time I've planned so... meeting with students tend to go over the time booked... and that can steal time to my research. So it's not so much the tools for managing maybe it could be a tool in here maybe more in... making sure that I don't do too much I this section [-administration] because the deadlines are much more strict here [-administration] or not so strict the deadlines are much more... they are closer like I have to do it tomorrow OK where the research deadline is slightly they're on different scales so you have to publish papers by within two months while I have to interview the person tomorrow. I have to meet the student... I have to supervise the student the supervision's meeting tomorrow and so on and so these things maybe they have... Sometimes less important or less effect on my career than this one [-research] and then it's easier this one [-administration] to go over.*

One senior academic (P15) explained that by setting and categorising tasks according to their deadlines, she was able to focus on a number of tasks to be completed by a certain time (e.g. a week), rather than being overwhelmed by them.

*P15: I set myself a deadline when I wanted to get it done by. [um] but I don't use any other form of prioritisation so I haven't got them all in terms of anything other than when they're due. So these are the things that I've left them in here [-Outlook to-do list] because I need to do them before I leave. So by the end of today, I've got rid of all of those and I've got rid of all of that. And then, that all my [] jobs will be done. But in my tasks, these are all my active tasks ordered by project... seems lots of things I have to do. But I can do thing like... I can just see what the other things that I can do within the next seven days and so I have got a list so if I have a slack time, I can just sit down and work through all of those. And this includes stuff on my... for my personal life as well as my work life.*

Other participants categorised their tasks by allocating priority numbers to them. Some explained that the numbers gave a certain meaning to their tasks. One senior academic (P26) used to assign priority numbers to her task lists. For example, 1 meant that the task needed to be done that day. Others assigned numbers to their tasks to show the order in which they should be completed. However, some participants further explained that it was not useful for them to categorise their tasks (see S10), particularly when they had so many tasks to do at the same time. As the number of tasks in their lists increased, it became difficult for them to differentiate them.

*P26: Um you can also put in um a priority from 1 to 9 I think um and if you put priority 1, if will show up on the day so it also serves as a diary and if you then go to the day view, this is why I do this thing [] I kept with it because if you then I mean I am sure other organizers do this as well but this is the one that I'm familiar with. It then comes up as a number one on that day so I know on Monday I've got to do I've got to prepare my session on promoting well being*

#### 7.2.5.4 Scheduling tasks lists

Most PhD students and post-doctoral researchers tended not to schedule their tasks. They only had to focus on their own project, and most of them were aware of or remembered what they had to do (as described previously). They were also not involved in different kinds of tasks and did not need to switch between them that often. Hence, it seemed less useful to schedule their tasks explicitly, as it was adequate to make simple task lists.

*P12: I dunno, I mean eventually…I have to finish all the things by a deadline and usually what happens is I just keep working until I finish. […] Schedule probably sounds like I put an hour. I don't really do that. You just plan. You don't have specific time. No. Except if I have a meeting, or if I have something that refers time but I don't... I don't say I'm gonna do this for half an hour. […] as I said, like we gonna be working from nine to five and if I don't... if I'm writing I get no motivation I'm just sitting in front… no, I said I'm gonna to stay here until then it gets me very frustrated because I'm not doing anything and I'm just sit in front of the computer.*

Conversely, simply making task lists or categorising the lists seemed inadequate to senior and junior academics, particularly when they were busier. Hence, most of them were inclined to schedule the tasks in their lists. As highlighted previously, most senior academics were involved in many research projects or committees, both within and outside their organisation. They were also involved in teaching tasks. They had many colleagues, staff or students to supervise simultaneously and it was a challenge to manage them. Due to the sheer number of tasks and their different purposes and the number of meetings they attended, it was a challenge for them to find time for their solo tasks. Consequently, most were inclined to feel stressed when deciding what tasks to do and when to do them solely from their task lists.

They had a tendency to focus on completing more important tasks rather than tackling small or less important tasks if they did not schedule their task lists. As highlighted earlier, some participants found that they were 'trapped' by having to do administrative or small or less important tasks and scheduled their task lists by using an electronic or paper-based diary. Scheduling helped them to forward plan a long time in advance and to set a time to do their tasks. They could then balance or match their time availability and the number of tasks they had to do. They could also reserve time to concentrate on their large or important tasks since they were often required to attend meetings and would be interrupted when dealing with small or less important tasks. More importantly, by setting a deadline and explicitly scheduling their tasks, this helped them to ensure that they completed them by a certain date.

*P8: I like the fact that I can use it for... a kind of forward planning... If I don't forward plan, I can get... I can basically get into a panic about all the things I've got to do you know if I just write a list, if I've got to write this paper and.. I used to just have a list... just had all the things I needed to do on it. And I just found it... you know... every time I had five minutes spare, I would start at the top of the list and*

*work down and think: what am I going... you know, what's the next thing to do.. whereas this [-scheduled task list], I can say, you know, OK, that reference has to be delivered by the twentieth. I'm gonna be working at home that week. I don't need to worry about it now.*

*P26: So I think is that balanced between um number of tasks I might estimate how much time they will take to complete and estimate how much time I've got before they need to be delivered.*

*P16: Yeah. I don't change task at home. That's why I like this... big block of time at home because I don't... I wouldn't... AT ALL change task you know I would just work on that one thing. Yeah sometimes I mean why I like to work at home is because you can concentrate.*

*P17: The important feature of a good time management to have a good deadline as well. […] so... you know if teaching someone asks you to do teaching in October... that gives me a MONTH. That's gonna take I'm gonna have to building time... in order to prepare that teaching. And if I don't, if I just think, "Oh I can do that... next week sometime", there's a risk that it wouldn't happen.*

Scheduling varied from one participant to another. Some scheduled both large and small tasks, others preferred to schedule only their large tasks. Some participants tended to specify the exact hour while others preferred to specify a particular day or week by which they had to complete their tasks without specifying the exact time to do them.

*P17: there're probably times of the day when I'm more likely to be doing certain types of activities so first thing in the morning, between say... well the time isn't relevant but like that kind of seven thirty time when I'm very alert, that might be... I might spend half an hour quickly doing some email but maybe from eight through ten or eleven, it's my really good intellectual writing. And that's where I can really clear my mind rather than four o'clock in the afternoon, I can't think. All I can do is boring mechanical task like emailing and stuff like that. So my schedule is worked out in certain respect is that I do the easy task where I can get quick outcome, quick response at the beginning and at the end of the day.*

*P8: So I know that I'm gonna have to move some of these things... that's fine. I don't have... it's part of the deal... actually. And I prefer to move them and say, OK, I didn't do it then, when shall I reschedule this for a while. Maybe I'm going to get some time on Thursday next week or whatever.*

This section has shown that some of the participants changed or implemented new strategies as their careers developed over time. The following section discussed the key similarities and differences of the PTM strategies employed within or across these groups.

### 7.2.6 Similarities of PTM strategies

Most PhD students and post-doctoral researchers had a single project to manage. They tended to create a Gantt chart to include important tasks and milestones that they had to achieve during the project. Due to a large amount of uninterrupted or non face-to-face-contact, most had a tendency to reflect on their daily or weekly achievements and compared them with tasks that they had planned to achieve over a short time period - a week, for example.

Junior and senior academics were similar in terms of their tasks or workload. For example, both were involved in three main types of job: teaching, research and administration. They had fewer uninterrupted hours as the majority of their time was spent doing their job; for example, preparing lecture materials, organising supervision meetings with their students, attending meetings with their colleagues or peers, attending conferences and workshops. Due to a limited amount of time to do their main job, they were inclined to schedule time to do tasks, particularly large tasks, in their diaries or task lists. They tended to review their time availability, and schedule or rearrange their tasks according to the amount of time they had left. If they had a full or half day of uninterrupted time, they tended to reserve it to tackle large tasks. While on a short break or where they had a small gap of time free, they would choose to do small tasks. Most of the participants also tended to delegate some tasks to other people, such as support staff and students. Some adopted a 'Say No' strategy to new requests to do tasks in order to complete existing tasks by a certain time i.e. they believed that they had no time to tackle new tasks.

The author identified that post-doctoral researchers, junior and senior academics tended to reassess their task lists/diaries throughout the day. They checked the progress made and revisited their plans, identifying what still needed to be done soon and what could be put off until later in order to accommodate unexpected tasks. They were also inclined to create

systematic task lists in which tasks were categorised according to a certain project, the context or people involved, the type of job (e.g. teaching, admin) and the deadline. They also controlled the amount of time to be spent on a certain task.

The author also found important similarities across all groups of academics. Most had a tendency not to specify the exact time when they would start or end a particular task. They also tended to create different task lists to distinguish between large or important tasks and small or less important tasks. Some would do small or routine tasks first before concentrating on the large tasks. Most determined when they were going to begin a particular task according to their deadlines. They tended to break down their tasks into sub-tasks in order to make them more achievable by spreading them across available time slots. Most matched a type of task with their location; for example, they would choose to read articles or review their task lists or diaries when they were travelling or commuting to work.

### 7.2.7 Differences between PTM strategies

**Scheduling tasks.** Senior academics tended to schedule both their big and small tasks. Some were inclined to schedule between 2-3 big tasks when they had between a half to a full day of uninterrupted time i.e. they had no face-to-face contact time with other people. Most used a single organizational tool to plan their potential list of tasks as well as their scheduled tasks. Some tended to separate their task lists and their scheduled tasks. They identified a certain task from their task lists and scheduled or transferred it to their daily task list to complete by the end of that day. Due to their higher position, reputation or seniority, some ignored certain types of task requests. In contrast, most of the participants from the other three groups tended to go through their task lists, choosing the tasks that they needed to do on a certain day. They also updated their lists by adding new tasks and crossing off or ticking tasks that they had done.

**Matching time availability and size of tasks.** Most of the senior academics regularly reviewed their time availability and scheduled appropriate tasks to complete during the time available. They tended to do large tasks when they had more than 2 hours of uninterrupted time and completed small tasks if they had a time slot of a couple of minutes to an hour, while in the middle of taking a break from completing large tasks. Other groups, instead, tended to do a mixture of tasks, depending on their mood or interest at that time. For example, they were inclined to do small tasks if they no longer could concentrate on doing big or difficult

tasks. They then tended to finish the small or easy to tackle tasks before concentrating on the large or more difficult to complete tasks.

**Reviewing.** It was common for senior academics to regularly review their task list and schedule in order to address their current situation. They tended to allocate or reschedule their time to tasks that best suited what was happening at the time i.e. the other people involved, the time gap, location and context. They also tended to arrange their schedule so that it gave them more flexibility to choose which task to do and when to do it.

#### 7.2.7.1 Possible reasons that contributed to the differences

There were several possible reasons that might contribute to the differences in PTM strategies between senior academics and other groups of academics. Senior academics had been working for longer than the other academics, and thus had more experience in their job. They could better estimate and control the amount of time required to do their job. Most scheduled their tasks when they could best work on them.

Most senior academics had a limited amount of time to undertake their solo tasks. They had to attend a number of meetings during the week with colleagues, students, visitors, etc. They also had to attend a number of events such as seminars and workshops, and had to travel locally or abroad for a day each week or more. They were thus inclined to use their time effectively to try to undertake the right task at the right time. For instance, as described earlier, they tended to do small tasks while they were having a break or small gaps between the meetings at their workplace. Most completed large tasks if they had more than an hour gap or whenever they worked from home. Sometimes, they negotiated with other people to postpone the deadline of a certain task e.g. submitting a paper for review or for a conference.

## 7.3 Section 3 - The Personas (i.e. descriptions of target users)

The previous section has described the PTM strategies practised by four different groups of academics over time. This section further describes four personas to represent them respectively. Previous researchers have highlighted some of the usefulness of personas in designing future tools:

1. To describe the user for the design (Goodwin, 2001).
2. To understand users' goals and how to accomplish them (Blomkvist, 2006).

3. To provide as a communication tool for the group of designers, software developers, managers, customers and other stakeholders (Cooper, 1999).
4. To eliminate unnecessary functions or features that may not be useful for personas , and to create a tool that makes them feel more happy and productive (Cooper, 1996).
5. To ensure that a tool is designed for a specific purpose and can satisfy users' needs (Blomkvist, 2006).

In order to develop the personas, the techniques and template suggested in (Kuniavsky, 2003; Rogers *et al.*, 2011) have been adopted.

### 7.3.1 The development of personas

To begin, all the participants involved in the previous interview and video-diary studies can be classified into four broad categories of users (as explained previously in Section 7.2). This is based on the following criteria:

- The level of busyness/service (i.e. maturity or seniority) in their profession.
- The nature of their routine or tasks.
- The tools (or systems) used for managing their tasks.
- The perceptions towards their strategies or tools adopted.

Personas can be synthesised based on a series of ethnographic interviews with real people (Goodwin, 2001). They inform characteristics of users' behaviour, goals and motives, compiled in a fictional description of a single individual, and contain some made-up personal details to make them more 'alive' (Blomkvist, 2006). Previous literature has suggested the following sources of information that can be included in a persona (Cooper, 1996; Goodwin, 2001; Grudin and Pruitt, 2002; Kuniavsky, 2003; Blomkvist, 2006; Maness *et al.*, 2008; Rogers *et al.*, 2011):

- User background (introduces user photo, name, age, research areas, teaching, service, technology and lifestyle).
- Common routine (e.g. where they live, how they go to work or what they prefer to do during weekdays or weekend, etc.).
- Typical tasks (explains activity or end goals users undertake to manage their tasks).

- Current problems (identify common scenarios or challenges they face in managing their tasks).
- Desires (general or specific needs raised by users with regards to their current problems or opportunities to support them in managing their tasks better).
- Personal values (describe aspects or experience goals that are important to users in managing their tasks).
- Motivation (informs aspects that could encourage/trigger people to manage their tasks in a more positive way).

Following this, the author then revisited the 31 individual interview transcripts (26 participants from the interview study and 5 participants from the video diary study) that matched the persona group. To keep the anonymity of participants, the author purposely removed important or key identifiers which may have led to the recognition of the real users and replaced them with other names/titles (e.g. name, institution, research areas or projects, teaching modules, etc.). All participants involved in both interview and video-diary studies can be grouped in any of the four personas created.

The personas contain a mixture of characteristics to represent a specific group of intended users. For example, Persona #1 represents senior academics who experienced more challenges in managing their tasks. They were also the busiest group of academics. The findings have also shown that they adopted the most improved or additional strategies compared to other groups of academics. Hence, it is important to particularly highlight this persona in this chapter (see Section 7.3.2). The other three remaining personas (Personas #2, #3 and #4) are included in Appendix N to represent junior academics, postgraduate researchers and PhD students respectively.

### 7.3.2 Example of persona

**Persona 1**

The persona was synthesised based on information provided by participants from the interview study (P8, P20, P24, P26) and video diary study (V1 and V2).

<table>
<tr>
<td>Background<br><br>  <br><br>(icon by Shutterstock (2013))<br><br>Professor Mary Barrett<br><br>Age: 55<br><br>Research: Interaction modelling, error studies, usability evaluation, Interactive Television, mobile computing, technology evolution and convergence, emotive and motivational factors in computer use.<br><br>Teaching: WET3321 – Novel Interactive Technologies<br><br>Service: Director of the Media Technology Unit, Advisor of 11 PhD students, Principal Investigator for CAIR - year research grant project in collaboration with UCL, York University, Cambridge, and King’s College as well as other organisations including Microsoft, Sun and Google (worth £1 million), Chief Editor of IIEHC and IMC journals, reviewer for IHC, EHCI journals, faculty advisor committee, evaluation committee, Chair for ECC and</td>
<td>Mary has worked as a professor at Imperial College London in the Department of Computer Science since 1999. Having joined the university as a lecturer in 1989, she usually works from home once a week, allowing her to concentrate on her big tasks. She usually takes the First Capital Connect train from her home to her office and the journey takes around 50 minutes. She normally reaches her office at 7:50am and leaves for home with her husband around 5:30pm usually catching the train at King’s Cross station at 6:00pm. On the way back and forth, she prefers to do some reading and manage her tasks. Due to her busyness, she usually has to continue working, managing her emails at home after dinner until midnight and goes to bed between 12 and 1am. She might just go to bed early and watch TV instead when she feels tired and too stressed or exhausted to face her work. She does not always have much spare time. At weekends, she might spend some time doing some work, running errands, shopping and looking after the garden with her husband. She usually has to travel around the UK or overseas once or twice a month and will be away from half a day to about a few days for conferences, workshops and meetings with her research collaborators, etc.<br><br>Tasks (Typical approaches she takes to manage her tasks).<br><br>• Semi -scheduling her big tasks during the weekend (i.e. determining a day on which she is going to do a particular task).<br>• Checking and replying to emails in the morning or in her spare time (e.g. in the middle of short time gaps).<br>• Noting down tasks that she needs to do some time later or in the future.<br>• Checking through her list of small tasks.<br>• Rearranging her schedule due to unexpected tasks, requests or situations.<br>• Reviewing her current tasks and current conditions and making necessary plans/changes at a certain time (e.g. in the morning, afternoon, before leaving home or while on the way back and forth to work).<br>• Identifying preparations prior to tasks/events and identifying appropriate times for which to do them (e.g. meetings, conferences, etc.).<br><br>Current problems<br><br>Professor Barrett has a wide range and a huge volume of tasks to do, which vary in terms of their characteristics (e.g. size, complexity, flexibility, dependency, etc.) from one to another. Among these, she quite often receives requests from her colleagues, post-doc</td>
</tr>
</table>

| | |
|---|---|
| IET conferences, invited speaker for IEH and CEIH conferences, Visiting Professor at the University of Sheffield, University of Sussex and American University in Dubai, UAE.<br><br>**Technology:** Mac desktop and laptop, Google calendar, MS Outlook email, iphone<br><br>**Lifestyle:** Hiking, mountain climbing on Tuesdays/Saturdays. | researchers, students or ex-students, peers or staff asking her to do them a favour with different sorts of things over time, which she normally receives through emails, phone calls or face-to-face communication. It is difficult for her to say no to these requests and this has forced her to sacrifice/readjust her time for doing her own tasks. She has to battle with, on overage, over 30 new emails each day. Some of these messages require her to give only a quick reply but most of them need her to do further tasks. The process of responding to emails and keeping them at a minimum is a great challenge and can take up much of her time, too. Occasionally, she tends to miss tasks (which are slightly less urgent or important at that time) that fall down to the bottom of the task list or email inbox as time passes by.<br><br>She has a very hectic schedule, particularly during term times. She needs to attend more than ten meetings every week, each of which will last between 1-2 hours. She hasn't got many long-time gaps and this makes it difficult for her to find time to do more complex or bigger tasks. Hence, she tries to maximise and make use of her available time as best she can. She tends to squeeze all meetings or small tasks into a particular day, giving her a long and uninterrupted space to concentrate on her big tasks. Due to the demanding situations and lots of competing tasks to do, she often struggles to decide which tasks to do first and which to do later, particularly when she is extremely busy. The tasks are represented by some of her email messages, to-do lists (which she normally uses to record and schedule big tasks) and physical documents and lists of small tasks written on sticky notes or scraps of paper.<br><br>At present, none of these tools provide support that can proactively match her current tasks with her time constraints or any unexpected changes that she might face over time. Also, none of them can easily allow her to schedule/semi schedule (i.e. float) tasks that have no specific deadline or timeframe attached. It is apparent that her current tools are unaware of the different nature of tasks (some tasks are rigid and some are moveable) and time allocations (time to attend meetings/conferences, travel and to do big tasks like writing and marking exam scripts). They are different but they look the same and seem flat in her calendars. The tools fail to dynamically recommend what tasks to do and when she should do them in relation to the current context.<br><br>**Desires**<br><br>• Would like to be able to quickly know the most appropriate tasks she should or could do at any point in time.<br>• Would like to be able to look forward and visualise her current and upcoming tasks (different sizes, age, etc.), deadlines and time criticalness/constraints (e.g. 1-2 months in advance).<br>• Would like to be able to easily and quickly match her current tasks with her current time constraints and receive necessary scheduling recommendations or alternatives when she needs to change/rearrange her schedules.<br>• Would like to be able to float (i.e. semi-schedule her tasks) within or by a certain period of time. |

| | |
|---|---|
| | • Would be able to create preparatory tasks and link them back to respective scheduled meetings, events, etc.<br><br>**Values**<br><br>• Prefers to have a bigger picture of her upcoming tasks, deadline or time constraints.<br>• Prefers to use tools that are very intuitive, fun, helpful, useful, flexible, and easy to use.<br>• Prefers to spend a big time gap (e.g. half or a whole day) doing big tasks rather than small tasks.<br>• Prefers to spend her weekends doing exciting tasks.<br>• Prefers to reassess her current conditions in deciding what she should be doing at that time and later.<br><br>**Motivations**<br><br>She would be thrilled by tools that are very easy, flexible, quick, fun and intuitive to use and maintain. She would be super-excited if her tools at any time during the day can flexibly highlight/suggest in advance what tasks she should do now and next or later in relation to her current conditions/changes/unexpected situations. |

## 7.4 Summary

The findings showed that different groups of academics have different PTM strategies. They started to develop additional or diverse strategies as time passed. Some of them did not necessarily implement all the strategies which they had used earlier in their careers. For example, some junior and senior academics still found that it was useful to categorise or label their tasks, while others no longer implemented this strategy. The findings also discovered a few strategies which none of the senior academics implemented. For example, none of the senior academics created Gantt charts or mind maps, which seemed apparent amongst some of the PhD students, post-doctoral researchers and some of the junior academics. The findings also identified that junior and senior academics tend to diverge and develop more idiosyncratic strategies compared to students and postgraduate researchers. For instance, some senior academics had a tendency to schedule their tasks and tick through their task lists but some of them preferred to use their email as their task lists and tended not to schedule their tasks, which were common among most of the participants. Some of them tended to review and rearrange their task lists by assigning priority labels/categories to their tasks but some just preferred not to apply such strategies. Instead, they just set a deadline when their tasks had to be done by and organised them according to the deadlines.

As described in the findings, academics tended to change their strategies when they were no longer useful to them, and stuck to the ones that suited their preferences in managing their tasks. As discussed in the findings section, most PhD students and post-doctoral researchers were involved in research projects. The difference between them was their experiences in undertaking and managing their tasks. For example, some of the post-doctoral researchers had to supervise students, assisting junior/senior academics with teaching and undertaking some admin tasks/responsibilities. Compared with PhD students, it was challenging for post-doctoral researchers to find time to complete tasks related to their research project. This influenced how they managed their tasks. Most of the post-doctoral researchers implemented additional strategies. According to some of the post-doctoral researchers, they tended to create a checklist or prepare separate task lists. Most of them used master task lists to write tasks related to their research project and used other task lists for small, daily or short-term tasks. This was to ensure that they were not trapped into doing small or less important tasks if their task lists contained both big/important and small/less important tasks. This was also to ensure that they could concentrate on their project and at the same time get their other tasks done by a certain deadline/within a certain period of time. Some explained the importance of getting all small tasks done or scheduling all meetings in one particular day, allowing them to have larger and uninterrupted gaps to concentrate on their big or most important tasks.

In contrast, most of the PhD students tended not to use separate task lists or used them only occasionally. They had longer time gaps to do their tasks uninterrupted. Hence, they had a tendency to switch between doing large or important tasks which related to their PhD research projects and small or less important tasks. Most PhD students had not been involved in a 3-4 year of project on their own, as opposed to post-doctoral researchers, who had experienced independent research and used their previous research experience in managing their post-doctoral research project. Their key challenge was to find a direction for their research and to develop expertise over time as well as to complete it within a few years. Hence, most PhD students and post-doctoral researchers devoted most of their time to doing their research. They were not required to undertake a wider range of commitments including teaching, research and admin concurrently, as the junior and senior academics faced. To manage their research and tasks related to it, PhD and post-doctoral researchers tended to use simple task management tools. It was common for them to use paper-based tools which included paper diaries, scraps of paper, post-it notes and notebooks. However, the lists were not explicitly organised or categorised; for example, according to projects, actions, workload,

deadlines and meetings, etc. There was also no differentiation between the tasks. There was also a tendency for them to use mental lists and to use calendars to schedule their meetings or set deadlines. To plan for their research project and its key tasks and milestones, they used project management to tabulate the main tasks and sub-tasks and to allocate the period of time - e.g. the number of weeks or months - which they were going to spend on the project. They usually wrote or updated their tools on a weekly or monthly basis, or whenever necessary.

It is apparent that the PTM strategy of PhD students seems unstructured or unscheduled. Most were not inclined to schedule or specify when they were going to do a particular task or how long they were going to take to do the task. There was little evidence of them controlling the use of their time to undertake personal tasks. Another possible reason for a lack of control was a relatively longer amount of time and larger time slots to do their tasks. They had more flexibility and a wider range of options in deciding when they were going to do their research. It was particularly common among PhD students to do their tasks at any time and to take as long as it required to complete them. The main challenge for PhD students was to do their research rather than to find a time to do it. Some students emphasised that it seemed difficult to estimate, as well as to control, the amount of time needed to do and complete their tasks.

As we have seen, in comparison to PhD and post-doctoral researchers, junior and senior academics were involved in teaching, research and admin tasks. Due to their different responsibilities and the number of meetings or other events that they had to attend, it was challenging for them to find a time gap to do their personal tasks. This motivated them to use more structured and sophisticated PTM strategies in order to both manage and complete such tasks. They tended to schedule their tasks. They would try to utilize and optimise the use of time gaps to undertake appropriate tasks. This was due to the challenge they faced in fitting in different kinds of tasks and the number of commitments into their schedule. They also faced a lot of interruptions or unexpected diversions while attempting to stick to their scheduled plans, requiring them to re-prioritize their tasks while on the go. The diversions came from different sources: emails, phone calls, face-to-face requests. These requests came from different groups of people, including their undergraduate and postgraduate students, researchers, colleagues, peers, the university, external organisations and potential students.

Instead of relying on written task lists, which seemed common among PhD or post-doctoral researchers, junior and senior academics further organised their lists and scheduled

tasks according to their urgency, their deadlines, time availability, location and other relevant factors. This helped them to be more productive and more effective by matching the tasks to be done with the related constraints that they needed to consider rather than organizing themselves around their task deadlines.

They tended to schedule their tasks and control the time that they would spend on them, according to their current situation. Some of them were inclined to schedule or limit the number of big tasks to do on a certain day. Others tended to schedule both small and big tasks. This helped them to ensure that they allocated some time to fulfil potential tasks or requests. Due to their 'busyness' in juggling a range of different tasks and sizes of tasks within a limited time gap, they constantly had to prioritise their tasks. Some of them highlighted that it would be useful for them to have a tool that could suggest appropriate tasks to do at a certain time with regards to their current situation taking account of time availability, deadline and location and other factors.

Most junior and senior academics shared similar strategies. For instance, it was common that most reviewed their task lists, scheduled their large tasks (as highlighted previously) and rearranged their task lists or schedules. This was associated with the range of tasks that they had to undertake (i.e. teaching, research and admin) at the same within a limited quantity of uninterrupted time gaps. When these two groups of academics were compared, the findings showed that some senior academics developed additional strategies which were not apparent among junior academics. For instance, some were inclined to schedule or limit themselves to between two to three large tasks a day. From their past experiences with managing their tasks, it was reasonable to set and do just a number of big tasks and get them done by the end of the day. Some senior academics were inclined to extract tasks from their master list into their daily list. They tended not to use a single task list to write down all their tasks, regardless of the nature, importance or size of their tasks. Some senior academics also highlighted the importance of delegating their tasks to their subordinates, including their colleagues or students or support staff, who could undertake certain tasks on their behalf. This strategy was associated with seniority or superiority (for example as director, supervisor for research projects, etc.) that they held in their workplace.

The differences or changes in PTM strategies across different categories of academics suggest that, as academics progress their career, they tend to implement diverse PTM strategies. This is in order to address greater challenges with managing their tasks or to cope

with more demanding roles as they develop their careers. Based on an understanding of different categories of academics and their experiences with task management, the author has developed four personas of academics. The personas highlight the importance of designing future PTM tools which are able to address the development of PTM strategies by providing functions or features through which academics can implement these new or additional strategies over time as their careers progress. In the next chapter, the author further explains the usefulness of the personas to designers, academics and researchers working in the field of PTM, and discusses the contribution and limitations of this thesis, as well as looking ahead to future developments.

# Chapter 8: Conclusion

This chapter summarises the whole study and its main contributions. This will be followed by a discussion of the implications the study has for research and design. The chapter then elaborates the limitations of the study and highlights potential future work. Finally, it concludes with a general summary of this thesis.

This chapter is divided into eight sections as follows:

- **Research questions** – highlighting how the author has addressed the research questions explained in Chapter 1.
- **Contributions** – describing the key contributions made and their components.
- **Implications** – discussing the key aspects of the contributions with previous literature and summarising the methodology of this research.
- **The usefulness of research outcomes and lesson learnt** – discussing how different audiences can use the key contributions made (i.e. the framework and personas). The section also highlights lessons learnt from the methodological approach undertaken.
- **General discussion of research outcomes** – discussing the key research outcomes with current knowledge/phenomena on PTM.
- **Limitations** – discussing the limitations of the research and its outcomes.
- **Future work** – highlighting potential areas of work that can be put forward as a result of the outcomes of this research.
- **Summary** – providing a general summary of this research.

## 8.1 Revisiting the research questions

Before explaining the contribution of this thesis, it is important to revisit the three research questions highlighted in Section 1.2. This section summarises how the author has addressed them, giving an overview to understand the contribution of this thesis described later.

**Question 1:** *How do academics manage their personal tasks?*

To answer this question, the author conducted interview and video-diary studies. The findings identified four groups of academics and a set of strategies that they employed, both within and across the groups. The findings also found similar and dissimilar strategies within and across those groups, suggesting how academics changed their strategies throughout their

career as their seniority progressed. In terms of the similarities, most of the participants tended to create separate task lists to distinguish between large or important tasks and small or less important tasks. They also had a tendency to break down their tasks into sub-tasks. In order to undertake their tasks, most of them explained that they use/set a deadline as the important factor in deciding when to begin a particular task. However, most of them were inclined not to specify the exact time when they would start or end their tasks. They tended to match a type of task with their location (for example they would do reading tasks while they were travelling or commuting).

There are some key differences in PTM strategies identified. Most of the junior and senior academics, in particular, had a tendency to scheduling their tasks rather than going through their task lists. Furthermore, they were inclined to match between their time availability and size of their tasks. For instance, they would do small tasks if they had relatively a short time gap during the day (e.g. between meetings) rather than undertake big tasks. Some of them tended to further allocate to do between 2-3 big tasks if they had between a half and full day time gap. If they were in the middle of doing a big task, they tended not to switch to do small or other tasks. Conversely, PhD students and post-doc researchers tended to create a list of possible tasks they needed to do and tick through them as the tasks were done, rather than to explicitly block a specific period of time to do their tasks.

Most of the PhD students had a tendency to switch between tasks particularly when they could not concentrate on a certain task. They had a long uninterrupted time gap to be working on their own research project. In addition to managing their research, most of the senior and junior academics had to be undertaking other types of job like teaching/supervision and administration tasks, and had to attend a large number of meetings. Most of them had fewer uninterrupted hours, and they therefore were inclined to regularly review and rearrange their task list and schedule (throughout the day) in order to address their current or unexpected situations. However, this practice was uncommon to other groups of academics, particularly among PhD students and post-doc researchers.

The findings further identified how the characteristics or nature of their jobs and the degree to which they were occupied during the day contribute to the range of strategies implemented across the groups. The findings also revealed a wide range of factors, which can be divided into internal and external, which influenced users' PTM strategies.

**Question 2:** *Do existing tools provide adequate support/features?*

Based on the video-diary study, the author identified a set of challenges that the academics faced in using existing tools. The findings revealed to what extent existing tools addressed the problems that they faced and highlighted their limitations. The findings further showed how the nature of their job contributed to these challenges. To investigate the usefulness or limitations of existing tools, the author conducted expert evaluations of existing PTM tools using CASSM. The findings revealed to what extent the PTM concepts (both internal and external factors) developed from the interview study were represented by existing tools, highlighting their strengths and limitations. Based on the findings from the CASSM study, existing tools provide a function where users can easily define their tasks and their respective properties; for example, deadlines, the importance or priority of tasks; location or context of where they are going to undertake the task. However, they still have limitations that are important to address. For example, none provides an adequate representation of the urgency of users' tasks. The existing tools tend to sort tasks based on a deadline or assigned a tag of priority or importance; for example numerical value, ranks or asterisk symbol. Current tools also do not provide the function to both schedule users' tasks and reassess them. Existing tools provide limited capacity for assisting users in distinguishing the complexity and size of their tasks. The author suggested improvements that could be made to bridge the conceptual misfits identified between the users and the tools, and explained how they might be addressed.

**Question 3:** *What support or features do academics need?*

Based on the understanding of users, the nature of their roles, and PTM strategies that academics employed, as well as the challenges they experienced as identified from the interview and video-diary studies, the author developed four different personas to represent four groups of academics. The personas describe both the problems that academics face in managing their tasks and the limitations of their current PTM tools. The personas also explain the strategies that they use to manage their tasks. The personas identify future PTM tools and the functions/features that people would like. Such descriptions provide important insights of what future PTM tools should provide and how they should facilitate academics in managing their tasks. Each of the personas represented a group of participants who shared similar characteristics. For instance, persona #1 represented participants 8, 13, 14, 15, 16, 24, 26 and

27. The personas also described how they used existing tools to help them manage their tasks and the common problems that they faced.

## 8.2 Contributions

The three key contributions of this thesis can be summarised as follows:

1. PTM framework (PTM factors and challenges).
2. The state of the art of the existing PTM tools (and improvements that can be made).
3. Tools for designers: PTM strategies and personas of four groups of academics.

### 8.2.1 A Personal Task Management (PTM) framework

The framework describes how people manage their tasks by explaining the following questions:

- *What activities/sub-activities (cognitive and physical)/strategies do participants perform in order to manage their tasks, and how and why do they do them?*
- *What tools/mechanisms do they use to manage their tasks and how are these important/useful to them?*
- *What contextual factors/aspects influence them in making their task management decisions (i.e. which tasks to do at a certain time/situation)?*
- *What are the challenges/difficulties that they face in managing their tasks and what contributes to these?*
- *How useful are their current tools and what kinds of tool support do they need to address the challenges to better manage their tasks?*

The answers to these questions were encapsulated in the following components (representing the framework):

**The underlying activities –** describes the steps/strategies that people perform in managing their tasks. These include planning, prioritisation and list-making activities. Planning allows people to identify/define their tasks (or goals) and allocate a time when they need to be done. Prioritisation helps them to review and rearrange their tasks in relation to their current situation/condition. And finally, the list-making activity refers to a strategy that enables

people to externalise both the planning and prioritisation activities by using a certain mechanism (e.g. a task list).

**Sources of tasks** – illustrates different media that people use to manage their tasks. In general, the framework identifies four sources of tasks that inform people of their tasks: email, calendar, task representation (e.g. task lists or physical cues- piles of paper, etc.), and social. Each of these is used interchangeably due to their different properties or benefits offered, suggesting that there is still no single method of facilitating task management. People have a tendency to use more personalised task lists, which are more meaningful or useful to them, rather than use a generic (for example, an electronic task manager). These personalised tools seem more flexible and meaningful to users, and can satisfy their own needs/preferences which are inclined to evolve over time.

**The underlying factors** – describes the wide range of factors that influence people's PTM behaviours (e.g. deciding what tasks they should do at particular time). These factors can be divided into two categories: internal and external. The internal factors are psychological factors and these include emotion, mental/physical strength, motivation, interest and effective use of time. The external factors, on the other hand, are factors related to an individual's environment, which can be further classified into five categories: task, environment, social, time and tools. People tend to choose to do tasks where constraints (e.g. size of task, time gap and dependencies) match with their emotions and mental/physical state, rather than choose simply based on deadlines or the importance of their tasks. Their task priorities, for instance, are constantly being compared against these factors, which tend to change over time, suggesting why they are difficult to weigh explicitly, in advance.

**Challenges -** explains two types of PTM's challenges that people often experience: management and task performance. The first one is about the difficulties faced in 'implementing' the aforementioned underlying activities. For example, it is a challenge to estimate the amount of time needed to complete a certain task, therefore making it demanding to schedule it explicitly. Due to their limited time availability, it is evident that people often struggle to rearrange or do big or long-term tasks (which have been planned previously), particularly when they experience day-to-day, small or less important tasks or unexpected situations over time. The second type of challenges explains the problems people face in 'doing' their tasks. For instance, it is a challenge for them to accomplish competing tasks and retain their self-motivation when continuously doing a certain task. Additionally, they have a

tendency to postpone their own tasks in order to accommodate tasks which involve other people (i.e. which need to be reported/given to someone).

**Context awareness –** elaborates the other important aspects of users that influence people's personal task management behaviours. This can be further split into two categories: individuals' perceptions and the nature of job. The first category refers to different strategies or approaches that people adopt in managing their tasks. The majority tend to use tools or steps that allow them to be more flexible in managing their tasks, so as to match between the internal and external factors involved before deciding which tasks they are going to do (i.e. how to make best use of their time). To be more realistic, they highlight the importance of having an adequate breathing space in between their tasks, allowing them to handle their tasks more effectively and tackle unexpected tasks. The second category explains the characteristics of their job, which contribute to some of the challenges highlighted previously. For example, most of them are involved in research tasks which have no specific or well-defined description of how they should be done. Such tasks usually require people to be creative and continuously explore and make sense of their work. It is a challenge to identify and schedule a time in which they can perform or complete those tasks productively, way in advance. At the same time, people need to undertake other administrative work (which is relatively less creative) as they go along. This brings some challenges for them to find the 'right' time to do their tasks and schedule them explicitly way in advance.

### 8.2.2 State of the art of existing PTM tools

Analytical evaluations were conducted to identify the adequacy of the existing tools. The focus of the evaluations was to determine the conceptual misfits between the users and the systems (i.e. existing tools). This led to the identification of the following:

- *Potential concepts of tools that need to be redesigned*- shows the concepts that are not adequately represented by the tools (e.g. users explain that the 'importance' concept cannot be ranked explicitly, and by contrast, the tools require them to assign explicit values or labels).
- *Potential concepts of tools to be implemented*- (e.g. users need new features; showing tasks/time recommendations; visualizing their tasks size, complexity or dependencies, and time constraints, etc.).

- *Useful concepts that users need to learn* (e.g. users need to learn about the 'context' or 'next action' concepts in order to prioritise their tasks).

The findings also present a comparison of the existing tools in order to highlight their strengths and weaknesses, suggesting the best tools to date.

### 8.2.3 Tools for designers: Personas

Four different personas were developed based on the understanding of participants (involved in the user studies), explaining the characteristics of target users that the designer must understand. They represent different stages academics may face throughout their profession, highlighting different levels of busyness and commitment that they have to deal with. The personas describe different strategies and complexities of tools used.

The following section explains the implications of some of the important aspects of these contributions by relating them to the previous research. The implications can be divided into three categories as follows:

1. Theory (framework and requirements).
2. Design.
3. Methodology.

## 8.3 Implications

### 8.3.1 Theory

#### 8.3.1.1 Activities and factors

To re-cap, the proposed PTM framework defines three underlying activities involved: planning, prioritisation and list-making. The list-making activity, in particular, can be described in two ways: cognitive and physical. The physical perspective refers to what types of interaction people perform. For instance, how they use/manipulate their tools. On the other hand, from the cognitive perspective, the framework explains how these activities help people in managing their tasks. For example, how sub-activities such as drawing mind maps or sketching or annotating things, physically moving post-it notes around, crossing off items on their task lists, can improve their motivation or satisfaction in managing their tasks. The diversity of these list-making strategies supports the previous study that has identified that

people are inclined to personalise their tools in order to satisfy their individual needs (Haraty *et al.*, 2012).

The differences in list-making strategies employed and reasons behinds these were not described in detail in the PAM model proposed by (Gonzalez *et al.*, 2008). The model, however, does highlight that it is essential to provide a mechanism that enables the users to capture their commitments and classify them according to certain category schemes (e.g. scope, time, priority, etc.). The model also explains the importance of providing a mechanism that allows users to review and prioritise their tasks. This can support them to focus on certain things at a time and revisit their current achievements and situations in order to make necessary changes. However, the diverse prioritisation strategies employed by users were not explained at length. The proposed framework extends this by showing different prioritisation approaches and activities that people employ, which can be categorised into two types: internal and external.

As mentioned previously, the framework classifies a wide range of factors that influence people's PTM behaviours. These overarching factors however, were not fully explained by the previous research. Instead, most of them tend to restrict to certain parameters used to support task prioritisation (e.g. urgency, deadline, importance, priority, duration, context, etc.). The framework further explains the relationships between the factors involved, clarifying some of the ambiguities and inconsistencies of some of the concepts found in the previous studies. The framework discovers that urgency and importance are two interrelated factors rather than orthogonally independent. It further shows that it is a challenge for people to weigh the importance or priority of tasks explicitly. The framework also clarifies the misconception of priority. Priority is an implicit and relative notion that is determined based on the comparison against these underlying factors involved, which tend to change over time. It appears to be impractical to assign task priority way in advance. In brief, the framework suggests that, in reality, the measurements that people use to prioritise goes beyond the importance and deadline concepts which have long been assumed to be the driving factors that influence people's PTM behaviours. Many other factors such as time gap, task size, complexity and dependency, social and emotion, still have not been adequately addressed or exploited, and this has emerged to be important to people as well.

#### 8.3.1.2 Challenges

The framework demonstrates that it is a challenge for people to both manage and undertake their tasks. Many of these challenges are due to the nature of their tasks, which are difficult to manage explicitly. Due to a limited time gap, it is difficult to find a 'suitable' time for a writing task (e.g. journal articles or books) amid the administrative, small and unexpected tasks or issues that people have to go through daily. It is also demanding for people to estimate the amount of time needed to complete their tasks. It is evident that this depends on the complexity of their tasks and how familiar they are with the task or domain related to it. This supports the previous studies that have identified that research tasks are difficult and complex (Newman *et al.*, Forthcoming), and therefore it is a challenge to estimate time to do/complete these 'research' tasks, particularly the ones that have no specific deadlines (e.g. follow-ups) (Newman, 2004). People face a challenge to schedule and rearrange these tasks in the future due to unexpected situations. The characteristics of their research tasks (which are ill-defined, exploratory and creative) and the level of familiarity (experience) that people have towards those tasks, influence how well they can estimate (or schedule time) to do or complete those tasks.

For instance, to write a research article, people need to identify a time where they can productively and creatively make sense of their materials gathered and write them up. This has a strong relationship with their aforementioned psychological factors (e.g. emotions, mental/physical strength and motivation) which tend to change over time. However, it seems challenging to find a long and interrupted time gap in which they can slot this task in. It is evident that people often get distracted by small, less creative tasks that contribute less 'weight', but these, however, are difficult to avoid (i.e. must be done as well). They also have a tendency to accommodate tasks (or spend more time to do tasks) that have social implications. For instance, participants reported that they were inclined to get tasks done which involve other people before their own/personal tasks. This is in line with Houston *et al.*, (2006) who found that people tend not to refuse additional tasks assigned to them. This suggests why people tend to allocate a small amount of time to do their tasks in order to get them done quickly (Newman *et al.*, Forthcoming).

#### 8.3.1.3 Individuals' perceptions

The framework also shows that individuals have different perceptions of their PTM behaviours, suggesting why they tend to manage their tasks in a certain way (i.e. different from one to another). Due to the complexity and factors involved, and the different needs and preferences that people have, they often prefer to use strategies and tools that allow them to manage and do their tasks more flexibly (in order to easily address the unexpected tasks or situations that they face over time). They are also inclined to assess their 'capacity' before choosing or accepting to do a certain task. As highlighted previously, it is also important for them to allocate a 'breathing space' in their schedule, allowing them to manage their tasks more realistically. These subtle aspects, however, were not clearly pointed out by the previous literature nor adequately implemented by the existing tools. To provide more usable or practical tools (e.g. to recommend the users with a more realistic and flexible schedule), future tools must recognise these individual aspects, which may vary from one to another.

#### 8.3.1.4 Personas

The personas developed show the diverse groups of target users within the academic community. In brief, they can be classified based on the stage of their career, suggesting different level of busyness, and the type and amount of commitments that they have to handle at the same time. As a result, they have different needs or issues which encourage them to use different strategies/tools to manage their tasks. Existing tools or prescribed methods for supporting task management, however, have not adequately addressed these. Due to the limitations of the existing tools, people therefore tend to use tools which they can personalise according to their evolving needs or situations (Haraty *et al.*, 2012). Existing tools seem to be generic and fail to identify the different and more complex scenarios or needs that people face or have respectively. The differences of these target users are described in the personas, guiding the designers in developing future tools that are in accordance with these different characteristics (e.g. common situations, strategies, needs and preferences).

### 8.3.2 Design

As highlighted earlier, priority is an implicit and 'relative' value of preferable tasks that people need to do at a given time. It tends to change over time with regards to current tasks and the underlying factors that people have to consider, suggesting why people have no

tendency to externalise their task priorities. By contrast, many of the existing tools focus on the importance of assigning an 'absolute' priority value/label to a task, and on implementing different things (for example, levels of priority) that users can use (e.g. (Gtdagenda, 2009; Effexis, 2010a; Kamsin *et al.*, 2012). Instead of assigning these values, the findings show that people are inclined to annotate their tasks, move the post-it notes around, draw mind-maps and certain symbols/figures, re-order their overall tasks, etc. This is in line with the previous study that has identified that some people tend to use 'spatial' distance to show the relative priority of their tasks (i.e. the nearest item has the highest priority) (Blandford and Green, 2001). To address this, some of the existing tools have dismissed the implementation of the 'absolute' priority concept. The intelligent personal calendar proposed by (Bank *et al.*, 2012) only allows the user to check or uncheck the 'importance' box. Task Vista proposed by (Bellotti *et al.*, 2004), on the other hand, enables the user to move their tasks up and down.

Existing tools also focus on providing features/functions that allow users to record, schedule and organise their tasks into a specific category/label. The study identifies that still, little concern has been given to going beyond these functions by equipping these tools with more useful features (that busy people need); recommendations of reasonable tasks/time; mechanisms to alert users to their current tasks and time constraints and the feasibility to undertake/accept tasks; tasks/time rearrangement suggestions; historical data to reflect their past performance and stimulate their awareness/change of behaviour, and predict how they are going to cope/undertake similar situations (tasks). For example, there is still no utility that can reassess users' current tasks and constraints (and their past performance) in order to recommend possible rescheduling options and rearrangements that the user can take.

To date, a first step has been addressed by (Bank *et al.*, 2012) in their intelligent calendar prototype. It offers a utility that can automatically schedule tasks based on certain properties. However, there are still other contextual factors (e.g. urgency, task size, social dependency, and most internal factors) and aforementioned users' individual aspects (i.e. the nature of job and individuals' perceptions) that have not been adequately taken into account by this tool. It is important to know how people match between the factors involved. Also, in order to provide more practical recommendations, it is imperative to first understand what tasks they prefer to do within a certain period of time and how they prefer to schedule them, taking into consideration their capacity, breathing space, etc. The task suggestions provided are based on limited properties (e.g. deadline, absolute priority or importance, and project or context category).

The study has also identified other important aspects that can be useful to users, suggesting some design opportunities that can be put forward to improve the existing tools. The findings show that some participants explain that it is essential to have a more comprehensive 'visualisation' of their tasks (e.g. different size, projects, people involved), time constraints and dependencies between them (e.g. between preparatory tasks and a meeting with a related person whom the task is done for). Such a first step has been pursued by (Bellotti *et al.*, 2004) who implemented a visualisation bar to show the imminent task deadlines, stimulating the user to be more aware of their tasks. In relation to the various and individual list-making strategies described by the PTM framework, there is also a lack of tools that support people in creating and manipulating their tasks, annotating them, and sketching and drawing (to mimic a 'pen-based interaction' and 'physical interaction' of moving post-it notes around (i.e. tasks)), which seems very important to people. Such aspects can mimic their preferred or more exciting ways of making/manipulating their lists and can provide a chance to improve their experience (or satisfaction) of using the tools. This also can motivate them in managing/doing their tasks (as explained by the framework). Many, rather, implement conventional methods for recording their tasks by typing in the tasks, clicking and assigning properties.

### 8.3.3 Methodology

The findings from the interview study were based on the reflections made by the participants on their PTM practice (strategies and tools) and their problems and needs. Arguably, it cannot be determined to what extent their descriptions represent their actual practice or problems that they experience in their real environment/situation, and how they handle them. The member-checking study, which was done to validate the interview study, showed that there were some inconsistencies between the findings of both studies. To address this, a video-diary study was conducted, allowing the author to observe and capture users' experience of managing their tasks in the wild (i.e. real context). Interestingly, the interview study discovered the detailed activities involved and the factors that influence people's PTM behaviours. By contrast, the video-diary study determined to what extent their current strategies/practice work for them and when they fall apart, explaining the real situations and challenges facing them and how well their current strategies and tools address those identified situations.

The user studies conducted enabled the author to develop a richer description of PTM behaviours, grounded in data. The framework defines, differentiates, relates and categorises

all the important aspects/components of the behaviour identified, clarifying the preconceptions, ambiguities and inconsistencies identified in the previous literature. The framework also provides more comprehensive descriptions of the different PTM behaviours displayed by people, and the levels of busyness and challenges that they experience. This shows the complex diversity of users that needs to be taken into account when designing tools or prescriptions to support them. Previous research, however, tended to use common preconceptions (e.g. urgency, importance or priority) that were believed to be the key factors in guiding people in managing their tasks, without giving more attention to their actual context and what these concepts mean to the users (i.e. what they actually experience and how they manage their tasks, and why). In brief, the methodology chosen has enabled the author to identify different practices adopted and problems experienced by diverse people, and should be considered when designing future tools (or prescriptions) to assist them.

## 8.4 The usefulness of the research outcomes and lesson learnt

### 8.4.1 The use of the framework

Previous section summarises the outcomes and contributions of this research, as well as the methodology employed. This section further explains how the following audiences, in particular, can use both the framework and personas developed:

**Designers.** Designers can use the framework to understand the key tools that people use to manage their tasks, aspects of tools that are important to users, and how people use different tools interchangeably. This allows designers to understand the strengths of each tool and to identify a way of improving existing tools in order to assist users in better managing their tasks. They can also understand what design features of existing tools should be retained and what needs to be further improved. For example, designers could examine information from email and calendars, in order to provide a feature which could identify a particular task to be carried out, based on the context/details identified. Designers could also provide a feature that suggests a potential task and the date by which it should be achieved, based on the user's availability and taking into account meetings recorded in their calendar.

**Researchers.** The framework can be useful for researchers to understand the nature of the work that people have to undertake. The framework shows the complexity of common scenarios that they have to face and the challenges that they experience. Researchers could investigate to what extent existing PTM tools (applications) or methods (e.g. GTD) can be

used to address the problems raised by the participants, in order to determine the usefulness or practicality of existing tools and methods. Through the framework, the researcher can see the range of problems faced by academics which may vary from one type of user, such as students, to another, such as senior academics. The researcher can further test whether the existing strategies can overcome the different problems faced by different groups of users over time. They can also see how the development of PTM strategies can facilitate academics to manage their tasks more effectively or solve the problems identified.

**Academics.** The framework explains that it is a challenge for most academics to decide which tasks would be most appropriate to do and, more importantly, when to do them. It describes a wide range of factors that academics tend to consider regularly. Previous literature suggests that deadlines and degree of importance were the main factors that influenced what tasks they should do and when to do them. The framework has further shown that academics tended to go beyond these two main factors in order to determine appropriate tasks to do at a particular time, depending on where they are and the amount of time available to undertake them. Academics tend to undertake different tasks concurrently. Some of their tasks have no specific deadlines. Due to the limited amount of time to address them all, academics tend to make use of their time by scheduling appropriate tasks in the time slots available at different locations.

### 8.4.2 The use of the personas

**Designers.** Designers can use personas to understand the categories of users and their characteristics. The findings identified four categories of academics based on the nature of their professional role. The personas describe the level or type of business that academics are involved in, including their working styles/preferences, problems and needs. This information will be essential for designers so that they can propose tools that can address their needs and preferences. Designers can also use personas to identify how their design can address the issues or needs raised. They also use them to evaluate their tools and identify improvements that could be made.

**Researchers into PTM.** Researchers can use the personas to understand the development of PTM strategies and challenges that academics experience as their careers progress. This enables them to identify the similarities and differences between different groups of academics and to formulate relationships between the strategies that academics employ and

the stage that they have reached in their careers. Different users have different strategies/tactics according to the nature of their role, the problems they experience, their seniority and job requirements, all of which can change over time. Senior academics might have implemented similar strategies when they were at the beginning of their career, but gradually adopt different strategies in order to meet new challenges. It is important for the researcher to understand the set of challenges faced by academics at different stages in their career development and to determine whether the practices implemented during the early stage are still relevant or practical when they are in a senior role. This may be different from post-doctoral researchers or PhD students who may have less of their time is structured so they have more time to carry out solo/personal tasks.

**Academics.** The personas are potential resources to support training, workshops, courses, books or modules on personal task/time management, academic career/professional development and stress management which academics may encounter. Through these events, the organiser/presenters/authors may use/include the personas as important characteristics/exemplars to illustrate different narratives of how different groups of academics manage their tasks in real contexts or settings. The personas are to be viewed against a background of the academic group, situations they face in common, challenges they experience and respective strategies (including techniques, steps, systems/tools, or tactics) that they use in order to deal with them. The personas also highlight the needs of academics and identify future PTM tools/systems that they prefer or are keen to use. Based on the personas, other academics may be able to reflect on their current or past PTM strategies. They may be able to understand why some strategies work for them and why some do not. They can further identify the similarities or differences between their personal experiences of managing their tasks with the ones described in the personas. They can also learn novel or potential strategies that could be beneficial and which they may wish to implement. This may help them to understand a wide range of strategies that they can implement now or in the future, when they reach seniority. Personas may also help academics to understand how the practicality of the strategies may change in relation to their job requirements and the possible strategies that they may adopt in order to address similar problems that they may face in the future. For example, it may be adequate for students or junior academics to use and go through their task lists whereas more senior academics who have less personal or uninterrupted time tend to schedule their tasks and control the amount of time to be spent on them.

### 8.4.3 The lesson learnt from the methodological approach

In terms of the methodological approach undertaken, both the interview and video data gathering allowed the author to describe PTM behaviour in detail. Based on the interviews, the author identified a wide range of factors that are important and described different activities that academics employ to manage their tasks before determining what tasks to do and when to do them. Both data gathering methods provided the opportunity for the author to identify and understand the similarities and differences of PTM behaviour both within similar groups and across dissimilar groups of academics. In the interview study, participants tended to describe the strengths of the PTM strategies that they implemented, explain the problems that they experienced and the limitations of the existing strategies or tools that they used to assist them.

It is important to explain the main differences between the findings from the interview and those from the video-diary studies. Most participants, particularly in the interview study, tended to highlight the strengths of their PTM tools and strategies and expressed their satisfaction with them. In contrast, in the video-diary study, most participants recognized their PTM problems and challenges and were able to identify the limitations of their current PTM tools and strategies. They further suggested possible solutions or alternatives to address the problems and limitations of their current tools or strategies. There were several possible reasons for the differences. Participants recruited from the interview study mainly came from the same department as the author and therefore there was the potential for the participants not to share the problems and limitations of their current PTM tools and strategies and explain them in detail. To do so, it might have revealed their limitations and reflected adversely on their performance and status in the workplace.

In contrast, participants in the video-diary study were instructed to identify and explain the problems that they encountered throughout a certain period of time, either during one day or during the course of a week. The author was thus able to investigate their problems as they used the tools and identify whether the tools or strategies were useful to them. More importantly, the study was aimed at identifying the problems and the limitations of their current PTM tools or strategies and finding solutions to improve them.

The findings in this study (e.g. the underlying strategies and challenges experienced by academics) can be compared with those adopted by other professionals (e.g. IT

professionals and managers) in order to explore the similarities and differences between them. This may be useful to understand whether the PTM strategies and challenges are influenced by the type of profession or professional domains, are generic across participants or are explained by individual preferences. This may further suggest whether there should be a unique or similar design of PTM tools used by all academics, regardless of seniority, and by workers in other domains with different environments, cultures, lifestyles and work patterns; for example engineers, doctors, salespeople and office workers. Findings that show the underlying factors that people consider before embarking on a particular task can be used to determine whether they are common across different professions or backgrounds or unique to particular individuals.

## 8.5 General summary of research outcomes (in relation to current knowledge/phenomena on PTM)

### 8.5.1 Knowledge contribution of to HCI discipline

Previous literature has focused on describing tools such as applications, systems and devices used to organise and complete tasks rather than describing strategies implemented by participants and the possible variations. Previous studies have focused on the differences between the tools and how users used them. Little was known about the variations of PTM strategies across different groups of users and the similarities and dissimilarities of the activities they were involved in.

The findings from the user studies have described the similarities and differences of PTM strategies and identified important reasons, including the nature of their role and the level of their activity, which contributed to the variations. The findings have also identified that there was a tendency among users to implement new strategies as their seniority progressed and to disregard some of their previous PTM strategies, which seemed useful when they were at the beginning of their career (e.g. when they were students or junior lecturers). Most of the senior academics were inclined to invest their efforts in learning and using additional or improved strategies compared to those used by junior academics or students. For example, they tended to schedule and rearrange their tasks regularly according to a wide range of factors, the people involved or current context or situations. In contrast, most junior academics, students and post doc researchers had a tendency to just create and work through task lists.

Previous studies have highlighted that certain factors such as deadlines, degree of urgency, importance, time availability and motivation influence users' PTM activities. They have not discovered other factors that go beyond these, and more importantly, they have not provided adequate descriptions to show the relationships between them. The findings in this study have explained a range of additional important factors that affect users in determining what tasks to do and when to do them, including the time gap between tasks, the size of task, the participants' motivation to complete them and social factors. Furthermore, the findings identified the relationship between the important key factors. For example, most senior academics were inclined to match the size or complexity of their tasks and the available time gaps. Most tended to schedule a time gap between a few hours to a full day to concentrate on undertaking large tasks, rather than tackling them in the middle of short time gaps such as between meetings or time-slots of less than an hour. Some participants tended to do a certain type of task, for example reviewing articles or reading a thesis while they were travelling. Participants also explained that how they felt at any one time and the relationship with the people involved could also influence them in choosing to do a particular task over other possible tasks. The findings have shown that most of participants tended to take into account more factors beyond urgency or deadlines in determining what tasks to do at a particular time.

Finally, the findings also revealed a set of challenges that academics experienced. This will provide an opportunity for researchers to further determine whether existing PTM methods (e.g. GTD/PFTF) or tools can assist people to address or overcome the problems. It will be also useful to investigate whether the challenges faced by the academics exist in other professions. Future research may also investigate how organizational policy can contribute to these challenges and how to address them.

### 8.5.2 The comparison between the framework and existing methods (e.g. GTD/PFTF)

It is important to relate back the framework with existing methods (e.g. GTD/PFTF) described previously in Chapter 2. This section summarises the key similarities and differences between them.

**Similarities**

Both GTD and PFTF methods identified activities that academics could do to manage their tasks, including dividing them into sub-tasks. They also helped to schedule them by setting a time by which they should be done or a deadline by which they should be accomplished. In the light of this, participants also needed to reassess their current situations and rearrange their tasks if necessary. This is similar to the findings presented in the framework which identified three main PTM activities that participants undertook: planning, prioritisation and list-making. For example, academics tended to identify what they needed, wanted or could do based on requests received via email or by phone using paper-based, electronic information or mental lists and scheduling them in their diaries/calendars. From a design perspective, future tools must provide features and functions which would enable these activities to be automated. It is vital for designers and developers to understand how users currently undertake these activities and how they use existing tools to perform the activities so that they can help them to undertake them easily and quickly.

**Differences**

The author has identified the main differences between the framework and GTD or PFTF. They can be sub-divided as follows:

***1) The PTM framework provides descriptions of PTM factors and challenges.*** The framework describes a wide range of factors that people take into account before deciding which tasks to do and when to do them. This goes beyond the common parameters suggested by GTD or PFTF which include importance, deadlines and contexts e.g. people involved or goals associated with a particular task, time availability and motivation. The framework explains that people consider the size and complexity of tasks, and their emotion, motivation and social context, before choosing a particular task to be done at any one time. These additional factors should inform designers/developers of the need for tools which would be able to take into account and store or capture critical information before recommending tasks to the user.

The additional factors described in the framework, however, were not well described in GTD and PFTF. The framework also identified a set of challenges faced by different groups of academics. It is vital for designers/developers to know about the issues raised by

the users and use them to assess to what extent the tools can assist users to address their time management challenges.

***2) GTD or PFTF methods provide a set of steps for PTM and categorisation of tasks/actions.***

Both GTD and PFTF methods (as highlighted in Chapter 2) provide a set of steps to assist people in managing their tasks, but they are not specifically tailored to academics. GTD suggests people to determine actions to be taken on particular tasks or requests which may be identified through email or other sources. Users identify whether those tasks can be dealt with immediately because they are small or can be completed quickly or whether to schedule them to complete some time later in their calendars. Users also organise their tasks according to certain contexts e.g. the nature of the project or people involved or categories, for example if the task can be associated with a phone call. The method also suggests users review their tasks/calendars regularly in order to address unexpected requests or new tasks.

PFTF focuses on providing steps for people to identify their roles and goals, and to classify their tasks according to four categories, which are based on two factors: importance and urgency. The method also recommends users to focus on and schedule tasks which are important but not urgent, in their calendars. These steps may inform designers/developers to provide features/functions that would help users to implement the identified activities. For example, it would be useful if future tools could assist users to process their tasks and organise them according to the categorization approaches prescribed by Getting Things Done (GTD) or Put First Things First (PFTF). The organisation of tasks or related information associated with them may help them in planning, prioritising and updating users' task lists. The framework, however, did not provide a set of steps that participants took to manage their tasks. Instead, it explained a wide range of PTM strategies that they undertook but in no particular order, which may suggest alternative strategies that users could employ. This may inform designers to provide features/functions that would enable users to adopt the most effective strategies.

### 8.5.3 The impact of smart devices (e.g. phones/tablets) on user behaviour in PTM activities

Smart phones or tablets can assist in managing tasks. Using mobile devices, participants would be able to review their tasks and current schedule easily and often. Some of the participants' devices contained email applications which identified tasks that they had to do. They also included calendar applications which enabled them to review their availability or to identify potential time-slots to undertake their tasks, as well as to schedule meetings or events like seminars. The devices would be able to identify the locations of meetings and events which helped the academics to organise their schedules.

These sources of up-to-date information stored on smart devices would be essential for users in reassessing and determining what tasks needed to be done and by when they should be completed. While users were commuting or at the office, the devices could use available information to recommend to users what would be appropriate for them to do at a certain time and place. Participants would be able to make best use of their available time slots by undertaking appropriate or necessary tasks. For instance, they could complete small tasks while there was a short gap in between the meetings at the office or while travelling (as explained in Chapter 4). Based on the available time gaps or location, it would be useful in the future if mobile devices could dynamically rearrange and schedule a sequence of tasks. This would provide the opportunity for users to be more productive and more effective by doing the right tasks at the right time.

Information in the devices might help the user to be more realistic in deciding possible tasks to do within or by a certain period of time, as well as to control the use of their time. For example, in relation to the real traffic information for their current journey or other information such as the weather, it would be useful for participants to rearrange tasks and meetings to take account of this information. Devices might also contain up-to-date information regarding emails received, people involved, documents/files attached, important dates, meetings, seminars and available time gaps. Using this information, academics could decide what would be appropriate tasks to do both while they are the move or in the office. In the future, this would present an opportunity for developers/designers to enable the devices to use information to suggest which tasks to tackle when.

## 8.6 Limitations

Previous sections have explained the contributions made, their implications and key lessons learnt from them. However, there are a number of limitations and challenges faced throughout this research which can be addressed for future work. They can be divided into three categories as follows:

1. Methodology.
2. Framework.
3. Analytical evaluation.

### 8.6.1 Methodology

*Data gathering methods.* Although the interviews and video data allowed the author to explore and explain the findings in detail, these methods did not allow for quantification of the commonalities or determination of the frequencies of factors involved across users. To improve this, it will be important to undertake a quantitative study to further determine these aspects in a wider population undertaking the same role or working in a similar environment. Another improvement that will be made will be to invite participants to implement a set of strategies that were identified in the user studies or prescribed by existing methods (e.g. Getting things done), and observe to what extent these strategies will help academics in managing their tasks.

*Expert evaluation method.* The detailed understanding of PTM behaviour and concepts identified from the interview and video-diary studies provided an opportunity for the author to conduct an evaluation of selected PTM tools using CASSM and to identify the strengths and limitation of these tools. This was achieved by comparing related concepts informed by users and implemented with the tools. The findings highlighted key misfits, which suggested potential difficulties that users may experience in using a particular feature or function of the tools. The findings also enabled the author to identify possible solutions to overcome these problems. However, the author did not test the other aspects of the usability of these tools, for example, how easy and quick users can use them. It will therefore be important to invite potential users or volunteers to use these tools and show their benefit and limitations during a timespan from two days to several weeks. This will not only validate the findings gathered

from the CASSM evaluation but will further identify other benefits and drawbacks of these tools from the perspective of target users.

*Participants' recruitments.* The user studies conducted involved 31 academics from three departments of one university in the UK. However, it was well above the average (as compared to other related studies, in terms of a larger number of participants recruited (see Table 2.8. p. 53), which representative of academics in both social and science fields. They also included a cross section of academics (i.e. professors, senior lecturers, lecturers, post-doc and PhD students). The author did not attempt to interview people who did not accept the study invitation.

*Coding.* The process of transcribing and coding participants' transcripts was done by one author. To mitigate this, transcripts were checked by native speakers. The findings were also sent back to both internal and external participants using member-checking to check the accuracy/adequacy of the interpretations and descriptions made by the author based on users' quotations.

### 8.6.2 Framework

*Confounding variable.* The social aspect strongly emerged in the PTM framework. This was perhaps due to the way in which the recruitment process was undertaken. As mentioned previously, the participants involved were the people who agreed to participate in the study. They perhaps felt socially obliged to contribute and help a fellow researcher/colleague to pursue his study. On the other hand, this might have turned into different results if the participants recruited had a tendency not to undertake tasks that have no direct contribution to their own personal goals/career.

*Qualitative representations.* The findings describe a wide range of factors that influence people's PTM behaviours and the challenges facing them. However, they do not present exact percentage of the occurrence of these factors and challenges. To address this, the author described each concept by using certain phrases (e.g. *people, the majority of, some, one or two participants*) to suggest whether the concept was generalisable across participants or unique to a particular person. For example, the findings show that the majority of the participants tend to explain the factors that influence their behaviours include urgency, importance, deadline, time gap, task size and complexity dependencies, and social relationships. This implies that nearly or more than half of the participants mentioned these

factors, and therefore they could be considered as significant. It is important for future studies to extend this by determining the significance of the underlying factors identified in this study.

*A rationale assumption.* There was no precondition or additional set up in this study to measure or relate individual personality to the findings. Therefore, there was no personality test conducted prior to interviewing the participants. The author did, however, identify job title (e.g. professor, lecturer, post-doc researcher). The author also did not investigate how organisational aspects (e.g. policy, requirements, pressure from the employer, industry, government, and so on) influence behaviour. This was beyond the scope of the study but would be interesting to further investigate in future works. In this study, the author instead assumed that there was no significant relationship between the individual's personality and their organisation towards personal task management behaviour.

*The 'best' strategies*. There is still little research that explains and measures different personal task management strategies adopted by people. This brings a challenge to determine the adequacy of these individual strategies, and to what extent they work or are useful to other people. Bellotti et al. (2004), however, have pointed out that the challenges in managing personal tasks are not due to poor strategies employed, but rather to a limited amount of time available to perform competing, or a huge amount of tasks. Leshed and Sengers (2011) highlighted that the existing method for managing tasks (i.e. GTD) fail to address the complex scenarios and types of busyness experienced by people in various contexts. Throughout the interviews, therefore, the author aimed to focus on identifying strategies that were useful and satisfying to people. It is important to address this in the future research to compare and measure these different strategies in order to design tools that can best assist people in managing their tasks. This is to avoid a risk of developing tools that are based on various and poor strategies, either employed by people or prescribed by the experts, which may not suit certain people who have different personality, needs and preferences (even though they have the same goals).

### 8.6.3 Analytical evaluation

As highlighted in Chapter 8, the analytical evaluation conducted did not reveal certain usability aspects. For instance, how easy and quick it is for users to use and learn the system. However, it was not the aim of the study to identify all usability aspects but rather to focus on

identifying the misfits between the users and the system and to specifically highlight possible improvements that can be made. This is to ensure that each feature/function provided by the existing tools is fit for purpose, and can be redesigned according to the concepts informed by people rather than by the preconceptions defined by the designers or experts. Another limitation of the evaluation is that it was done only by the author. Arguably, to conduct this evaluation, the expert should have a detailed understanding of both users/domains and the tools, improving his credibility for conducting this evaluation. It is a challenge to find a number of analysts who are expert in both respects in order to produce as accurate/reliable findings as possible. To address this, it is important to highlight again that the evaluation was rooted in data (the users and the systems' descriptions rather than the author's personal thoughts). The author has built up knowledge of both entities incrementally over a few years, and believed this was adequate to conduct the evaluation.

## 8.7 Future work

### 8.7.1 Quantitative measurement

Given some of the limitations of the findings explained previously (done using a qualitative approach), it is valuable to further identify the significance of the factors identified. In relation to this, it is also important to identify which of these factors should be designed explicitly and how they should be represented (or implemented) by the tools. This can assist designers in focusing on the factors that are critical to users and which need to be represented explicitly. Additionally, future studies can also validate the requirements identified and investigate which of them are most critical to users. As described in the personas, target users can be divided into different categories, depending on the stages of their career. It is interesting to therefore determine whether these different groups have different requirements. It is also interesting to first identify the generic and personal requirements across different sections of profession or personality. Based on this, the designers can identify what features/functions are critical for the majority of people and which ones are more personal, and therefore they can be adequately prioritised when it comes to the design and evaluation phases.

### 8.7.2 Pool of participants

The design of the study can be useful to understand different professions or work settings (e.g. business, financial and marketing, medical/hospital, industries, government agencies,

non-profit organisations, constructions or manufacturing, etc.). This is to investigate whether there are any similarities and differences between them. This can be useful in determining whether there can be a generic that can suit different people regardless of their professions or settings. It is also to determine whether a person's profession has a direct effect on their personal task management behaviours.

### 8.7.3 Design and evaluation

Based on the requirements and personas developed, it is beneficial to come up with several design mock-ups. This allows the designers to test them among experts or users in order to identify the best way of implementing the requirements. The results can also be useful in both validating and refining the requirements before embarking onto developing the running systems. This is also another way of identifying which of the concepts (i.e. factors) identified should be represented explicitly and how they should be implemented. Given that it is a challenge for the users to weigh the importance of their task explicitly, it is critical to determine whether it is useful to implement this concept explicitly, and if not, how it should be implemented instead.

Given the limitation of the analytical evaluation, it is imperative to further test the existing or future tools on the experts or the target users. This is to validate the findings identified in the evaluation as well as to see whether there are any discrepancies between the evaluations done by the experts and the users. Moreover, this allows the users to explain the strengths and limitations of the tools. In order to do this, the tools can be either used by the users for a certain period of time, or tested against the personas identified or their personal experiences of managing their tasks.

## 8.8 Summary

The author began this thesis by highlighting the current phenomena of the acceptance towards electronic PTM tools. Although there were over a hundred PTM tools available on the market, many people still rely on paper-based tools. The adoption of electronics tools has been low. Such things led to the detailed exploration of PTM behaviours to investigate the messiness of the real world. Indeed, the study has shown that there are many aspects of the user in their situated context need to be resolved first before designing the tools to assist them to better manage their tasks. The study has identified that the existing tools, however, have

not considerably taken into account the complex PTM behaviours identified. To date, it is still a challenge to identify whether one tool can satisfy different people situated in different contexts and with different personalities.

The motivation of this thesis is to focus on building a detailed understanding of PTM behaviour from a user's rather than a designer's or an experts' perspective. This was used as a basis in developing a PTM framework to describe the complexity of PTM displayed by people.

The framework describes diverse strategies employed by people, which all aimed at assisting them in managing their task better. These include a systematic classification of all the underlying activities involved and the factors that influence their behaviours. The framework explains users' needs and preferences as well as different types of busyness or challenges that they experience. It is apparent that the nature of their job has contributed to some of these challenges. The framework captures the reality of the experiences with managing tasks and the contextual factors that contribute to this. The framework explains PTM behaviour from a user's rather than a designer's or expert's point of view.

To the best of the author's knowledge, the existing tools or methods for assisting people in managing their tasks have not fully considered these emergent aspects in their implementations or prescriptions. It is evident that based on the evaluation study conducted, there were still some important conceptual misfits between the users and the existing tools, highlighting potential usability problems that users may experience when using the tools. To address these, the author has identified possible improvements/recommendations that can be made to both the tools as well as the users. Such a discovery informs the importance of taking into account the diversity of users in terms of their PTM behaviours and the contextual aspects informed by them.

To design more practical and useful tools, these must be addressed first in order to bridge the gaps between users and tools. Overall, the author has provided a detailed framework for understanding PTM behaviours and evaluating the adequacy of tools to facilitate the behaviours (i.e. whether they fulfil users' needs and preferences in their actual context). The framework also provides a concrete foundation to discovering the complexity of PTM behaviours among other busy people in different or wider contexts.

# References


ACM (2014), "ACM Code of Ethics and Professional Conduct", Available at: http://www.acm.org/about/code-of-ethics (Accessed: 2 May 2014).

Adams, A. and Cox, A.L. (2008), "Questionnaires, in-depth Interviews and Focus Groups", in Cairns, P. and Cox, A.L. *Research Methods for Human-Computer Interaction*, Cambridge University Press, pp 17-34.

Adams, A., Lunt, P. and Cairns, P. (2008), "A Qualitative Approach to HCI Research", in Cairns, P. and Cox, A.L. *Research Methods for Human-Computer Interaction*, Cambridge University Press, pp 138-157.

Ailamaki, A. and Gehrke, J. (2003), "Time Management for New Faculty", *ACM SIGMOD Record*, Vol. 32 No. 2, pp. 102-106.

Allen, D. (2009), "*Getting Things Done: How to Achieve Stress-free Productivity"*, Piatkus.

Anderson, D., Johnson, R. and Saha, L. (2002), "*Changes in Academic Work: Implications for Universities of the Changing Age Distribution and Work Roles of Academic Staff"*, Canberra, Australia: Department of Education, Science and Technology.

Bank, J., Cain, Z., Shoham, Y., Suen, C. and Ariely, D. (2012) 'Turning personal calendars into scheduling assistants'. *Proceedings of the 2012 ACM annual conference extended abstracts on Human Factors in Computing Systems Extended Abstracts*. Austin, Texas, USA: ACM, pp 2667-2672.

Barreau, D. and Nardi, B.A. (1995), "Finding and Reminding: File Organization from the Desktop", *SIGCHI Bull.*, Vol. 27 No. 3, pp. 39-43.

Barreau, D.K. (1995), "Context as a Factor in Personal Information Management Systems", *Journal of the American Society for Information Science*, Vol. 46 No. 5, pp. 327-339.

Barrett, L. and Barrett, P. (2007), "Current Practice in the Allocation of Academic Workloads", *Higher Education Quarterly*, Vol. 61 No. 4, pp. 461-478.

Barry, D., Cramton, C.D. and Carroll, S.J. (1997), "Navigating the Garbage Can: How Agendas Help Managers Cope with Job Realities", *The Academy of Management Executive (1993-2005)*, Vol. 11 No. 2, pp. 26-42.

Battaglia, M. (2008), "*Convenience Sampling. Encyclopedia of Survey Research Methods. Sage Publications, Inc"*, Thousand Oaks, CA: Sage Publications, Inc.

Bellotti, V., Dalal, B., Good, N., Flynn, P., Bobrow, D.G. and Ducheneaut, N. (2004), "What a To-Do: Studies of Task Management Towards the Design of a Personal Task List Manager", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Vienna, Austria, pp. 735-742.

Bellotti, V., Ducheneaut, N., Howard, M. and Smith, I. (2003), "Taking Email to Task: the Design and Evaluation of a Task Management Centered Email Tool", *Proceedings of*

*the SIGCHI Conference on Human Factors in Computing Systems*, Ft. Lauderdale, Florida, USA, pp. 345-352.

Bellotti, V. and Smith, I. (2000a) 'Informing the Design of an Information Management System with Iterative Fieldwork'. *Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*. New York City, New York, United States: ACM, pp 227-237.

Bellotti, V. and Smith, I. (2000b), "Informing the design of an information management system with iterative fieldwork", *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques*, New York City, New York, United States, pp. 227-237.

Berglund, A., Daniels, M. and Pears, A. (2006) 'Qualitative Research Projects in Computing Education Research: an Overview'. *Proceedings of the 8th Australasian Conference on Computing Education - Volume 52*. Hobart, Australia: Australian Computer Society, Inc., pp 25-33.

Bergman, O., Boardman, R., Gwizdka, J. and Jones, W. (2004), "Personal Information Management", *Proceedings of the CHI '04 Extended Abstracts on Human Factors in Computing Systems*, Vienna, Austria, pp. 1598-1599.

Bernstein, M., Kleek, M.V., Karger, D. and Schraefel, M.C. (2008), "Information Scraps: How and Why Information Eludes Our Personal Information Management Tools", *ACM Transactions on Information Systems*, Vol. 26 No. 4, pp. 1-46.

Bishop, J. (2007), "Increasing participation in online communities: A framework for human–computer interaction", *Computers in Human Behavior*, Vol. 23, pp. 1881–1893.

Blackwell, A. (2011) 'Diary and Probe Studies in Technology and Physical Sciences'. [Online]. Available at: https://camtools.cam.ac.uk/access/wiki/site/e30faf26-bc0c-4533-acbc-cff4f9234e1b/diary%20and%20probe%20studies.html.

Blandford, A., Green, T.R.G. and Connell, I. (2005), "Formalising an Understanding of User-System Misfits.", *Engineering Human Computer Interaction and Interactive Systems. Lecture Notes in Computer Science*, pp. 253-270.

Blandford, A., Green, T.R.G., Furniss, D. and Makri, S. (2008a), "Evaluating System Utility and Conceptual Fit Using CASSM", *International Journal of Human-Computer Studies*, Vol. 66 No. 6, pp. 393-409.

Blandford, A., Hyde, J.K., Green, T.R.G. and Connell, I. (2008b), "Scoping Usability Evaluation Methods: A Case Study", *Human Computer Interaction Journal*, Vol. 23 No. 3, pp. 278 – 327.

Blandford, A., Keith, S., Connell, I. and Edwards, H. (2004a), "Analytical Usability Evaluation for Digital Libraries: a Case Study", *Proceedings of the 4th ACM/IEEE-CS joint Conference on Digital Libraries*, Tuscon, AZ, USA, pp. 27-36.

Blandford, A.E., Connell, I. and Green, T. (2004b), "Concept-based Analysis of Surface and Structural Misfits(CASSM)", Available at: http://www.uclic.ucl.ac.uk/annb/CASSM.html (Accessed: 21 Dec 2013).

Blandford, A.E. and Green, T.R.G. (2001), "Group and Individual Time Management Tools: What You Get is Not What You Need", *Personal Ubiquitous Computing*, Vol. 5 No. 4, pp. 213-230.

Blomkvist, S. (2006), "The User as a Personality: a Reflection on the Theoritical and Practical Use of Personas in HCI Design", *Proceedings of the Technical report*, Uppsala, Sweeden, pp. 1-13.

Boardman, R. (2004), "*Improving Tool Support for Personal Information Management*". Unpublished PhDThesis. University of London.

Boardman, R. and Sasse, M.A. (2004), ""Stuff Goes into the Computer and Doesn't Come Out": a Cross-Tool Study of Personal Information Management", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Vienna, Austria, pp. 583-590.

BPS (2010), "Code of Human Research Ethics", Available at: http://www.bps.org.uk/sites/default/files/documents/code_of_human_research_ethics.pdf (Accessed: 20 Feb 2013).

BPS (2013), "The Data Protection Act 1998 – Guidelines for Psychologists", Available at: http://www.bps.org.uk/sites/default/files/documents/data_protection_act.pdf (Accessed: 20 Feb 2013).

Brandt, J., Weiss, N. and Klemmer, S.R. (2007), "txt 4 l8r: Lowering the Burden for Diary Studies Under Mobile Conditions", *Proceedings of the CHI '07 Extended Abstracts on Human Factors in Computing Systems*, San Jose, CA, USA, pp. 2303-2308.

Brown, B.A.T., O Hara, K. and Sellen, A. (1999), "A Diary Study of Information Capture", *Proceedings of the Second Workshop on HCI for Mobile Devices*, Edinburgh, Scotland.

Brown, B.A.T., Sellen, A.J. and O'Hara, K.P. (2000), "A Diary Study of Information Capture in Working Life", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, The Hague, The Netherlands, pp. 438-445.

Bryman, A. (2004), "Member Validation and Check", in Michael, S., Lewis-Beck, A., Bryman, A. and Liao, T.M. *The SAGE Encyclopedia of Social Science Research Methods*, Thousand Oaks, CA: Sage Publications, pp 634.

Buchanan, E., Aycock, J., Dexter, S., Dittrich, D. and Hvizdak, E. (2011), "Computer science security research and human subjects: Emerging considerations for research ethics boards.", *Journal of Empirical Research on Human Research Ethics: An International Journal*, Vol. 6 No. 2, pp. 71-83.

Buchbinder, E. (2010), "Beyond Checking : Experiences of the Validation Interview", *Qualitative Social Work*, Vol. 10 No. 1, pp. 106–122.

Buchwald, D., Schantz-Laursen, B. and Delmar, C. (2009), "Video Diary Data Collection in Research with Children : An Alternative Method", *International Journal of Qualitative Methods*, Vol. 8 No. 1, pp. 12-20.

Burden, J. and Roodt, G. (2007), "Grounded theory and its application in a recent study on organisational redesign : some reflections and guidelines", *SA Journal of Human Resource Management*, Vol. 5 No. 3, pp. 11-18.

Calman, L. (2006), "What is Grounded Theory?", Available at: http://www.methods.manchester.ac.uk/events/whatis/gt.pdf (Accessed: 27 June 2014).

Campbell, C. and Maglio, P. (2003), "Supporting Notable Information in Office Work", *Proceedings of the CHI '03 Extended Abstracts on Human Factors in Computing Systems*, Ft. Lauderdale, Florida, USA, pp. 902-903.

Carlson, J.A. (2010), "Avoiding Traps in Member Checking", *The Qualitative Report*, Vol. 15 No. 5, pp. 1102-1113.

Carter, S. and Mankoff, J. (2005), "When Participants Do the Capturing: The Role of Media in Diary Studies", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Portland, Oregon, USA, pp. 899-908.

Charmaz, K. (2014), "*Constructing Grounded Theory"*, 2nd edition, Sage, Thousand Oaks.

Claessens, B.J.C., Eerde, W.V., Rutte, C.G. and Roe, R.A. (2010), "Things to Do Today....: A Daily Diary Study on Task Completion at Work", *Applied Psychology*, Vol. 59 No. 2, pp. 273-295.

Cohen, D.J. and Crabtree, B.F. (2008), "Evaluative Criteria for Qualitative Research in Health Care: Controversies and Recommendations", *ANNALS OF FAMILY MEDICINE*, Vol. 6 No. 4, pp. 331-339.

Conley, K. and Carpenter, J. (2007), "Towel : Towards an Intelligent To-Do List", *Proceedings of the AAAI 2007 Spring Symposium on Interaction Challenges for Intelligent Assistants*.

Conway, N. and Brine, R.B. (2002), "A Daily Diary Study of Affective Responses to Psychological Contract Breach and Exceeded Promise", *Journal of Organizational Behavior*, Vol. 23 No. 3, pp. 287-302.

Cooper, A. (1996), "Goal-Directed Software Design", Available at: http://drdobbs.com/article/print?articleId=184409952&siteSectionName= (Accessed: 21 Dec 2013).

Cooper, A. (1999) *The Inmates are Running the Asylum*. SAMS Macmillan, 2013.

Corbin, J. and Morse, J.M. (2003), "The Unstructured Interactive Interview: Issues of Reciprocity and Risks When Dealing With Sensitive Topics", *Qualitative Inquiry*, Vol. 9 No. 3, pp. 335-354.

Costa, R. (2009), "Information Systems and Qualitative Research", Available at: http://www.map.edu.pt/i/2008/map-i-research-methods-workshop-2009/RaulCostalFinal.pdf (Accessed: 21 Dec 2013).

Covey, S.R. (2004), "*The 7 Habits of Highly Effective People"*, Simon & Schuster UK.

CQUniversity (2011), "Academic Career Planning and Promotion", Available at: http://policy.cqu.edu.au/Policy/policy_file.do?policyid=2106 (Accessed: 31 July 2014).

Czerwinski, M., Horvitz, E. and Wilhite, S. (2004), "A Diary Study of Task Switching and Interruptions", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Vienna, Austria, pp. 175-182.

Dana, J., Robyn Dawes , R. and Peterson, N. (2013), "Belief in the unstructured interview: The persistence of an illusion", *Judgment and Decision Making*, Vol. 8 No. 5, pp. 512–520.

Davidson, J. (2006), "Probability (Random) Sampling", in Jupp, V. *The SAGE Dictionary of Social Research Methods*, London, England, Sage Publications, pp 239-240.

Dey, A.K. and Abowd, G.D. (2000), "CybreMinder: A Context-Aware System for Supporting Reminders", *Proceedings of the 2nd international symposium on Handheld and Ubiquitous Computing*, Bristol, UK, pp. 172-186.

Dillahunt, T., Mankoff, J. and Forlizzi, J. (2001), "A proposed framework for assessing environmental sustainability in the HCI community", *Proceedings of the CHI '10 Examining appropriation, reuse, and maintenance workshop at CHI 2010*.

Dillon, A. (1999), "TIME - A multi-level framework for the design and evaluation of digital libraries.", *International Journal of Digital Libraries*, Vol. 2 No. 3, pp. 170-177.

Dix, A., Finlay, J., Abowd, G.D. and Beale, R. (2004), "*Human-Computer Interaction"*, Third edition edition, Essex, England: Pearson Prentice Hall.

Dix, A., Ramduny-Ellis, D. and Wilkinson, J. (1998), "Redefining Organisational Memory - Artefacts and the Distribution and Coordination of Work", Available at: http://www.alandix.com/academic/papers/artefacts98/ (Accessed: 21 Dec 2013).

Dix, A., Ramduny, D. and Wilkinson, J. (1995), "Interruptions, Deadlines and Reminders: Investigations into the Flow of Cooperative Work. Technical Report. ", Available at: http://interruptions.net/literature/Dix-RR9509.pdf (Accessed: 21 Dec 2013).

Dodd, P. and Sundheim, D. (2010), "The 25 Best Time Management Tools & Techniques: How to Get More Done Without Driving Yourself Crazy", Available at:

http://www.amazon.com/Best-Time-Management-Tools-Techniques/dp/097695060X (Accessed: 21 Dec 2013).

Ducheneaut, N. and Bellotti, V. (2001), "E-mail as Habitat: An Exploration of Embedded Personal Information Management", *interactions*, Vol. 8 No. 5, pp. 30-38.

Effexis (2010a), "Achieve Planner User Manual", Available at: http://www.effexis2.com/achieve/APUserManual.pdf (Accessed: 9 December 2009).

Effexis (2010b), "Effexis Software: Achieve Planner Time Management Software", Available at: http://www.effexis.com (Accessed: 9 December 2009).

Egger, E. and Wagner, I. (1992), "Time-Management: A Case for CSCW", *Proceedings of the ACM Conference on Computer-Supported Cooperative Work*, Toronto, Ontario, Canada, pp. 249-256.

Eldridge, M., Lamming, M. and Flynn, M. (1993), "Does a Video Diary Help Recall?", *Proceedings of the People and computers VII*, York, United Kingdom, pp. 257-269.

Eldridge, M. and Newman, W. (1996), "Agenda Benders: Modelling the Disruptions Caused by Technology Failures in the Workplace", *Proceedings of the Companion on Human Factors in Computing Systems: Common Ground*, Vancouver, British Columbia, Canada, pp. 219-220.

Fertig, S., Freeman, E. and Gelernter, D. (1996), "Finding and Reminding Reconsidered", *SIGCHI Bull.*, Vol. 28 No. 1, pp. 66-69.

Finlay, L. (2006), "'Rigour', 'Ethical Integrity' or 'Artistry'? Reflexively Reviewing Criteria for Evaluating Qualitative Research", *British Journal of Occupational Therapy*, Vol. 69 No. 7, pp. 319-326.

Fitzgerald, S., McCauley, R. and Clark, V.L.P. (2011) 'Report on Qualitative Research Methods Workshop'. *Proceedings of the 42nd ACM Technical Symposium on Computer Science Education*. Dallas, TX, USA: ACM, pp 241-242.

Fleet, L. and Blandford, A.E. (2005), "Requirements of Time Management Tools for Outpatient Physiotherapy Practice", *Health Informatics Journal*, Vol. 11, pp. 179 - 199.

Francis-Smythe, J. (1999), "On the Relationship Between Time Management and Time Estimation", *The British Journal of Psychology*, Vol. 90 No. 3, pp. 333-347.

Furniss, D. (2008), "*Beyond Problem Identification: Valuing Methods in a 'System of Usability Practice' "*. Unpublished PhDThesis. UCL.

Furniss, D., Blandford, A. and Curzon, P. (2011) 'Confessions from a Grounded Theory PhD: Experiences and Lessons Learnt'. *Proceedings of the 2011 Annual Conference on Human Factors in Computing Systems*. Vancouver, BC, Canada: ACM, pp 113-122.

Galicia, L., Gonzales, V.M. and Favela, J. (2007), "Personal Activity Management: Towards a Technological Approach to Support Proactive Planning of Multiple Activities", *International Journal of Computers, Systems and Signals*, Vol. 8 No. 2,

George, J. (2006), "Researching Life in E-society with Diary Studies", *Proceedings of the ECIS 2006*.

Gibson, C. (1998), "Semi-structured and unstructured interviewing: a comparison of methodologies in research with patients following discharge from an acute psychiatric hospital", *Journal of Psychiatric and Mental Health Nursing*, Vol. 5, pp. 469–477.

Gil, Y. and Chklovski, T. (2007), "Enhancing Interaction with Task Lists Using Artificial Assistants", *Proceedings of the AAAI Spring Symposium on Interaction Challenges for Artificial Assistants*, Standford University, CA, USA.

Gil, Y. and Ratnakar, V. (2008), "Towards Intelligent Assistance for To-Do Lists", *Proceedings of the 13th International Conference on Intelligent User Interfaces*, Gran Canaria, Spain, pp. 329-332.

Giusti, L., Mencarini, E. and Zancanaro, M. (2010), "Luckily, I don't need it": Elderly and the Use of Artifacts for Time Management", *Proceedings of the NordiCHI*, Reykjavik, Iceland.

Goldblatt, H., Karnieli-Miller, O. and Neumann, M. (2010), "Sharing Qualitative Research Findings with Participants: Study Experiences of Methodological and Ethical Dilemmas", *Patient Education and Counseling*, Vol. 82, pp. 389–395.

Gonzalez, V.M., Galicia, L. and Favela, J. (2008), "Understanding and Supporting Personal Activity Management by IT Service Workers", *Proceedings of the 2nd ACM Symposium on Computer Human Interaction for Management of Information Technology*, San Diego, California, pp. 1-10.

González, V.M. and Mark, G. (2004), ""Constant, Constant, Multi-Tasking Craziness": Managing Multiple Working Spheres", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Vienna, Austria, pp. 113-120.

Goodwin, K. (2001), "Perfecting Your Personas", Available at: http://www.cooper.com/journal/2001/08/perfecting_your_personas.html (Accessed: 13 September 2012).

Grbich, C. (2009), "*Qualitative Data Analysis"*, SAGE Publications.

Green, P. and Skinner, D. (2005), "Does Time Management Training Work? An Evaluation", *International Journal of Training and Development*, Vol. 9 No. 2, pp. 124-139.

Grudin, J. and Pruitt, J. (2002), "Personas, Participartory Design and Product Development: An Infrastructure for Engagement", *Proceedings of the Participartory Design Conference* pp. 144 -161.

Gtdagenda (2009), "Gtdagenda.com", Available at: http://www.gtdagenda.com/tour.php#goals (Accessed: 9 December 2009).

Gtdagenda.com (2013a), "http://www.gtdagenda.com/useit/1/Use-Gtdagenda-to-implement-Getting-Things-Done-GTD-by-David-Allen", Available at: http://www.gtdagenda.com/useit/1/Use-Gtdagenda-to-implement-Getting-Things-Done-GTD-by-David-Allen (Accessed: 4 Feb 2013).

Gtdagenda.com (2013b), "Make Gtdagenda a part of your 7 Habits for becoming Highly Effective", Available at: http://www.gtdagenda.com/useit/3/Make-Gtdagenda-a-part-of-your-7-Habits-for-becoming-Highly-Effective (Accessed: 4 Feb 2013).

Gwizdka, J. (2000), "Timely Reminders: A Case Study of Temporal Guidance in PIM and Email Tools Usage", *Proceedings of the CHI '00 Extended Abstracts on Human Factors in Computing Systems*, The Hague, The Netherlands, pp. 163-164.

Gwizdka, J. (2002), "Reinventing the Inbox: Supporting the Management of Pending Tasks in Email", *Proceedings of the CHI '02 Extended Abstracts on Human Factors in Computing Systems*, Minneapolis, Minnesota, USA, pp. 550-551.

Gwizdka, J. (2004), "Email Task Management Styles: The Cleaners and the Keepers", *Proceedings of the CHI '04 Extended Abstracts on Human Factors in Computing Systems*, Vienna, Austria, pp. 1235-1238.

Haraty, M., Tam, D., Haddad, S., McGrenere, J. and Tang, C. (2012) 'Individual Differences in Personal Task Management: A Field Study in an Academic Setting'. *Proceedings of the 2012 Graphics Interace Conference*. Toronto, Ontario, Canada: Canadian Information Processing Society, pp 35-44.

Harper, M. and Cole, P. (2012), "Member checking: Can benefits be gained similar to group therapy? ", *The Qualitative Report*, Vol. 17 No. 2, pp. 510-517.

Harrison, B.L., Cozzi, A. and Moran, T.P. (2005), "Roles and Relationships for Unified Activity Management", *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work*, Sanibel Island, Florida, USA, pp. 236-245.

Hartson, H.R., Andre, T.S. and Williges, R.C. (2001), "Criteria for evaluating usability evaluation methods", *International Journal of Human Computer Interaction*, Vol. 13 No. 4, pp. 373-410.

Hazzan, O. and Dubinsky, Y. (2007), "The Software Engineering Timeline: A Time Management Perspective", *Proceedings of the Software-Science, Technology & Engineering, 2007. SwSTE 2007. IEEE International Conference on*, pp. 95-103.

Hazzan, O., Dubinsky, Y., Eidelman, L., Sakhnini, V. and Teif, M. (2006) 'Qualitative Research in Computer Science Education'. *Proceedings of the 37th SIGCSE Technical Symposium on Computer Science Education*. Houston, Texas, USA: ACM, pp 408-412.

Holliday, R. (2000), "We've been Framed: Visualising Methodology", *The Sociological Review*, Vol. 48 No. 4, pp. 503-521.

Hooff, B.v.d. (2004), "Electronic Coordination and Collective Action: Use and Effects of Electronic Calendaring and Scheduling", *Information & Management*, Vol. 42 No. 1, pp. 103-114.

Houston, D., Meyer, L. and Paewai, S. (2006), " Academic Staff Workloads and Job Satisfaction: Expectations and Values in Academe", *Journal of Higher Education Policy and Management*, Vol. 28 No. 1, pp. 17-30.

IEEE (2014), "IEEE Code of Ethics", Available at: http://www.ieee.org/about/corporate/governance/p7-8.html (Accessed: 2014 2 May).

Ismail, M. and Rasdi, R.M. (2006), " Uniqueness Of Career In Academia: Experience Of High-flying Women Academics", *The Journal Of Global Business Management*, Vol. 2 No. 2,

Jain, J. (2009), "Value of Using Multimodal Data in HCI Methodologies", *Proceedings of the 13th International Conference on Human-Computer Interaction. Part II: Novel Interaction Methods and Techniques*, San Diego, CA, pp. 48-57.

Johnson, R.B. (1997), "Examining the Validity Structure of Qualitative Research", *Education*, Vol. 118 No. 2, pp. 282-292.

Jones, M. and Alony, I. (2011), "Guiding the Use of Grounded Theory in Doctoral Studies – An Example from the Australian Film Industry", *International Journal of Doctoral Studies*, Vol. 6,

Jones, W., Bruce, H., Foxley, A. and Munat, C.F. (2006), "Planning Personal Projects and Organizing Personal Information", *Proceedings of the American Society for Information Science and Technology*, Vol. 43 No. 1, pp. 1-24.

Jones, W., Klasnja, P., Civan, A. and Adcock, M.L. (2008), "The Personal Project Planner: Planning to Organize Personal Information", *Proceedings of the Twenty-sixth Annual SIGCHI Conference on Human Factors in Computing Systems*, Florence, Italy, pp. 681-684.

Kamsin, A., Blandford, A. and Cox, A.L. (2012) 'Personal Task Management: My Tools Fall Apart When I'm Very Busy!'. *Proceedings of the 2012 ACM Annual Conference Extended Abstracts on Human Factors in Computing Systems Extended Abstracts*. Austin, Texas, USA: ACM, pp 1369-1374.

Keane and Able (2012), "Any To-Do", Available at: http://anytodo.com/evernote-to-do/ (Accessed: 4 Feb 2013).

Kincaid, C.M., Dupont, P.B. and Kaye, A.R. (1985), "Electronic Calendars in the Office: An Assessment of User Needs and Current Technology", *ACM Transactions on Information Systems*, Vol. 3 No. 1, pp. 89-102.

Kleek, M.G.V., Bernstein, M., Panovich, K., Vargas, G.G., Karger, D.R. and Schraefel, M. (2009), "Note to Self: Examining Personal Information Keeping in a Lightweight Note-Taking Tool", *Proceedings of the 27th International Conference on Human Factors in Computing Systems*, Boston, MA, USA, pp. 1477-1480.

Kuniavsky, M. (2003), "*Observing the User Experience: A Practitioner's Guide to User Research",* Morgan Kaufmann.

Kutar, M., Britton, C. and Nehaniv, C. (2001), "Specifying Multiple Time Granularities in Interactive Systems", *Proceedings of the 7th International Conference on Design, Specification, and Verification of Interactive Systems*, Limerick, Ireland, pp. 51-63.

Lansdale, M. (1988), "The psychology of personal information management", *Applied Ergonomics*, Vol. 19 No. 1, pp. 55-66.

Lee, H. (2003), "Your Time and My Time: A Temporal Approach to Groupware Calendar Systems", *Information and Management*, Vol. 40 No. 3, pp. 159-164.

Leshed, G. and Sengers, P. (2011) "'I Lie to Myself that I Have Freedom in My Own Schedule": Productivity Tools and Experiences of Busyness'. *Proceedings of the 2011 Annual Conference on Human Factors in Computing Systems*. Vancouver, BC, Canada: ACM, pp 905-914.

Lewis, J. (2003), "Design Issues", in Ritchie, J. and Lewis, J. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*, SAGE Publications, pp 47-76.

Lewis, J. and Ritchie, J. (2003), "Generalising from Qualitative Research", in Ritchie, J. and Lewis, J. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*, SAGE Publications, pp 263-286.

Lietz, C.A., Langer, C.L. and Furman, R. (2006), "Establishing Trustworthiness in Qualitative Research in Social Work - Implications from a Study Regarding Spirituality", *Qualitative Social Work*, Vol. 5 No. 4, pp. 441–458.

Lietz, C.A. and Zayas, L.E. (2010), "Evaluating Qualitative Research for Social Work Practitioners", *Advances in Social Work*, Vol. 11 No. 2, pp. 188-202.

Macan, T.H. (1994), "Time Management: Test of a Process Model", *Journal of Applied Psychology*, Vol. 79 No. 3, pp. 381-391.

Mack, N., Woodsong, C., MacQueen, K.M., Guest, G. and Namey, E. (2005), "*Qualitative Research Methods: A Data Collector's Field Guide",* Family Health International. North Carolina, USA.

Mackay, W.E. (1988a), "Diversity in the Use of Electronic Mail: A Preliminary Inquiry", *ACM Transactions on Information Systems*, Vol. 6 No. 4, pp. 380-397.

Mackay, W.E. (1988b), "More Than Just a Communication System: Diversity in the Use of Electronic Mail", *Proceedings of the 1988 ACM Conference on Computer-Supported Cooperative Work*, Portland, Oregon, United States, pp. 344-353.

Mackay, W.E. and Fayard, A.-L. (1997), "HCI, Natural Science and Design: A Framework for Triangulation Across Disciplines", *Proceedings of the DIS'97: Designing Interactive Systems*, pp. 223-234.

Malone, T.W. (1983), "How do People Organize Their Desks?: Implications for the Design of Office Information Systems", *ACM Transactions on Information Systems*, Vol. 1 No. 1, pp. 99-112.

Maness, J.M., Miaskiewicz, T. and Sumner, T. (2008), "Using Personas to Understand the Needs and Goals of Institutional Repository Users", *D-Lib Magazine*, Vol. 14 No. 9/10,

Mark, G., Gonzalez, V.M. and Harris, J. (2005), "No Task Left Behind?: Examining the Nature of Fragmented Work", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Portland, Oregon, USA, pp. 321-330.

Maxwell, J.A. (2005), "*Qualitative Research Design"*, Second edition, SAGE Publications.

Mazza, R. and Berre, A. (2007), "Focus Group Methodology for Evaluating Information Visualization Techniques and Tools", *Proceedings of the Proceedings of the 11th International Conference Information Visualization*, pp. 74-80.

Metcalf, H., Rolfe, H., Stevens, P. and Weale, M. (2005), "Recruitment and Retention of Academic Staff in Higher Education", Available at: https://www.education.gov.uk/publications/eOrderingDownload/RR658.pdf (Accessed: 31 July 2014).

Myers, M.D. (2008), "*Chapter 9 Grounded Theory"*, Qualitative Research in Business and Management. Sage Publications.

Newman, W., Warwick, C. and Rimmer, J. (Forthcoming), "Humanities Researchers' Problems with Follow-ups, as Revealed in their Stories. Journal of Documentation", *Journal of Documentation*,

Newman, W.M. (2004), "Busy Days: Exposing Temporal Metrics, Problems and Elasticities through Diary Studies", *Proceedings of the CHI 2004 Workshop on Temporal Structures in Work*.

Newman, W.N. and Lamming, G. (1995), "*Interactive System Design "*, Addison Wesley.

Noyes, A. (2004), "Video Diary: A Method for Exploring Learning Dispositions", *Cambridge Journal of Education*, Vol. 34 No. 2, pp. 193-209.

O'Brien, M.A., Rogers, W.A. and Fisk., A.D. (2008), "Developing a Framework for Intuitive Human-Computer Interaction", *Proceedings of the Proceedings of the Human Factors and Ergonomics Society Annual Meeting* Vol. 52, pp. 1645-1649.

Ohmukai, I., Takeda, H. and Miki, M. (2003), "A Proposal of the Person-centered Approach for Personal Task Management", *Proceedings of the Symposium on Applications and the Internet*, pp. 234.

Oliver, P. (2006), "Purposive Sampling", in Jupp, V. *The SAGE Dictionary of Social Research Methods*, London, England, Sage Publications.

Palen, L. (1999), "Social, Individual and Technological Issues for Groupware Calendar Systems", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: The CHI is the Limit*, Pittsburgh, Pennsylvania, United States, pp. 17-24.

Palen, L. and Salzman, M. (2002), "Voice-Mail Diary Studies for Naturalistic Data Capture Under Mobile Conditions", *Proceedings of the ACM Conference on Computer Supported Cooperative Work*, New Orleans, Louisiana, USA, pp. 87-95.

Papaconstantinou, H.T. and Lairmore, T.C. (2006), "Academic Appointment and the Process of Promotion and Tenure", *Clinics in Colon and Rectal Surgery*, Vol. 18 No. 3,

Papatzanis, G., Curzon, P. and Blandford, A. (2007), "Identifying Phenotypes and Genotypes: A Case Study Evaluating an In-Car Navigation System", *Proceedings of the Engineering Interactive System* Vol. LNCS 4940, pp. 227–242.

Partington, D. (2000), "Building grounded theories of management action", *British Journal of Management*, Vol. 11 No. 2, pp. 91.

Payne, S.J. (1993), "Understanding Calendar Use", *HumAn Computer Interaction*, Vol. 8 No. 2, pp. 83-100.

Pocket (2013), "Pocket Informant", Available at: http://download.pocketinformant.com/PIIP/2.5%20Docs/Pocket%20Informant%202.5%20User%20Manual.pdf (Accessed: 4 Feb 2013).

Porter, S. (2007), "Validity, Trustworthiness and Rigour: Reasserting Realism in Qualitative Research", *Journal of Advanced Nursing*, Vol. 60 No. 1, pp. 79–86.

Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S. and Carey, T. (1994), "*Human-Computer Interaction"*, Essex, England: Addison Wesley.

Priacta (2009), "118 Researched GTD Software Programs and Counting", Available at: http://www.priacta.com/Articles/Comparison_of_GTD_Software.php (Accessed: 20 November 2009).

Rebenich, T. and Gravell, A.M. (2008), "An Adaptive Time Management System for Student Learning", *Proceedings of the In: World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008*, Vienna, Austria, pp. 5357-5366.

Richard, N. and Yamada, S. (2007), "An Adaptive, Emotional, and Expressive Reminding System", *Proceedings of the AAAI Spring Symposium on Interaction Challenges for Intelligent Assistants*, Stanford, USA.

Rogers, Y., Sharp, H. and Preece, J. (2011), "*Interaction Design: Beyond Human-Computer Interaction"*, John Wiley.

Rolfe, G. (2006), "Methodological Issues in Nursing Research - Validity, Trustworthiness and Rigour: Quality and the Idea of Qualitative Research", *Journal of Advanced Nursing*, Vol. 53 No. 3, pp. 304-310.

Rosson, M.B. and Carroll, J.M. (2002), "*Usability Engineering Scenario-Based Development of Human-Computer Interaction"*, San Francisco, CA: Morgan Kaufmann.

Russell, C.K. and Gregory, D.M. (2003), "Evaluation of Qualitative Research Studies", *Evidence-Based Nursing*, Vol. 6, pp. 36-40.

Sas, C., Dix, A., Hart, J. and Su, R. (2009), "Emotional Experience on Facebook Site", *Proceedings of the 27th International Conference Extended Abstracts on Human Factors in Computing Systems*, Boston, MA, USA, pp. 4345-4350.

Sbaraini, A., Carter, S.M., Evans, R.W. and Blinkhorn, A. (2011), "How to do a grounded theory study: a worked example of a study of dental practices", *BMC Medical Research Methodology*,

Schumann, M. (2006), "*Usability Evaluation of Presentation Tools"*. Bachelor's Thesis. Leipzig University of Applied Sciences.

Shenton, A.K. (2004), "Strategies for Ensuring Trustworthiness in Qualitative Research Projects", *Education for Information*, Vol. 22, pp. 63–75.

Shutterstock (2013), "shutterstock", Available at: www.shutterstock.com (Accessed: 21 Dec 2013).

Sidek, S., Dora, M.T., Kudus, N. and Hassan, M.A. (2012), "Academic Career in the Malaysian Higher Education: Becoming a Professor", *Journal of Human Capital Development*, Vol. 5 No. 2,

Simon, M.K. (2011) 'Validity and Reliability in Qualitative Studies'. *Dissertation and scholarly research: Recipes for success*, [Online]. Available at: http://dissertationrecipes.com/wp-content/uploads/2011/04/Validity-and-Reliability-in-a-Qualitative-Study.pdf.

Strauss, A. and Corbin, J. (1998), "*Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. "*, Sage, Thousand Oaks.

Taylor, A.S. and Swan, L. (2004), "List Making in the Home", *Proceedings of the ACM Conference on Computer Supported Cooperative Work*, Chicago, Illinois, USA, pp. 542-545.

Tullio, J., Goecks, J., Mynatt, E.D. and Nguyen, D.H. (2002), "Augmenting Shared Personal Calendars", *Proceedings of the 15th Annual ACM Symposium on User Interface Software and Technology*, Paris, France, pp. 11-20.

Turner, S. and Coen, S.E. (2008), "Member Checking in Human Geography: Interpreting Divergent Understandings of Performativity in a Student Space", *Royal Geographical Society*, Vol. 40 No. 2, pp. 184-193.

Vardi, I. (2009), "The Impacts of Different Types of Workload Allocation Models on Academic Satisfaction and Working Life", *Higher Education*, Vol. 57 No. 4, pp. 499-508.

Whittaker, S. and Hirschberg, J. (2001), "The Character, Value, and Management of Personal Paper Archives", *ACM Transactions on Computer-Human Interaction*, Vol. 8 No. 2, pp. 150-170.

Whittaker, S. and Sidner, C. (1996), "Email Overload: Exploring Personal Information Management of Email", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Common Ground*, Vancouver, British Columbia, Canada, pp. 276-283.

Wolcott, H.F. (2001), "*Writing Up Qualitative Research"*, 2nd edition, London: Sage.

Woods, P. (2005), "*Successful Writing for Qualitative Researchers"*, Taylor & Francis.

Yli-Kauhaluoma, S. (2009), "Time at R&D Work: Types and Strategies of Time in the Collaborative Development of a Chemical Technology", *Time & Society*, Vol. 18 No. 1, pp. 130 -153.

# Appendix A: Instruction and consent form for the interview study (phase I)

Instruction for Respondents January 2009

Project Title:
Time Management: Tools to Support Task Scheduling and Reminding

Instruction:
You are being invited to take part in a research study. Please take time to read the following information. Ask us if there is anything that is not clear or if you would like more information. Take as long as you like to decide whether or not you wish to take part.

Purpose of Study:
The aims of this study are to understand:

a) how people manage their time (tasks related to work and personal).
b) what types of tools/mechanisms they rely on.
c) what are the problems, difficulties or challenges faced in planning and scheduling their time.
4) what are their main concerns for a future time management tool.
5) what sorts of needs or support they are looking for in managing their time.

Respondent:
We are working with a broad cross-section of people within the UCL Interaction Centre – both staff and students. You have been approached simply as a representative of one of this group whose views and experiences we wish to gather.

Participation:
It is up to you to decide whether or not to take part. If you do decide to take part but then decide you wish to withdraw from the study you may do so at any time and without giving reason.
If you agree to take part, you will be interviewed or observed for about an hour. The overall study will take place over several months, but your own input will be relatively brief. No data that would enable anyone else to identify you will be collected.
Findings will be reported to UCL Interaction Centre, University College London. No information will be circulated that would make it possible to identify any particular individual's views.

Organiser:
This research is contributing to my MPhil/Phd research project. It is not externally funded.

Contact:
You can discuss this study with the person who gave you this information sheet, or contact Prof Ann Blandford at UCL Interaction Centre, University College London (contact details shown at the top of the following consent form sheet). You will be given a copy of the information sheet and a signed consent form to keep.

Thank you for taking part in this study.

Amirrudin Kamsin

UCL Interaction Centre
MPEB 8th Floor
University College London
Gower Street
London WC1E 6BT
United Kingdom
+44 (0) 20 7679 0686

Tel: +44 (0) 20 7679 0683 Email: a.kamsin@ucl.ac.uk

Identification Number for this trial:

CONSENT FORM

Title of Project: Time Management: Tools to Support Task Scheduling and Reminding

Name of Researcher: Amirrudin Kamsin

Please initial box

1. I confirm that I have read and understood the information sheet dated……. (version……) for the above study and have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected. ☐

3. I agree to take part in the above study. ☐

| _____ | _____ | _____ |
|---|---|---|
| Participant number | Date | Signature |
| _____ | _____ | _____ |
| Researcher | Date | Signature |

# Appendix B: Questions for the interview study (phase I)

A. Introduction

A1. What is your current job?

A2. Can you tell me briefly about your work routines?

A3. Can you tell me briefly about your personal routines?

A4. Do you have a busy schedule?

B. Time Management Styles or Techniques

B1. How do you manage your time?

B2. Do you use any particular tools such as diary, calendar, post-it or sticky notes, etc to manage your time?

B3. If so, is it an electronic or paper-based tool?

B4. How do you use it?

B5. What is it that you like about your current tool?

B6. What is it that you dislike about your current tool?

B7. How do you feel about your current tool?

B8. Do you have any problems or difficulties with your current tool?

B9. Do you rely on other things to manage your time about things you intend to remember?[question not clear]

B10. If so, how frequently do you use it and for what matters?

B11. Do you have any problems with your additional tools?

B12. Have you ever seen or used an electronic calendar or diary?

B13. What do you like about it?

B14. What do you dislike about it?

B15. Do you have any problems with it?

B16. Do you make any task lists to manage your work?

B17. If so, how do you make your task lists?

B18. How frequently do you make your task lists?

B19. Do you have any problems with your task lists?

C. Time Management Problems and Future Expectations

C1. What do you think about your current time management practices?

C2. Do you have any problems in managing your time?

C3. Do you have any problems in scheduling your day, work or tasks?

C4. Do you have any problems in remembering things you intend to do?

C5. Can you rely on your current tools to solve your time management problems?

C6. Do you prefer to use electronic or paper-based mechanisms to manage your time?

C7. What are the important aspects of time management to you?

C8. What kinds of support are you looking for in a time management tool?

C9. What makes a particular time management tool useful to you?

C10. What makes a particular time management system useful to you?

# Appendix C: Instruction and consent form for the interview study (phases II and III)

Information Sheet for Participants in Research Studies
You will be given a copy of this information sheet.

Title of Project: Personal task management

This study has been approved by the UCL Research Ethics Committee [Project ID Number]: Staff/0809/001

Name, Address and Contact Details of Investigators: UCL Interaction Centre(UCLIC), Malet Place Engineering Building (8th Floor), UCL, Gower Street, London WC1E 6BT

We would like to invite you to participate in this research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or you would like more information.

Instruction:
You have been invited to take part in a research study about your time management using a **contextual inquiry approach**. In this study, we would like to identify how you **prioritise your time** by interviewing and observing your **tools, artefacts or techniques** used for it. We would also like to know how **you use them as well as any problems pertaining to them**. Additionally, we would also like to **discover any critical incident based on your experiences which you felt made it difficult for you to manage and prioritise your time** effectively and efficiently.

Purpose of Study:
In this study, we would like to investigate:

- How you prioritise your time.
- What sorts of tools you use to manage your time/plans.
- How you use your tools.
- What your time management issues are.
- What your needs in time management are.
- Critical incidents, situations or issues in your time management that are difficult to handle.
- Your experiences during those critical incidents.

Expected Duration Participation:
Approximately 1 hour

Participation:
It is up to you to decide whether or not to take part. If you do decide to take part but then decide you wish to withdraw from the study you may do so at any time and without giving reason. If you agree to take part, you will be interviewed or observed for about an hour. The overall study will take place over several months, but your own input will be relatively brief. No data that would enable anyone else to identify you will be collected.

Findings will be reported to UCL Interaction Centre, University College London. No information will be circulated that would make it possible to identify any particular individual's views.

By signing the consent form, you are confirming that you understand what the study will involve, agree to participate and agree the interview and observations to be audio recorded and camera captured. Your signature also confirms that you are aware that:

1. The transcript of your interview and observation will be anonymised and information that could be used to identify you omitted.
2. Parts of the anonymised transcript may be included in academic publications and presentations.

All data from the study will be used and disseminated in accordance with the Data Protection Act 1998

Informed Consent Form for Participants in Research Studies
(This form is to be completed independently by the participant after reading the Information Sheet and/or having listened to an explanation about the research.)

Title of Project: Investigating academics' personal task management behaviour.

This study has been approved by the UCL Research Ethics Committee [Project ID Number]: Staff/0809/001.

Participant's Statement

I …….....
agree that I have

- read the information sheet and/or the project has been explained to me orally;
- had the opportunity to ask questions and discuss the study;
- received satisfactory answers to all my questions or have been advised of an individual to contact for answers to pertinent questions about the research and my rights as a participant and whom to contact in the event of a research-related injury.

I understand that I am free to withdraw from the study without penalty if I so wish and I consent to the processing of my personal information for the purposes of this study only and that it will not be used for any other purpose. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

Signed: Date:

Investigator's Statement

I Amirrudin Kamsin
confirm that I have carefully explained the purpose of the study to the participant and outlined any reasonably foreseeable risks or benefits (where applicable).

Signed: Date:

# Appendix D: Questions for the interview study (phase II)

A. Prioritisation in Time Management: Concepts, Strategies, Techniques and Tools Used (Focus on Concepts/Techniques/Strategies and Tools Used)

**A1: Practices:** Interview and identify the respective context of participants and their concepts, strategies or techniques of prioritisation in their time management practices

1. What are your job responsibilities?
2. When are your busiest times or periods?
3. Do you feel in control during that time?
4. Are you able to manage your time effectively and efficiently during that time?
5. Do you prioritise your time?
6. How do you prioritise your time?
7. What makes you prioritise your time?
8. When do you normally prioritise your time? Any situations for examples?
9. Where do you do your prioritisation?
10. How regularly do you prioritise your time?
11. What are the tasks or things that you normally prioritise?
12. Do you have problems prioritising your time?
13. Do you have any guidelines or techniques or principles you use to prioritise?
14. How do you determine your priority?
15. Do you determine priority based on urgency and importance? Do you have any other aspects/factors to determine priority?
16. How do you manage your priority?
17. Do you externalise your priority using any tools?
18. Do you decide to do your work solely based on its priority? Any other factors which determine your decision to do your work?

**A2: Tools:** Observe and Probe the tools used by participants

1. Do you use any time management tools or techniques to help you to prioritise?
2. Can you show and explain to me how you use your tools?
3. Do you have any problems with the tools?
4. Is your current tool reliable and useful for you to manage or prioritise your time or plan?
5. Does it work and is it useful to you?
6. What are the weaknesses of the tools?
7. Would you like to have a time management tool that can help you to manage your prioritisation? If so, how do you want it to be?
8. What are the functions that the tool should support?
9. What makes the time management tool useful to you?
10. How can the tool become useful for you to prioritise?

B. Prioritisation in Time Management: Issues and Problems or Other Relevant Issues

1. What is your main time management problem?
2. Can you rely on your current tools, strategies or techniques to prioritise your time?
3. Do you think that prioritisation tools can help you manage your time better?
4. Do you think that prioritisation tools can help you to be in control and manage your time effectively and efficiently?

C. A Reflection on Personal Critical Incident in Time Management Pertaining to Prioritisation

1. Do you have any problems or issues of prioritisation in your time management?
2. When do you normally face this problem or issue?
3. Do you rely on any tools to manage your prioritisation/

4. Can you show and explain to me your current time management tools?
5. Can this current tool help you to manage and prioritise your time?
6. Do you have any critical situation or incident where you feel it is difficult to manage and prioritise your time? Can you explain and describe it?
7. What is the most difficult situation for you to manage and prioritise your time or work?
8. What makes that situation happen?
9. What is the problem behind the problem?
10. Do your current tools help you to manage your time management or prioritisation problem?
11. What sorts of support do you need in order for you to be able to manage your time effectively, efficiently and feel in control?

D. Additional Questions throughout the Interviews

P: probing questions

1. Think about your experiences in managing your time. Tell me about good experiences in your time management strategies. Tell me about the challenges you face in managing your time.
2. Now think about your experiences with your time management strategies.
3. What challenges have you had in sticking to your strategies?
4. P: How have both your work and personal commitments influenced you in sticking to your strategies?
5. When do you feel extremely busy? Why? Can you recall any recent situation when you felt extremely busy? Can you tell me more about it?
6. In your time management practice, do you prioritise? Why
7. On what occasions do you feel it is difficult to manage or prioritise your time? Why?
8. Can you give an example of events and experiences?
9. P: What are the things that you prioritise? (Work, personal) How do you deal with this? How do you decide to do things? When do you decide not to do things? Why?
10. P: How often do you prioritise? When?
11. P: Where do you prioritise?
12. P: How has prioritisation affected your time management? Can prioritisation help you to manage your time better? Does it work for you? If not, why?
13. P: How does prioritisation influence your time management?
14. Can you recall recent events where you decided not to do your work? Why?
15. When do you decide to do it? Why?
16. What makes you decide what to do next? Why? Can you give an example?
17. What makes you decide what not to do next? Why? Can you give an example?
18. How is daily life affecting your time management?
19. Please provide examples of knowledge or experiences that you have learned from your current or previous time management practice?
20. What sorts of support are you're looking for to help you better manage your time?
21. In the long term, what do you expect to achieve in your time management practice?
22. What kinds of things in your time management practice matter to you?

# Appendix E: Questions for the interview study (phase III)

Thank you for agreeing to be interviewed today. I'm Amirrudin Kamsin, a research student from UCL Interaction Centre (UCLIC). I'm conducting a study on personal task management adopted by academics. In brief, I aim to understand the nature of their work or tasks and how they manage them, particularly on their busy days. I'm going to ask you some questions about your experience of managing your tasks and then about how you feel about it.

Please be informed that you can withdraw from the study at any time without any obligation. The information that you share with me today is completely confidential. You will be assigned a pseudonym and your responses will not have any identifying information. The information I gather here today will be used to develop a personal task management framework which explains how academics manage their tasks.

To capture accurate and complete responses, I would like to record this interview. The recording will be transcribed and all names and places will be removed so as to protect your identity, and it will be destroyed after transcription. I'd also like to ask for your permission to take some photos of your work environment and any related tools that you use to manage your tasks. Do I have permission to do so? Thank you.

Part I: Understanding some background information about the participant.

1) Please tell me about your roles and job responsibilities in UCL. P: How do you feel about your job?
2) In relation to your job, what sorts of tasks do you have to do? What are the differences between your tasks?
3) In order to manage your tasks, how do you organise them? P: What makes you organise your tasks? P: How important is this to you?
4) Do you always plan your tasks? P: What do you mean by planning? P: What makes you plan your tasks? P: How do you plan your tasks?
5) Do you schedule your tasks? P: What do you mean by schedule? P: What kinds of things do you schedule? P: What makes you schedule them? P: How do you schedule them?
6) Do you make task lists? P: What do you mean by list making? P: What makes you create your task lists? P: How important are they to you? P: What kinds of task lists do you have? In order to manage your tasks, how do you use your task lists? P: To what extent does your task lists help you to manage your tasks? P: How do you feel about your task lists?

Part II: Understanding different kinds of busy situations faced by the participant.

7) Now I'd like to ask about how you have managed your tasks in the past week.
    a. Think about experiences that you had for example yesterday or in the past one week. Please tell me about your good experiences in managing your daily tasks.
    b. What are the challenges that you have faced in order to manage your tasks? P: How have these challenges affected you in managing your tasks and sticking to your plans?
    c. How do you feel about yesterday's achievement? P: Have you managed to do or complete your daily tasks? P: What made you not do or complete your tasks? P: How have these experiences affected your emotions?

d. Next, let's think about a particular day when you found yourself very busy. What does it mean to be busy in your work? P: What else makes you very busy?

8) Let's go back to the examples of busy situations that you have experienced. How do you usually feel when you are busy? P: What is the feeling that has influenced you the most?

9) How have your feelings affected the way you manage your tasks?

P: What do you often tend to do when faced with these feelings?

10) Now I'd like to ask about the nature of your tasks and how you manage them.
    a. Given that you have to do different types of tasks, how do you feel about them? P: How have these different types of tasks affected your feelings?
    b. How have your feelings influenced which tasks you decide to do? P: What makes you choose to do a certain task over the other tasks?
    c. What motivates you to do a particular task?
    d. What puts you off doing or completing a certain task?
    e. How often do you change your tasks? P: What makes you switch from one task to another task or something else? P: How do you feel after doing that? P: How has it affected the way you manage your tasks?

Part III: Understanding different personal task management techniques or tools adopted by the participant and how these relate to their emotions.

11) Now I'd like to understand any different approaches that you take in order to manage your tasks, particularly during your busy times.
    a. Please tell me, how do you feel about your personal task management right now?

P: How do you feel about the way you are managing your tasks right now?

    b. Have you had any intention to change or improve your approach in managing your tasks? P: Can you explain?
    c. Have you stopped using a certain approach to manage your tasks?
    d. How have your approaches supported you in managing your tasks during busy times?
    e. What have you learnt from your current approaches to managing your tasks?

12) Ok, now I'd like to ask you about the tools or mechanisms that you use in order to do or remind you about tasks to be done.
    a. Please tell and show me what tools you use to manage your tasks.

P: What else reminds you about your tasks?

    b. How often do you create and refer to your tools? P: How important are these tools to you? P: What makes you use the tools? P: Whatputs you off using the tools?
    c. How have your tools influenced you in managing your tasks?

P: how do you feel about these tools? P: To what extent do the tools support you in managing your tasks in busy situations?

    d. Now, let's have a look at your tools, how have they influenced you in deciding what tasks to do?
    e. What are your feelings about using the tools?
    f. How have these feelings affected the way you manage your tasks?
    g. How have these feelings influenced what tasks you decide to do?
    h. What do you think about your current tools? P: To what extent do the tools support you in managing your tasks in busy situations?

i. Have you tried to change to other tools?

Part IV: Wrap-up questions.

13) What personal task management support would you like to have in the future? P: Let's reflect upon the busy situations that you have highlighted at the beginning of this interview. P: What might be helpful for you to manage your tasks better?

14) On the whole, what are your goals for managing your personal tasks? P: Can you give me an example of a goal that you want to achieve? P: How important is this goal to you?

15) What do you expect to get rid of by managing your tasks? P: What are your main concerns about the way you manage your tasks?

16) Is there anything else you want to mention which I haven't asked about?

Thank you very much for your participation.

# Appendix F: Instruction for member-checking

Academic participant feedback information sheet used for member-checking.

Research on 'Academics' Personal Task Management' at University College London
Participant Feedback

Please read this brief summary of our findings on personal task management behaviour among academics. You may also like to refer to example quotations (i.e. evidence which is denoted by [Q]) from user interviews provided in Appendix 1 to further assess the findings.

Based on interviews with 26 academics, we propose a framework of personal task management to describe how they manage their tasks.

[A] We found that they perform three main activities:

1. **Planning** – refers to an activity of identifying goals or tasks (or sub-tasks) and the details of them [Q1]. It also involves scheduling a time for achieving or undertaking those goals or tasks [Q2].
2. **Prioritisation** – refers to an activity of reviewing and rearranging tasks that they are going to do within a certain timeframe [Q3].
3. **List-making** – refers to an activity of creating [Q4] and manipulating task lists (to assist people in planning and prioritising their tasks) [Q5].

[B] We identified contextual factors that influence their decisions about what task to do when. These factors can be divided into two categories:

1. **External factors** refer to independent factors surrounding individuals.
2. **Internal factors** refer to psychological factors.

Both factors can be further classified into other sub-factors as follows:

| External | Internal |
|---|---|
| Task (Urgency [Q6, Q7], Complexity [Q8], Size[Q9] Duration[Q10])<br><br>Environment [Q11]<br>Tools [Q12]<br>Social [Q13]<br>Time (Allocation [Q14], Gap [Q15]) | Emotion (Positive - e.g. Happiness [Q16], Pride [Q17]; Negative – e.g. Stress [Q18], Panic [Q19], Frustration [Q20])<br><br>Motivation [Q21]<br><br>Mental/physical strength [Q22]<br><br>Interest [Q23]<br><br>Effective use of time [Q24] |

[C] Busy academics take into consideration these various factors before deciding what tasks they should or could do now or later, which go beyond the notions of urgency (e.g. deadlines) or importance (or priorities) of their tasks.

[D] However, existing tools lack mechanisms for representing different aspects of users' tasks, for instance, size, complexity and dependency, and other contextual constraints such as time and psychological factors or unexpected situations that change over time. Instead, their recommendations tend to be solely based on assigned urgency or importance. Also, there are

no adequate control mechanisms or links between email/to-do lists and calendar applications. Thus, they fail to provide more reasonable and dynamic suggestions of tasks that busy people should or could do at a certain time.

[E] We therefore propose that future tools must be more aware of the factors involved. For instance, future tools should take into account the available time gap and the complexity of tasks, and recommend possible tasks and times to do them, rather than allow people to feel overwhelmed by a list of tasks.

Do you agree/disagree with findings and proposals [A]-[E]? We would be keen to know why…

Thank you very much for your time and contributions!

Amirrudin Kamsin (PhD research student)
a.kamsin@ucl.ac.uk

Prof Ann Blandford (Primary advisor)
Dr Anna L. Cox (Secondary advisor)

UCL Interaction Centre (UCLIC)
MPEB 8th floor
University College London
Gower Street
WC1E 6BT
London

Appendix 1 - Evidence

| No | Categories | Sub-categories | | | Example quotations from interview transcripts |
|---|---|---|---|---|---|
| Q1 | Planning | Identifying goals/tasks | | | P26: um you realise that there're series of steps that would need to be taken that build incrementally on each other in order to achieve that goal |
| Q2 | | Scheduling a time | | | P22: one the challenging thing is planning very far in advance. Um and try to give people a definite answer for when you gonna do something. |
| Q3 | Prioritisation | | | | P26: Prioritising by that I mean deciding which needs to be done immediately or today or tomorrow or within the next week. So for me I guess prioritisation is um it's something that I would review in a daily basis um because I would know a timeline of when certain thing had to be done by. And the process of prioritization is really one of continuously reordering the tasks that I'm going to do next if you like um in the light of when each needs to be completed. |
| Q4 | List-making | Creating task lists | | | P23: For me, writing something on the paper or a white board what I want to do in a specific time, it's very important. |
| Q5 | | Manipulating task lists | | | P4: Mostly what I do with this, is if I go through all these lists and consolidate them so cross off thing that I have done, copy the things [still need to be] done onto this list and then throw that away. |
| Q6 | External factors | Task | Urgency | Importance | P9: I can choose not to attend the committee meeting if I have something more important. |
| Q7 | | | | Deadline | P3: I might stay really really late depending on whether there's a deadline approaching. |
| Q8 | | | Complexity | | P1: the other mode of thinking is when you sitting down thinking deeply about something [shutting] off all distractions and try to [...] you know think deeply about something that requires a lot of thought |
| Q9 | | | Size | | P8: Whereas if I've got a day at home, I will do the next big job that's sitting on my stack. |
| Q10 | | | Duration | | P1: So I have a list of long term projects long term thing like you know all the papers I've promise that I'll write and haven't done it yet. |
| Q11 | | Environment | | | P16: a lot of the time, I read on the train. If I'm... coming out of London, and |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | it's very useful time to read stuff. If I'm doing journey I go to you know conferences or working on other projects in different universities, either on the planes or sitting at airports or something like that, I find that it's a good time to read. |
| Q12 | | Tools | | | P8: OK, yeah, OK so I mean some of them are defined by meetings in the diary... and you know in a sense what there is to do is defined by the piece of paper. Some of them are defined by bits of papers so in my work bag which... I mean this is essentially my office you know I've got a proposal I need to review and I know when I need to review it by... [] But that's one bit of my to-do lists... actually. It's represented by those... And another one is represented by my email. I have a fairly complicated way of organising my emails so that I... keep track of... what I should be doing and when I should be doing it, and the third is my very beautiful little set of post... of post-it notes which I schedule... and what I do with these is... these are jobs which are probably at least... two hours long... usually mostly anyway. |
| Q13 | | Social | | | P24: considering the departmental interests, my colleagues and the future of this department [x] I think about that quite a lot. Um try to maintain all these constraints working together I make the decision about what I do next. |
| Q14 | | Time | Allocation | | P16: That's why I like this... big block of time at home because I don't... I wouldn't... AT ALL change task you know I would just work on that one thing. Yeah sometimes I mean why I like to work at home is because you can concentrate. |
| Q15 | | | Gap | | P7: Sometimes... you know, something really low priority […] and I know that at the moment, I've probably got a bit of spare time so I could do that and rather than just let that one slip [by me] and... because I feel that I've got time. |
| Q16 | Internal factors | Emotion | Positive | Happiness | P8: you know last weekend I worked on a couple of papers on Saturday, and actually I really enjoyed working on them, so it was more like hobby than work really. And I probably did those... earlier than was really necessary because it was stuff that I was looking forward to. |

| | | | | | |
|---|---|---|---|---|---|
| Q17 | | | | Pride | P16: I want to produce good work because I don't want people that I work with thinking “Oh well you know that's not very good is it” or you know stuff that... if you publish something in a journal you want it to be the best it can be because you want people, you know peers to read it and think “Oh well that's... y'know that's good”. So that's all emotional stuff really. |
| Q18 | | | Negative | Stress | P4: “as I said if it’s too much, it doesn’t work cause if I really read through, if were to take when we’re finished. If I sat down for ten minutes to read all these, I would just be so stressed that I wouldn’t do any of those... I’d play a computer game or go off you know for a coffee or something cause it’s just too stressful.” |
| Q19 | | | | Panic | P 17: if it gets beyond ten or twenty emails I start panicking, so again control freak but I... I read an email and then I either delete it, respond to it immediately, or it gets put in a file for action at a time when I've got time to deal with it... rather than keeping on opening an email. |
| Q20 | | | | Frustration | P18: But when it's busier during term time, I probably get more frustrated with myself that I can't sit down and do a particular task at that particular point when I decided I was going to do it. |
| Q21 | | Motivation | | | P11: And it depends on your motivation on that day itself. There’re times when you can complete more that you have allocated for the day and there are times when you can complete less than the tasks that you have allocated for the day. |
| Q22 | | Mental/ physical strength | | | P24: Other time you know if you feeling very well and really strong and your mentally functioning well, you can cram in more you know. You can work longer and harder. |
| Q23 | | Interest | | | P15: Mainly based on which one is gonna be easier to write, or which one I’m more interested in, […] because they don’t really have a hard deadline. |
| Q24 | | Effective use of time | | | P16: I’m a strange person in that I work better from about four o’clock in the afternoon to about nine or ten at night. |

# Appendix G: An overview of user feedback received through member-checking exercise

Legend

√: Agreement +: Suggestion ×: Disagreement/critic ? : Question

| **Type** | **ID** | **Job title** | **General/Overall comments** | **Specific comments** | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | **A** | **B** | **C** | **D** | **E** |
| Internal (I) | P3 | Post-doc researcher | √ | √ | √ | + | √ | × |
| | P4 | Research manager | √ | | | | | |
| | P7 | Post-doc researcher | √<br>+ | | | | | |
| | P17 | Lecturer | √ | | | | | |
| | P18 | Senior lecturer | √ | | | | | √ |
| | P24 | Professor | √ | | | | | |
| | P26 | Professor | √ | | | | | √ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| External (E) | P1 | Senior lecturer | | √<br>? | √<br>? | √ | √ | √ |
| | P2 | Associate professor | √ | | | | | |
| | P3 | Senior lecturer | | √ | √ | √ | √ | √ |
| | P4 | Senior lecturer | √<br>+ | | | | | |
| | P5 | Senior lecturer | | √ (A1 and A2)<br>× (A3) | √<br>? | √ | √ | √ (1st sentence)<br>× (2nd sentence) |
| | P6 | Assistant Professor | √ | √<br>? | ? | ? | ? | ? |
| | P7 | PhD student | | √ | √ | √ | + | + |

# Appendix H: Instruction and consent form for the video-diary study

**Information Sheet for Participants in Research Studies**

You will be given a copy of this information sheet.

| | |
|---|---|
| Title of Project: | Investigating personal task management behaviour using a video diary approach and semi-structured interviews. |
| This study has been approved by the UCL Research Ethics Committee [Project ID Number]: | Staff/0809/001. |
| Name, Address and Contact Details of Investigators: | UCL Interaction Centre (UCLIC), Malet Place Engineering Building (8th Floor), UCL, Gower Street, London WC1E 6BT. |

We would like to invite you to participate in this research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to read the following information carefully and discuss it with others if you wish. Please do not hesitate to ask us if there is anything that is not clear or should you require further information.

**Introduction:**

You have been invited to take part in a study that aims to gain a detailed understanding of academics' personal task management behaviour. We aim to feed the findings into the development and validation of a framework of academics' personal task management for describing their behaviours. The framework is aimed at informing designers about the underlying aspects of personal task management behaviour and how to design better tools support it.

**Procedure:**

The study is divided into 3 phases as follows:

**Phase I:** An initial appointment is set up to explain the implementation of the study to the participant in detail. The objectives of the study and instructions for it will be explained to the participant. The instruction sheet consists of three items: example situations, prompts and how to use a flip mino (Please see Appendix 1). This will be provided to the participant. Following this, a consent form will be given to the participant to be signed if

they agree to participate in the study. Next, a schedule of a one-week diary study and a follow-up interview will be set up.

**Phase II:** Participants will be required to record their diaries based on the prompts given over one week (i.e. 7 days) using a flip mino video camera. They might also be reminded to record their diaries once or twice throughout the period. Before submission of the camera footage, the participant is allowed to add, edit, view and delete their diaries, then the flip mino camera will be collected from the participant.

**Phase III:** During an hour's follow-up interview, the participant will be asked about their diaries. Significant events or aspects in their video-diaries will be selected and used as prompts for the interview session. The prompts will be used to encourage them to explain or further clarify aspects of their diaries that might be of interest for the research.

**Participation:**

It is up to you to decide whether or not to take part. If you do decide to take part but then decide you wish to withdraw from the study, you may do so at any time and without giving reason. If you agree to take part, you will be required to record your video diaries for a week long period. A week after, you will be interviewed to further discuss some of your diary entries that are significant. No data that would enable anyone else to identify you will be collected.

Findings will be reported to UCL Interaction Centre, University College London. No information will be circulated that would make it possible to identify any particular individual's views.

By signing the consent form, you are confirming that you understand what the study will involve, agree to participate and agree the interviews and video diary entries to be audio recorded and video camera captured respectively. Your signature also confirms that you are aware that:

1. The transcript of your interviews and video diary entries will be anonymised and information that could be used to identify you omitted.
2. Parts of the anonymised transcript may be included in academic publications and presentations.
3. All data from the study will be used and disseminated in accordance with the Data Protection Act 1998.

## Informed Consent Form for Participants in Research Studies

*(This form is to be completed independently by the participant after reading the Information Sheet and/or having listened to an explanation about the research.)*

Title of Project: Investigating academics' personal task management behaviour.

This study has been approved by the UCL Research Ethics Committee [Project ID Number]: Staff/0809/001.

Participant's Statement

I …….....

agree that I have

- read the information sheet and/or the project has been explained to me orally;
- had the opportunity to ask questions and discuss the study;
- received satisfactory answers to all my questions or have been advised of an individual to contact for answers to pertinent questions about the research and my rights as a participant and whom to contact in the event of a research-related injury.

I understand that I am free to withdraw from the study without penalty if I so wish and I consent to the processing of my personal information for the purposes of this study only and that it will not be used for any other purpose. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

Signed: Date:

Investigator's Statement

I Amirrudin Kamsin
confirm that I have carefully explained the purpose of the study to the participant and outlined any reasonably foreseeable risks or benefits (where applicable).

Signed: Date:

# Appendix I: Instruction for recording the video-diaries

1. Please go through the following situations that you might experience while managing your personal tasks:

- You attempt to look at the tasks that you have planned to do.
- You attempt to plan the tasks that you are going to do.
- You attempt to prioritise the tasks that you have to do at the present time.
- You put aside the task that you have been doing to allow you to do other tasks or something else.
- You decide not to do a particular task that you have planned to do.
- You have been asked by someone to do something.
- You realise that you need to do another task.
- You struggle to manage or do your tasks.
- You do not really know what tasks you should be doing.
- You feel any of these feelings while managing or doing your tasks: happy, excited, in control, motivated, overwhelmed, dreadful, stressed, unhappy, miserable, *bewildered*, resentful, fed up, bored, depressed, desperate, anxious, frustrated, panicky, annoyed, hated, distracted, demotivated, exhausted, weary or any other mood.
- You experience other situations that make it difficult for you to manage your tasks.
- You attempt to review the tasks that you have or have not managed to do or complete for today.
- You try to reflect on how you manage your tasks.

2. If you experience any of the above situations (or similar) throughout the period of the study, please tell me more about it based on the following prompts:

- What is going on there?
- How do you feel about it (if relevant)?
- What are you going to do about it?
- If necessary, please show related matters that could further describe the situation.

3. Please use the flip mino video camcorder provided to record the information.

4. To start recording, please press the red button in the middle of the device. The red light at the back of the device will be on when the recording is in progress. To stop recording, please press the red button again.

5. If the device's internal flash memory is running out of space, please inform the researcher so he can replace it immediately. The flash memory can hold up to 1 hour's video.

6. If the battery life is running low, please replace them with the two AA extra batteries provided.

7. It is advisable to immediately record the information at the moment when you experience the situation. Therefore, I would encourage you to bring the device with you at all times.

8. You will be contacted by the researcher from time to time to check whether or not you need further assistance or information about the study.

9. Thank you for your participation.

# Appendix J: System description – Gtdagenda

| Categories | Description | Properties | Description (for selected/important properties) |
|---|---|---|---|
| Category | General type of commitments | - | Can be divided into career/business or personal (example) |
| Goals | Refers to different types of commitments (i.e. big themes of commitments) | Name, timeline (month/year), category, priority | |
| Projects | Refers to different categories of goals | Name, goal, priority, where (active, someday/maybe, archive), | |
| Tasks | Refers to different steps of a particular project that people have to do | Type (task, memo, meeting, anniversary), Name, Project, Context (home, computer, phone call, etc. (other specified contexts), Priority, Next action (is considered as a first thing to do), Due, Repeat (daily, every weekday, weekly, monthly, yearly), Actions (done, set/unset next action, move to active, someday, or archive, priority, delete) | |
| Filters | Refers to criteria in filtering/searching/identifying tasks to view | (by category, goal, project, context, type, Next action?, Priority, Status (active, completed, all), inserted time, completed time, due, active/someday or maybe/archive, sort by(e.g. project, then next action and then due date, limit) | |
| Checklists | Refers to tasks that people go through during a certain period of time (e.g. daily, weekly, monthly) | | |
| Customize | View options | (by category, goal, project, context, type, Next action?, Priority, Status (active, completed, all), inserted time, completed time, due, active/someday or maybe/archive, sort by (e.g. project, then next action and then due date, limit) | |

# Appendix K: System description – Intelligent calendar

| Categories | Sub-categories | Description (selected/important | Properties |
|---|---|---|---|
| Event | Simple | *Simple Events* are standard calendar entries with a manually specified time and duration, and can optionally be recurring. This entity type captures events like: "I have a meeting from 12 to 1 on Monday". | What, When (Date, Time), Where, Important, Enjoyable, Concentration. |
| | Float | *Floating Events* are uninterruptible events of a known duration that can occur at any time in a specified window or set of windows. This construct captures intentions like: "I need to do laundry sometime on Monday and it takes 2 hours." | What, Duration, Windows, Where, Important, Enjoyable, Concentration. |
| | Multiple | *Tasks* are interruptible intentions with a known or unknown duration that may or may not have a deadline. These capture a wide variety of intentions, ranging from "I have a paper due on January 9th that will take 50 hours" to "I want to learn French." | What, When, Where, Important, Enjoyable, Concentration. |
| Task | | | What, Duration, Deadline, Where, Important, Enjoyable, Concentration. |
| Schedule | | System schedules users' intentions (events or tasks) based on a few properties: duration, deadline, importance, 'where' (i.e. location), task enjoyment and concentration) | |

# Appendix L: System description – MS Outlook GTD Add-in

| Categories | Description | Properties | Description (for selected/important properties) |
|---|---|---|---|
| Action/Project/Task (Subject) | Users can define projects, actions (i.e. categories of tasks) and tasks. | Project, Subproject, Actions-Getting things done (e.g. @Waiting for, @Admin, @Me, @Papers, @People, @Projects, @Proposals, @Teaching, @Work, @Read/Comment, etc.), Subject, Start date, End date, Status, Priority(High, Normal, Low), %Complete, Reminder), Notes. | Users can create different actions to refer to different categories of tasks that they have to do. They may imply the nature/type of their tasks (e.g. what the task is about, what they are supposed to do, who are the people involved or the context of where they are going to be done. The user will use these categories to organise their tasks so that they can easily recall about them in the future. |
| View options | Users can choose how they are going to view their current tasks | To-Do List (ordered by Deadline –e.g. what tasks are coming up today, tomorrow, this week, next week and next month and later).<br>Tasks (ordered by Project/Subproject or Action)-categories of tasks and their respective deadline, project, sub-project, and other details.<br>Someday Project Actions (i.e. list of possible tasks that users might want think of or do in the future). | |
| Sorting options | Users can sort their tasks by certain properties | Complete, icon, priority, attachment, status, due date, modified, date completed, in folder, categories (colours) and flag status. | |
| Assign | Users can assign a particular task to other people (who are using the same system-Outlook) | | |
| Details | Users can add details of their tasks | Date completed, Total work, Actual work, Mileage, Billing information and Company. | |
| Email Inbox - | User can convert an email into an | Action, Project, Subproject, Task Subject. | |

| | | | |
|---|---|---|---|
| Add to Action List | action/task | | |
| Email Inbox - Defer | Users can convert an email into a calendar item(e.g. appointment), reschedule and automatically send email to notify respective people/attendees invited | | |
| Calendar/ Appointment | Users can allocate a time to do their tasks. | Schedule/re-schedule task (i.e. convert a task into an appointment), block or create a time(e.g. to be at home, etc.) and denote it as either free, tentative, busy, or out of the office) | |
| OneNote | Users can create Notebooks (e.g. Work, Teaching, Supervision, Personal, etc.)/Notes, and link them to their respective email messages, calendar and tasks. Users can have the details of their email message/information (e.g. action points) and its attachments automatically copied to their Notebooks. | | |

# Appendix M: The detailed findings of the evaluation of the existing PTM tools using CASSM

In this document, I present the findings of the overall evaluation of existing task management tools. To summarise the findings, the document is divided into three parts. In part I, I present the comparison prioritisation concepts perceived by the users with the concepts implemented within the tools. As I have already described in Chapter 4, the proposed prioritisation ontology perceived by the users includes two underlying concepts, as follows:

1. Task concept.
2. Individual condition (factors) concept.

Each of these underlying concepts will be highlighted in this section by **Table 1** and **2** respectively.

In part II, I present a comparison between explicit prioritisation concepts (i.e. absolute priority) implemented by the existing personal task management tools and the users' concepts. In part III, I discuss some of the important misfits found in this evaluation study and highlight some issues that need to be considered when designing future generation tools. To supplement this document, I provide some references which were used to identify and evaluate prioritisation concepts implemented within the existing personal task management tools at the end of this document.

Part I: A comparison between prioritisation concepts perceived by users and the concepts represented by selected personal task management tools.

Task concept

Table 1: A comparison of task concept between user, interface and underlying system concepts the across selected personal task management tools

| | Entities/attributes | User | Interface: T1 | Interface: T2 | Interface: T3 | Interface: T4 | Interface: T5 | Interface: T6 | Interface: T7 |
|---|---|---|---|---|---|---|---|---|---|
| E | Task to do | present | present | present | present | present | present | present | present |
| E | Urgency | difficult | present | absent | absent | absent | difficult | absent | absent |
| E | Importance | difficult | present | absent | absent | present | difficult | absent | absent |
| E | Requirement | present | absent | difficult | absent | difficult | difficult | difficult | absent |
| A | Responsibility | present | absent | difficult | difficult | difficult | difficult | difficult | difficult |
| A | Necessity | difficult | absent | difficult | difficult | difficult | difficult | difficult | difficult |
| A | Option | difficult | absent | difficult | difficult | difficult | difficult | difficult | difficult |
| E | Benefit | difficult | absent | absent | difficult | present | absent | absent | difficult |
| E | Consequence | difficult | absent | absent | absent | difficult | absent | absent | absent |
| E | Dependency | present | absent | absent | absent | present | present | difficult | present |
| A | Personal | present | absent | absent | absent | present | difficult | difficult | present |
| A | Social | present | absent | absent | absent | present | present | difficult | present |
| E | Deadline | present | absent | present | present | present | present | present | present |
| E | Opportunity | difficult | absent | absent | absent | difficult | absent | absent | absent |
| E | Complexity | present | absent | absent | absent | difficult | absent | absent | absent |
| A | Difficult | present | absent | absent | absent | difficult | absent | absent | absent |
| A | Easy | present | absent | absent | absent | difficult | absent | absent | absent |
| E | Size | present | absent | absent | absent | difficult | absent | absent | absent |
| A | Big | present | absent | absent | absent | difficult | absent | absent | absent |
| A | Small | present | absent | absent | absent | difficult | absent | absent | absent |
| E | Accomplishment | present | absent | absent | absent | difficult | absent | absent | absent |
| A | Rigid | present | absent | absent | absent | difficult | absent | absent | absent |
| A | Flexible | present | absent | absent | absent | difficult | absent | absent | absent |
| E | Expected Duration | difficult | absent | present | absent | difficult | present | difficult | absent |
| | Long Term | difficult | absent | difficult | absent | difficult | difficult | difficult | absent |
| | Short Term | present | absent | difficult | absent | difficult | difficult | difficult | absent |

Tools Abbreviations:

T1 : What Do I Need To-Do
T2 : Toodledo
T3 : Gtdagenda
T4 : Achieve Planner
T5 : ToDoList v5.9
T6 : Microsoft Outlook 2003
T7 : Vitalist

Notes:
E : Entity
A : Attribute

Table 1 shows a comparison of task concepts which includes its pertinent concepts perceived by the users across all seven personal task management tools respectively. It seems that none of these tools was likely to match with users' concept of prioritisation appropriately. Among these tools, T1 seemed to be the least likely tool to match with the user concepts. T1 only presented two distinct concepts such as urgency and importance explicitly. The tool provided a 2x2 dimension matrix that represents both concepts separately but equally at the same level. In contrast, the urgency concept perceived by users, can be further classified into other underlying concepts such as importance, deadline and opportunity of doing the task. Furthermore, the importance concept can be further divided into other subconcepts. In spite of its simple task categorizations, the analyst believes that the tool seemed difficult for users to prioritise their tasks appropriately since the concepts presented by T1 mismatched with the users' concepts.

On the other hand, T4 was found to be the most likely tool that matched with the users' concepts. The tool presented most of the concepts perceived by users but it was somehow difficult to identify their relationship with the respective user concepts. The analyst suggests that T4 was difficult to use since it provided and required complex menus and input requirements respectively. Hence, each task was represented by several properties and dimensions. It was also difficult for the analyst to recognize and associate these different properties to the concepts perceived by users (i.e. prioritisation ontology). For instance, it was still not clear and easy for users to relate them to their respective concepts such as complexity, size and accomplishment of a certain task. Thus, the analyst suggests that the tool was difficult for users to prioritise their tasks based on these complex and mismatched requirements imposed by the tool.

On the whole, most of the tools clearly presented only certain concepts as suggested by the proposed prioritisation ontology. They included concepts such as task requirement, deadline, dependency or contact and expected duration and disregarded other user task to-do concepts. Among these presented concepts, the deadline concept was provided by most of the analysed tools. However, the rest of the concepts seemed difficult as they were not easily recognized and associated to the respective concepts perceived by users.

Nonetheless, there were few other concepts that were present by users but were absent from the tools. Some of these concepts were matter to users in order to support them in prioritising their tasks apart from the other influential concepts such as deadline and dependency. For example, most of the tools did not present concepts associated to task complexity, size, accomplishment and expected time to do them. These absent or difficult concepts might

suggest why the tools were not able to support users in prioritising their personal tasks adequately.

Individual condition concept

Table 2: A comparison of individual condition concept between user, interface and underlying system concepts across selected personal task management tools

| | Entities/attributes | User | Interface: T1 | Interface: T2 | Interface: T3 | Interface: T4 | Interface: T5 | Interface: T6 | Interface: T7 |
|---|---|---|---|---|---|---|---|---|---|
| E | Individual Conditions | difficult | absent | absent | absent | absent | absent | absent | absent |
| E | Working space | difficult | absent | absent | absent | absent | absent | absent | absent |
| E | Time Allocation | difficult | absent | present | difficult | present | absent | difficult | absent |
| A | Public | present | absent | difficult | difficult | absent | absent | difficult | difficult |
| A | Private | present | absent | difficult | difficult | absent | absent | difficult | difficult |
| E | Time Gap | difficult | absent | difficult | difficult | difficult | difficult | difficult | absent |
| A | Long Gap | difficult | absent | difficult | difficult | difficult | difficult | difficult | absent |
| A | Short Gap | difficult | absent | difficult | difficult | difficult | difficult | difficult | absent |
| E | Location | present | absent | present | present | difficult | difficult | absent | present |
| A | Office | present | absent | present | present | difficult | difficult | absent | difficult |
| A | Home | present | absent | present | present | difficult | difficult | absent | present |
| A | Mobile | present | absent | absent | present | difficult | difficult | absent | difficult |
| E | Psychological Factors | difficult | absent | absent | absent | absent | absent | absent | absent |
| E | Mental Preparedness | difficult | absent | absent | absent | absent | absent | absent | absent |
| E | Interest | difficult | absent | absent | absent | absent | absent | absent | absent |
| E | Motivation | difficult | absent | absent | absent | absent | absent | absent | absent |
| E | Emotion | difficult | absent | absent | absent | absent | absent | absent | absent |
| E | Effective Time | difficult | absent | absent | absent | absent | absent | absent | absent |
| A | Morning | present | absent | absent | absent | absent | absent | absent | absent |
| A | Afternoon | present | absent | absent | absent | absent | absent | absent | absent |
| A | Evening | present | absent | absent | absent | absent | absent | absent | absent |
| E | Current Commitment | present | absent | present | present | present | present | difficult | absent |
| A | Work | present | absent | present | present | present | present | difficult | difficult |
| A | Personal | present | absent | present | present | present | present | difficult | difficult |
| A | Social | present | absent | present | present | present | present | difficult | difficult |

So far I have compared the first part of the users' concepts of prioritisation (i.e. task concepts) across the selected personal task management tools. Next, I will further compare the second part of the users' concepts of prioritisation (ie. individual condition concepts) across the same personal task management tools.

As presented in Table 2, none of the tools explicitly presented any concepts to capture and present the 'individual conditions' concept explicitly. However, among these individual condition concepts, some of the individual condition concepts were present although the analyst believes that some of them were difficult to be understood by users. These difficult concepts included psychological factors such as mental preparedness, interest, motivation and emotion. None of the analysed tools seemed to provide features which could capture and present these pertinent users' concepts.

Nevertheless, among these tools, T3 was found to be the most likely tool that matched with the users' individual condition concepts. The tool presented individual concepts such as time allocation, time gap, location and current commitment. Of these four individual condition sub-concepts, the tool was only found difficult to use when determining time allocation as well as the time gap discussed earlier. If we look at the time allocation concept, it was present by users. None of the tools, including T3, were able to present clearly between time allocated for either public or private use.

Overall, there are two main user concepts of prioritisation which include task and individual condition concepts. Some of these concepts were clearly presented by the tools but some of the concepts were absent. There were also some concepts that were perceived to be represented by the tools but the analyst found it difficult to relate them to the respective users' concepts. Therefore, the analyst suggests that the tools were difficult to be used by users to prioritise their tasks. Additionally, some of the users' concepts were not apparent within the tools. This further suggests the misfits between the users and the tools themselves. As a result, the analyst believes that the users might find it difficult to prioritise their tasks according to their own understanding of prioritisation. This suggests that the tools still lacked understanding of prioritisation concepts perceived by the users.

Part II: A comparison between absolute priority concepts implemented within the existing personal task management tools and the users' concepts (i.e. System-User concepts that are similar but not identical.)

Absolute Priority Concepts

Among these seven personal task management tools, five explicitly implemented an absolute priority concept. In this document, the concept is defined as a process which allows a user to assign a specific value or label to represent the priority of a particular task. The tools which included this concept are as follows:

1. What to-do.
2. Toodledo.
3. Gtdagenda.
4. AchievePlanner.
5. Microsoft Outlook 2003.

Example 1: What to do

Table 3. A comparison of priority concept represented by the What to-do tool with the users' concepts

| A | entities/attributes | User | Interface | System |
|---|---|---|---|---|
| E | Task Categorisation | difficult | present | present |
| A | Urgent and Important | difficult | present | present |
| A | Not Urgent and Important | difficult | present | present |
| A | Urgent and Not Important | difficult | present | present |
| A | Not Urgent and Not Important | difficult | present | present |

Table 3 shows a prioritisation concept presented by the 'What to do' tool. Based on its representations, each task can be assigned in any of four different options of a 2 by 2 matrix that represents (urgent X not urgent) by (important X not important). However, based on the proposed prioritisation ontology, the analyst believes that it was difficult for users to determine which of these four options a particular task should belong to. The concepts of urgency and importance perceived by the users are more complex than the prioritisation options presented by the tool. Hence, it was relatively difficult for users to prioritise based on only partial user concepts of prioritisation. This suggests another possibility why the tool might restrict the users from using it.

Example 2: Toodledo

Table 4. A comparison of priority concept represented by the 'Toodledo' tool with user concepts

| A | entities/attributes | User | Interface | System s |
|---|---|---|---|---|
| E | Priority | absent | present | present |
| A | Numerical Value (-1,0 - 3) | absent | present | present |

Table 4 shows a priority concept implemented by 'Toodledo'. In order to determine the priority of each task, the tool allowed users to input fixed values (1-, 0, 1 , 2 or 3) which represent negative, low, medium, high and top respectively. However, it did not provide any recommendation or guidelines to determine these absolute priority values. Based on the proposed prioritisation ontology, this absolute priority concept was absent. The ontology suggests that conceptually, users do no prioritise their tasks by assigning any fixed priority values between -1 to 3 to their tasks. This mismatch suggests that Toodledo could not be easily used by users to prioritise their tasks appropriately. Moreover, the values also seemed static and did not make any sense for users to prioritise their tasks accordingly and were not dynamically changed to accommodate other prioritisation concepts perceived by the users as a whole. There were other interrelated users' concepts that were not presented by this tool explicitly.

Example 3: Gtdagenda

Table 5. A comparison of priority concept represented by the 'Gtdagenda' tool with user concepts

| A | entities/attributes | User | Interface | System |
|---|---|---|---|---|
| E | Priority | difficult | present | present |
| A | Project | absent | present | present |
| A | Task | absent | present | present |
| A | Value | absent | present | present |
| E | Goals | difficult | present | present |
| A | Set Category | difficult | present | present |
| A | Set Priority | absent | present | present |
| E | Schedule | difficult | present | present |
| E | Checklists | difficult | present | present |
| A | Daily/Weekly Routine//Items | difficult | present | present |
| A | Set Priority | absent | present | present |
| E | Group Task | absent | present | present |
| A | By Priority | absent | present | present |
| A | By Project | absent | present | present |
| A | By Context | absent | present | present |
| E | Next Action/First Task to do | difficult | present | present |
| E | Context | difficult | present | present |

Table 5 shows a priority concept provided by the Gtdagenda tool. The tool allowed the users to set a range of values (between 1- 5) for each project or task. A project or task that had a priority value between 1 or 2 was considered to have a higher priority compared to the tasks which were valued between 3 – 5. Also, the tool provided a function which allowed the users to create goals and set their respective category as well as their priority. To set the priority of their goals, users were allowed to insert any value to them. The tool also permitted users to create any checklists and set a priority to them as well.

The analyst perceives that most of the concepts presented by this tool were absent and difficult for the users. For example, the analyst believes that it was difficult for them to determine any fixed value of each project and task explicitly. From the proposed prioritisation ontology, the users were found not to literally specify any fixed value from 1 – 5 to represent the value of their projects or tasks. Also, the ontology suggests that the users do not explicitly assign any value to each of their goals nor their tasks checklists. This suggests another source of misfit between the system's and the users' concepts and hence might suggest why this tool fails to support prioritisation.

Although the tool provided next action/first task to do concepts, based on the proposed prioritisation ontology, these concepts were not apparent. This might suggest why the tool might be difficult for the users to prioritise their tasks. The analyst suggests that it was not clear the relationship between these two related system's concepts based on the concepts (i.e. the proposed prioritisation ontology) perceived by users. According to the users, prioritisation is a concept by which they determine what tasks to do and when to do them. In fact, they did not assign any specific value to those tasks nor differentiate significantly between prioritized tasks and the next tasks. As a result, the analyst also believes that the tool was difficult for the users to prioritise their tasks adequately.

Example 4: Achieve Planner

Table 6. A comparison of priority concept represented by the 'Achieve Planner' tool with user concept

| A | entities/attributes | User | Interface | Systems |
|---|---|---|---|---|
| E | Priority | difficult | present | present |
| A | Level ABCD | absent | present | present |
| A | Value | absent | present | present |
| A | Reorder row of prioritised projects/tasks | difficult | present | present |

Slightly similar to the importance concept presented in Table 3, Table 6 shows a range of importance levels provided by the tool. In general, the tool provided four different priority levels which can be labeled A, B, C or D to represent the highest to the lowest range of importance respectively. Additionally, the tool also included another attribute which was known as Value that can also be assigned to each label of task to represent its respective rank in the task lists. In order to rank the tasks, the users can assign any numerical value (i.e between 1 and 2499). The lowest number was considered to have the highest value and vice versa. Overall, the task lists could be automatically sorted according to the label and its respective rank value assigned to each task in the list.

In contrast, these system concepts were absolutely absent from the users' concepts. For instance, users do not prioritise their tasks based on four different level of importance as well as numerical rank value assigned to them. This suggests that there were significant misfits between these prioritisation concepts implemented by the tool with the users' concepts. These misfits might also suggest why this tool might be inappropriate for the users to prioritise their tasks.

Although the users could easily change the label as well as the rank value of each task, the analyst suggests that it was still difficult for the users to associate these changes to the overall user concepts of prioritisation. From the proposed ontology, there are many interrelated prioritisation concepts which were not apparent in this tool. In relation to this complex prioritisation ontology, it was also not clear how these labels or ranks could be associated with the overall prioritisation concepts suggested by the proposed ontology. For example, it was not clear for the users to identify what is the basis that could be used in order to divide their tasks into these four labels of importance (i.e. A,B,C or D) as suggested by the tool. Also, the analyst believes that it was not clear for them to determine what is the basis that they might use in order to assign absolute numerical rank value to their tasks.

The issues highlighted in the previous paragraph illustrate some of the possible troubles that users might face while trying to prioritise their tasks by manipulating and maintaining all those labels and their respective rank values. The analyst suggests that the users might find it difficult to change as well as to make sense of all those labels and their respective values among all of their other tasks in order to continuously prioritise their tasks in the future. Overall, the analyst suggests that these absolute prioritiy concepts were inadequate for busy users.

Example 5: Microsoft Outlook 2003
Table 7. A comparison of priority concept represented by Microsoft Outlook 2003 with user concept.

| A | entitities/attributes | User | Interface | System |
|---|---|---|---|---|
| E | Task Priority | difficult | present | present |
| A | Level | absent | present | present |
| E | Task Status | difficult | present | present |
| E | % task complete | difficult | present | present |
| E | View/Sort Task | difficult | present | present |
| E | Details of Task | difficult | present | present |
| E | Task Category | difficult | present | present |

Table 7 shows the last example of tools which explicitly provided an absolute priority concept. This tool provided a menu that enabled the users to assign a level of priority to each task. They could assign any of three different priority levels (i.e. High, Average or Low). This concept, however, was not apparent to the users (i.e. absent). The mismatch between the system and the users pointed to another source of misfit that might be redesigned. The analyst believes that the misfit might confine users to using this absolute priority concept which did not fit complex prioritisation concepts understood by them. Similar to the previous tools, based on the proposed prioritisation ontology, it was not clear how those priority levels could be linked to the overall prioritisation concepts that matter to the users.

Despite this significant misfit, the tools still provided some concepts that might help the users to prioritise their tasks. For example, the tool allowed them to sort and view their tasks either by simple list, detailed list, active task, next 7 days, overdue, category, assignment, by person responsible, completed, or timeline. However, the analyst believes that it was still not clear to the users what is the difference between the latter concepts and the previous absolute concept provided by the tool. Additionally, it was not clear how the users could rely on all these concepts in order to prioritise their tasks appropriately. Based on the proposed prioritisation ontology, the users prioritise their tasks based on complex and interrelated concepts, but most of the prioritisation system concepts were apparent from the user's concepts. In contrast, most of the prioritisation concepts perceived by the users were not implemented within the tool. The misfits between the users' and the system's concepts suggest why this tool might be difficult to be used by the users.

Part III: Discussion of the findings

The usability issues of the existing personal task management tools which particularly aimed to support prioritisation have suggested that they did not provide prioritisation concepts perceived by the users adequately. There are two possible reasons that contribute to these misfit issues.

Firstly, there were only limited user concepts presented by the tools as shown in Table 1 and 2. Some of these concepts were prevalent such as deadline, dependency, expected duration, location, etc. In order to prioritise, the users still depend on other important concepts such as size, complexity and accomplishment of tasks as well as their time gaps and requirements for doing it. However, these concepts were not explicitly represented by the tools. This shows that there are still mismatches between the user and system concepts. The identified gaps suggest why those tools failed to support the users to prioritise their tasks adequately.

Secondly, there was also another significant mismatch between the prioritisation concepts perceived by users and the existing tools. For example, most of the tools explicitly provided an absolute priority concept that enabled users to assign specific labels or values to their tasks, but surprisingly, this concept was not apparent from the users' understanding of prioritisation. The system concept was one of the examples of prioritisation concepts that was poorly defined and thus has to be redesigned. Based on the proposed prioritisation ontology, this system concept was not significant. This significant misfit suggests that most of the existing personal task management tools, in particular, the ones which explicitly implemented absolute priority concepts, need to be redefined and redesigned. The analyst believes that this is paramount to accommodate the prioritisation concept perceived by the users as a whole, fulfilling their underlying requirements and hence improving the usability of the tools.

On the whole, the evaluation study has also shown that there were only some of the user concepts that were presented by the tools whereas most of the users' concepts remained either difficult or absent. These might lead to partial representations of user concepts, suggesting why the users might not be able to rely on these tools to prioritise their tasks adequately. In relation to this, it is important to further investigate which of those users' concepts should be designed and how they should be designed. To investigate this, I aim to confirm these design requirements in future studies (i.e prototype design and evaluation). The findings from these future studies might further inform designers how the users' concepts should be designed for future personal task management tools.

In brief, the evaluation study has taken a step in uncovering the misfits between the users' concepts and system concepts, in particular, the prioritisation aspect. Of course, it is also possible to analyse other personal task management tools that might have presented most of the users' concepts, but due to time constraints, the evaluation was limited to seven tools. However, to the best of our knowledge, these were among the personal task management tools that explicitly aimed to support prioritisation. It is also important to emphasize that based on the methodological approach of this evaluation method, the findings from this evaluation study were entirely based on the analyst's interpretations which were guided by the users' concepts (i.e. the proposed prioritisation ontology which is grounded in empirical data) and the systems' concepts which were gathered based on the available system documentation or running systems. These fulfilled the evaluation requirements which are imposed by CASSM.

References for evaluating the tools (i.e. system concepts).

| ID | Tool | Analysis based on | URL |
|---|---|---|---|
| T1 | What Do I Need To-Do | Online Product Documentation | KeaneAndAble innovative iphone applications http://www.keaneandable.com/iphone/index.html Accessed on: 20 Nov 2009 |
| T2 | Toodledo | Online Product Documentation | Toodledo http://www.toodledo.com/info/details.php Accessed on: 23 Nov 2009 |
| T3 | Gtdagenda | Online Product Documentation and free registered online tool | Gtdagenda.com http://www.gtdagenda.com/index.php Accessed on: 20 Nov 2009 |
| T4 | Achieve Planner | Online Product User Manual@/ Documentation/ Video Tutorial (Prioritise Task) * and a running(Free 30-day trial) tool | Effexis Software – Organizer Software and Time Management Software http://www.effexis.com User Manual @: http://www.effexis2.com/achieve/APUserManual.pdf Prioritise Video Tutorial *: http://www.effexis.com/achieve/tour/GMDT-AP-Lesson2-T2-PrioritizeTasks.htm Accessed on: 9 Dec 2009 |
| T5 | ToDoList v5.9 | Online Documentation and a running tool | AbstractSpoon Software http://www.abstractspoon.com Accessed on: 9 Dec 2009 |
| T6 | Microsoft Outlook 2003 | A running tool on a Personal Laptop | Built-in Microsoft Office Software on Personal Dell Laptop |
| T7 | Vitalist v3.1.1.76 | Online Video(Product Demo)/ product documentation and free registered online tool | GTD Software Online for Getting Things Done - Vitalist.com http://www.vitalist.com Accessed on: 20 Nov 2009 |

# Appendix N: Personas

**Persona 2**

The persona was synthesised based on information provided by participants from the interview study (P17, P18, P19) and video diary study (P7).

<table>
<tr>
<td>Background<br><br>  <br><br>(icon by Shutterstock (2013))<br><br>Dr. Robert Donlan<br><br>Age: 41<br>Research: School inclusion of children who have special educational needs; professional learning and continuing professional development.<br>Teaching: PSYC1001 - Doctorate in Educational & Child Psychology<br>Service/responsibility/roles: Deputy to Head of Division of Psychology and Language Sciences, Advisor of 5 PhD students, examination committee, faculty advisor committee, course committee, editor of PSCE Journal, IPPC conference committee.<br>Technology: Dell desktop and laptop, iPad, iPhone. MS Outlook email, calendar and tasks manager<br>Lifestyle: Gardening and spending time with his wife and three kids</td>
<td>A lecturer in the Division of Psychology and Languages Sciences, UCL and has been working there since 2001. Before joining the university, he worked as a psychiatrist at St Thomas' Hospital in Central London for five years. He prefers not to do any work during weekends or late in the evening but rather spend it with his wife Amelia and their three beautiful kids – Ollie (7), Owen (5) and Alice (1). He loves keeping in touch with his family, friends and peers via Facebook, email and Twitter.<br><br>Tasks<br>Checking and replying to emails in the morning while taking a short break.<br>Converting emails into tasks and organising them into specific projects or folders.<br>Setting reminders for tasks (i.e. when they need to be done by).<br>Scheduling tasks (big and small).<br>Reviewing weekly task lists, current tasks and schedules.<br>Responding to unexpected tasks/problems.<br>Brainstorming/identifying related or sub-tasks and relationships between them.<br>Setting categories of tasks and where they can be done (e.g. office, home, away, specific place, etc.).<br>Delegating or deferring tasks.<br>Sorting tasks according to their respective categories (e.g. weekly, projects/types, deadlines, etc.)<br>Determining priorities and dependencies of tasks/times.<br>Checking through reminders received.<br>Rescheduling tasks.<br><br>Current problems<br>He has more than thirty tasks that he has to do at present, which are represented by different projects or types of work in his task lists. Many of them are (or are going to be) overdue soon. Due to limited time, it is very challenging for him to decide which tasks out of these long lists of tasks should be done first. Most of them are equally important to him or for other people. None of his tools can suggest the most reasonable tasks that he should do at a certain time. It also seems difficult for him to weigh the tasks' importance or priority. He</td>
</tr>
</table>

| | |
|---|---|
| | always needs to reassess the overall tasks and his conditions at present when determining which of these tasks can wait and which need to go first. Whenever he has any opportune times or gaps, he often struggles in choosing which tasks he should do out of these long lists.<br>It is a challenge for him to finish and tick through his task lists due to a lot of unexpected problems or requests which he receives over time, particularly through emails or sudden phone calls or face-to-face requests. He also has a feeling that the number of tasks on his lists keeps growing as opposed to only a small number of tasks that get done (removed from the stack). He tends to feel frustrated and stressed particularly when he is unable to commit to his planned tasks due to unexpected tasks or interruptions. He quite often feels that he tends to get caught up in doing day-to-day tasks which happen unexpectedly and which seem more urgent to him or to other people. Consequently, this causes him to neglect the tasks that he has planned on his to-do lists, trying to reschedule them to several other times. Sometimes, he feels it slightly difficult to begin his big or difficult tasks or tasks that have not got specific deadlines or are only for his own benefit (e.g. writing a journal paper on his own). He is also inclined to choose to do tasks that are easy and more exciting, leaving the boring ones until the last minute. Sometimes, he just feels that he is constantly unable to escape from reducing his task lists to a minimum.<br><br>**Desires**<br>Would like to be able to quickly and easily know the most appropriate tasks he should do during any given time gaps in relation to his current situation (e.g. existing tasks, time constraints, time gaps). (For example, what would be the best tasks to do when he has an hour gap between his scheduled meetings or about half a day's gap).<br>Would like to be able to know the reasonable tasks to do when he is away for a conference abroad or in the middle of his break from undertaking big tasks (e.g. marking exam scripts).<br>Would like to be able to easily reorder/rearrange tasks according to his current situations.<br>Would like to be able to easily see the different nature of tasks or deadlines that are coming up or have passed or possible time left to do/complete them.<br>Would like to be able to receive appropriate scheduling recommendations particularly when he has very limited time to undertake his tasks or wants to make some schedule changes. |

| | |
|---|---|
| | **Values**<br>Prefers to have and rely on a systematic and well-organized task manager, which can ensure that everything gets recorded and reminds him at a certain time.<br>Prefers to block (schedule) a big chunk of time to do big tasks (e.g. writing books and reading theses, etc.).<br>Prefers to schedule his tasks way in advance and make sure each of his tasks has time allocated.<br>Prefers to schedule meetings or rigid tasks all in one day so that he will have a big gap to focus on his own tasks (e.g. writing research grants or papers, books, marking, etc.) and do them at home.<br>Prefers to make use of short time gaps to do small tasks (e.g. replying to emails, contacting people, reprioritising tasks, etc.).<br>Prefers to use email as a communication tool (and keep it at the minimum number) rather than as a task management tool.<br>Loves to keep his desk and room neat and tidy. Everything gets filed in folders.<br><br>**Motivations**<br>He would be excited to use tools that can support him in ensuring that all his tasks get organised, scheduled and reminded way in advance so that he can always concentrate on a small number of tasks at one time rather than being overwhelmed by all tasks at the same time.<br>He would be thrilled if the system is always aware of his current context or situations (e.g. existing tasks, deadlines and time constraints/opportunities and location) and can quickly suggest only the most reasonable tasks he should do at a certain time and changes that he should or could make in relation to these situations. |

**Persona 3**

The persona was synthesised based on information provided by participants from the interview study (P1, P3, P6, P7, P25) and video diary study (V4).

<table>
<tr>
<td>Background<br>  <br>(icon by Shutterstock (2013))<br><br>Dr. Amy Alan<br><br>Age: 31<br>Research:<br>Teaching: INSTG008 Digital Resources in the Humanities; INSTG017 Internet Technologies<br>Service: Advisor of 2 PhD students, graduate committee, teaching committee<br>Technology: Dell desktop, Google mail and calendar, Nokia communicator<br>Lifestyle: Horseriding during weekends, running a small company – providing training programmes in IT for disabled students (joint venture with Linda, her best friend).</td>
<td>Post-doctoral researcher at the Centre for Information Sciences at Middlesex University. She joined the university in 2009. She obtained her PhD in 2007 from The University of Melbourne, Australia and continued working there as a postdoc for about two and a half years before coming to the UK. She is originally from Auckland, New Zealand and most of her family members are still there. She will spend some time every weekend keeping in touch with her parents and sisters back home via phone, web-cam or email. She has just got married and now lives with her husband, Mark, in Brighton. She usually comes to her office between 4-5 days a week. She prefers to work from home for the remainder of the week, particularly to do her own personal tasks. Most of her time while she is in her office is fully occupied with meetings with her colleagues, Dr. Nardi and Dr. Mellisa Kerley, Dr. Brahman Ali (researchers), Julia and Steven (PhD students), and other undergrad and postgrad students.<br><br>Tasks<br>Skimming through emails and identifying the most pressing ones.<br>Reviewing her current meetings and available time in her online calendar.<br>Recording more important, big or long term tasks (e.g. writing a book, research grant, etc.) that need to be done and their respective deadlines in a master copy of her to-do list (i.e. text file) in her machine.<br>Ticking through the written lists at the end of the day or the next morning and adding new tasks that have just come to mind.<br><br>Current problems<br>Difficult to estimate the amount of time required to do tasks (e.g. writing a paper).<br>Tends to be overcommitted as a result of agreeing and committing to more tasks without realising her existing tasks and time constraints for undertaking them. Tends to take much longer to do a particular task than previously expected due to unanticipated problems or further work/requests or interruptions.<br>Tends to leave unexciting tasks to the last minute (e.g. marking exam scripts).<br>Difficult to link between tasks and related information (e.g. other tasks, emails, file folders, events (e.g. meetings), time constraints, etc.). Feels overwhelmed by</td>
</tr>
</table>

| | |
|---|---|
| | the amount of tasks she still needs to do.<br>Difficult to schedule a certain type of task. For example, it is a challenge to schedule writing and reading task in preparing for a research grant proposal. There is no clear sequence or structure of how to begin the tasks. Also, the idea to write the proposal might spark unexpectedly and hence it is not easy to schedule it. The state of their mental and physical strength as well as her emotions might influence/change her mind as to when it is appropriate to make use of her best time to do it. It is hard to do this task in the middle of short time gaps between meetings, lectures, etc. (e.g. less than two hours).<br><br>**Desires**<br>Would like to be able to easily reassess her schedules, habits and reflect on her achievements, task progress, etc.<br>Would like to be able to create sub-tasks and rearrange the order in which they are going to be done.<br>Would like to be able to easily and quickly relate between the tasks, information (e.g. emails) and see the relationships between them.<br>Would like to be able to quickly know when tasks should be done by or appropriate times to do them (e.g. for example, preparing for a lecture or talk could or should be done some time later when it gets close to the event).<br><br>**Values**<br>Prefers to rely on her email inbox and mental list as tools for managing her tasks.<br>Hates writing task lists, which tend to grow over time.<br>Prefers to create simple task lists using Word to record only big or very important tasks that she needs to do (e.g. writing journals, books, grants, etc.)<br>Only uses Google calendars to record meetings with colleagues, students, etc.<br>Prefers to reflect on and appreciate her past achievements and receive feedback on her current way of managing her tasks or existing situations (tasks/schedules).<br>Prefers to stay back in her office or stay up late at night to finish doing tasks that need to be completed soon (e.g. when the deadline is imminent).<br>Prefers to work on tasks that suit her mood at that time.<br><br>**Motivations**<br>Would be thrilled if the tools were very lightweight and could support her in quickly deciding on a number of possible tasks that she can do rather than be bombarded with repetitive reminders or long list of tasks based on her current situation (e.g. current time gaps and nature of |

| | |
|---|---|
| | tasks that she has just completed).<br>Would be more calm and motivated to make use of her time if the tools dynamically rearrange and suggest, for example, between the 3-5 most reasonable tasks in relation to her current conditions, which she could choose from to do at a certain time rather than feeding her with a long list of her overall tasks/deadlines. |

**Persona 4**

The persona was synthesised based on information provided by participants from the interview study (P10, P11, P12, P21, P22) and video diary study (V5).

| | |
|---|---|
| **Background**<br>  <br>(*icon by Shutterstock (2013)*)<br><br>Michael Baker<br><br>Age: 25<br>**Research:** Game-based learning<br>Teaching: None<br>Service/responsibility/roles: Advisor of 1 MSc student<br>**Technology:** Dell desktop, Mac laptop, Samsung Galaxy<br>**Lifestyle:** Chilling out with friends during the weekend, travelling twice a year, weightlifting training at Fitness first 3-4 times a week, loves doing programming during his limited free time | Michael has just begun his final year of doctoral studies in Human Computer Interaction at University College London. He is working with Prof. David Brooke and Dr. Salman Shah. His research is being funded by the Engineering and Physical Sciences Research Council (EPSRC) which has allowed him not to take on any teaching duties. He is still taking courses in statistics and research methods, but spends most of his time working on his research. He lives off campus and shares a flat with three friends – Jack, Mathew and Frank (who are also graduate students at the same university) in Camden. They frequently organise social gatherings among them and their other close friends once a month such as football, tennis or hiking in Snowdonia and the Lake District. In his limited spare time, he loves watching movies at home.<br><br>**Tasks**<br>Updating a Gantt chart of his PhD project (milestones, main tasks, sub-tasks, etc.) once a month.<br>Writing down tasks that need to be done or ideas to think of on a day-to-day basis.<br>Ticking through task lists.<br>Scheduling fixed events (e.g. meetings, appointments with participants, etc.)<br>Recording important deadlines and virtual deadlines (prior to the actual deadlines).<br><br>**Current problems**<br>Easily distracted by Facebook or books or anything surrounding him.<br>Sometimes he lacks motivation and hasn't got a clear idea of possible tasks that he is going to do.<br>Procrastination.<br>Tends to undertake tasks that have something to do with other people and postpone/neglect tasks that contribute to personal goals (i.e. tasks that need not to be reported to anybody, for example, his supervisors).<br>Unable to undertake long term tasks continuously (e.g. reading related papers, writing journal papers, etc.).<br>Difficult to rrefuse requests from his colleagues, friends, etc. and tends to neglect personal important tasks.<br>Difficult to carry out a certain task that he has got stuck on or which is getting difficult. He tends to switch to something else, which seems a bit more fun and easy. |

| | |
|---|---|
| | **Desires**<br>Would like to be able to record his tasks by quickly writing or jotting them down.<br>Would like to be able to receive appropriate recommendations or alerts regarding his current tasks, schedule and habits.<br>Would like to be able to easily create important deadlines, reminders, sub-tasks and merge tasks.<br>Would like to be able to annotate and tick off tasks, ideas, etc.<br><br>**Values**<br>Prefers to use a paper diary only to schedule events (e.g. meetings, etc. which have a specific period of time) because it's quick, easy, cheap, portable and available.<br>He hates using electronic calendars/diaries or task list manager due to their inflexibility and a lot of steps that he needs to follow in order to use and manage them. He feels like he is doing extra work when using or maintaining these systems but feels very little benefit from his efforts.<br>He rather prefers to use a paper notebook and scraps of paper to sketch or write down tasks/ideas that he may want to pursue.<br>He likes to use a mental list to remember less important tasks or routines.<br>He would only change to electronic tools if they are very lightweight (requiring little effort) but provide significant benefits to him.<br><br>**Motivations**<br>Excited when discovering interesting findings or new things.<br>Sketching or creating mind maps of tasks, sub-tasks of related matters.<br>It would be helpful if the tools could monitor his habits. He would be more cautious if the tools could reassess way in advance how long he has been spending on a certain task or how many times it has been rescheduled and how much actual/reasonable time there is left for him to do his tasks. |

# Appendix O: Recognition

Certificate of award (Third Place)

Certificate of recognition

STUDENT RESEARCH COMPETITION

Association for Computing Machinery
Advancing Computing as a Science & Profession

SPONSORED BY Microsoft Research

# Certificate of Recognition

The Association for Computing Machinery (ACM) recognizes and congratulates:

*Amirrudin Kamsin*

On being selected as a Participant in the ACM Student Research Competition (SRC) held at:

*CHI '12*

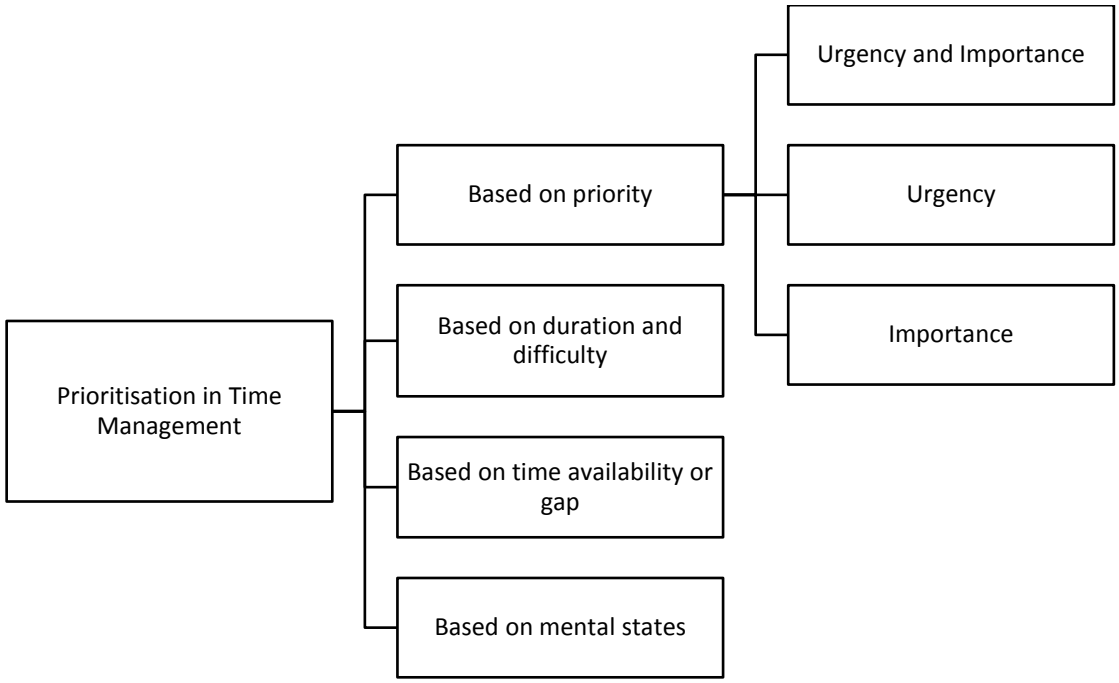
*May 2012*

John White
*ACM Chief Executive Officer*

Ann Sobel
*ACM Student Research Competition Chair*

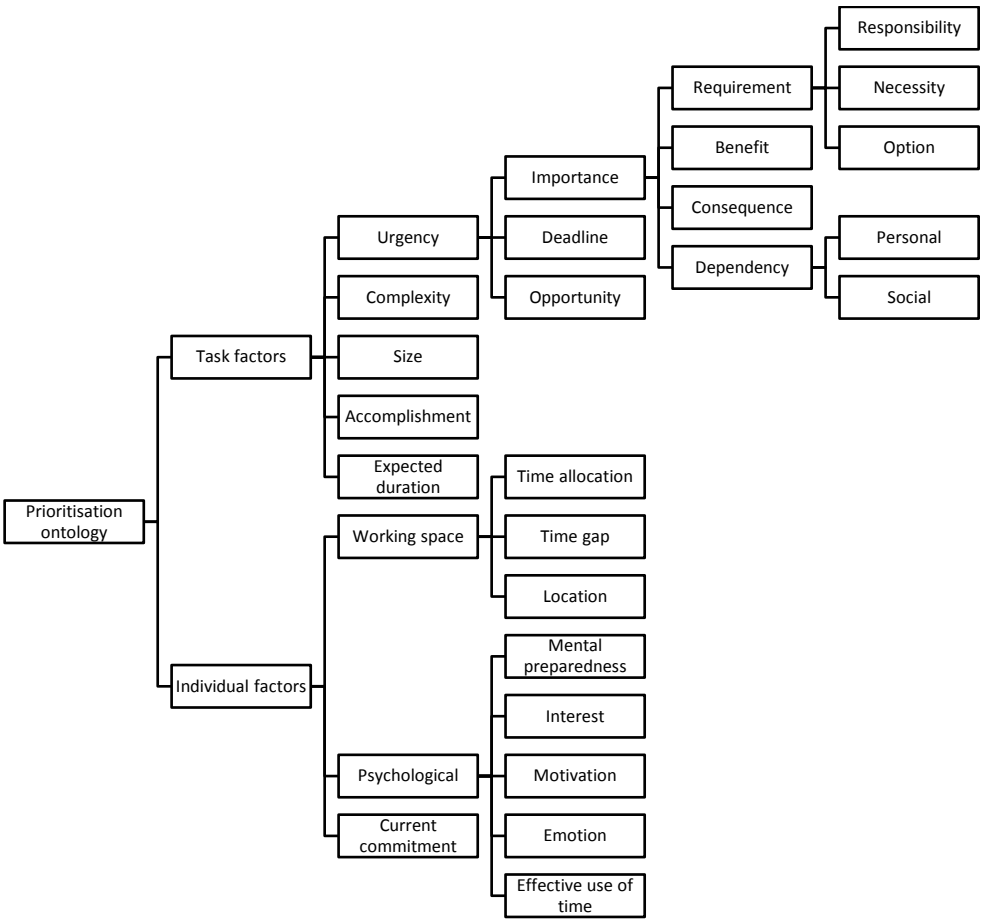
# Appendix P: Framework development based on the first phase of interview study

Decision Making and Prioritisation in Time Management



# Appendix Q: Framework redevelopment based on the second phase of interview study

Prioritisation Ontology



# Appendix R: Analysis table of PTM strategies across and within academic groups

| **Strategies** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S30** | | | | | | | | | | | | | | | | | | | | √ | | | √ | √ | | | |
| **S29** | | | | | | | | | | | | | | | | | | | | √ | √ | √ | | | | | |
| **S28** | | | | | | | | | | | | | | | | | | √ | | | | | | | √ | | |
| **S27** | | | | | | | | | | | | | | | √ | | √ | | | | √ | | | | √ | | |
| **S26** | | | | | | | | | | | | | | | √ | | | | √ | | | | | | | | |
| **S25** | | | | | | | | | | | | | | | | √ | | | | | | √ | | | | | |
| **S24** | | | | | | | | | | | | | | | | √ | | √ | √ | | √ | | √ | | √ | √ | |
| **S23** | | | | | | | | | | | | | | | √ | | | | | √ | | | | | √ | | |
| **S22** | | | | | | | | | | | | | | √ | | | | √ | | | √ | √ | | √ | | | |
| **S21** | | | | | | | | | | | | | | √ | | | | | | √ | | | | √ | | | |
| **S20** | | | | | | | | | | | | | | | √ | | | | | | √ | | | | | | |
| **S19** | | | | | | | | | | | | | | | √ | √ | | | | | | | | | | | |
| **S18** | | | | | | | | | | | | | | | √ | √ | | √ | | √ | | | | | | | |
| **S17** | | | | | | | | | | | | | | | √ | | | | | | | V | | | | | |
| **S16** | | | | | | | | | √ | | | | | | | | | | | √ | | √ | | √ | | | |
| **S15** | | | | | | | | | | | | | | √ | √ | | √ | | √ | √ | | | √ | √ | √ | √ | |
| **S14** | | | | | | | √ | √ | | | | | | | √ | √ | | √ | | | | | | √ | | | |
| **S13** | | | | | | | √ | √ | | | | √ | √ | | √ | | √ | | √ | | √ | | | | √ | | |
| **S12** | | | | | | | √ | √ | | | √ | √ | √ | | | √ | | √ | | √ | | | √ | √ | √ | | |
| **S11** | | | | | | | | | | √ | | | | | | | | | | | | √ | | | | | |
| **S10** | | | | | | | | | | √ | | v | √ | | | | | | √ | | √ | | √ | | √ | | |
| **S9** | | √ | √ | | | | √ | √ | | | | √ | | | | | | √ | | √ | | | √ | | | | |
| **S8** | | √ | | | | | √ | √ | | | √ | √ | | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| **S7** | | | | | √ | | | | | | | √ | | | √ | | | | | √ | | √ | √ | | | | √ |
| **S6** | √ | √ | √ | | | | | | √ | | | √ | | | | | √ | | | | | | √ | | | √ | √ |
| **S5** | √ | | √ | √ | | | √ | | | | √ | | √ | | | | √ | | | | | | | | | | |
| **S4** | | √ | | | | | | | | | √ | √ | | | | | | | | | | | | | | | |
| **S3** | √ | √ | | | √ | | √ | | √ | √ | | √ | | | | √ | | | | | √ | | √ | | √ | | |
| **S2** | | √ | √ | | | | √ | √ | | √ | | √ | | | | √ | √ | √ | | | √ | | √ | | | | |
| **S1** | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| **Groups** | **PhD students (6 participants)** | | | | | | **Post-doc (7 participants)** | | | | | | | | **Junior (5 participants)** | | | | | **Senior (9 participants)** | | | | | | | | |
| **Participants** | **P10** | **P11** | **P12** | **P21** | **P22** | **V6** | **P1** | **P3** | **P6** | **P7** | **P23** | **P25** | **V4** | **V5** | **P9** | **P17** | **P18** | **P19** | **V7** | **P8** | **P13** | **P14** | **P15** | **P16** | **P20** | **P24** | **P26** | **V1** |