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Gamification framework for a document management system

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Resumo

Esta tese consiste na definição de uma estratégia de ludificação para um software de gestão documental para empresas, principalmente orientado para a gestão e organização das tarefas associadas aos documentos, através dum sistema de workflows, que pode incluir para cada documento um conjunto de tarefas alocadas a diferentes utilizadores. Os principais desafios deste trabalho são definir uma estratégia que se adapte ao perfil da maioria dos utilizadores e que evite os atuais pontos negativos apontados aos sistemas ludificados.

O projeto desenvolvido dividiu-se assim numa investigação teórica sobre a forma como pode ser definida a experiência do utilizador, essencial para desenvolver a estratégia de ludificação. Tendo sido abordados ainda nesta revisão da literatura: os principais conceitos associados a jogos, as frameworks Werbach & Hunter e Octalysis, assim como as atuais controvérsias aos sistemas ludificados, e uma análise crítica de alguns projetos relacionados. Posteriormente, as conclusões obtidas foram aplicadas ao estudo da plataforma iPortalDoc, um gestor documental e de processos destinado ao tratamento e arquivo de documentos relativos aos procedimentos de uma empresa, bem como à organização e alocação de todas as tarefas a eles associadas.

A análise da plataforma iPortalDoc iniciou-se com a aplicação da framework Octalysis, a qual permitiu analisar a plataforma à luz das oito componentes principais da motivação presentes nos jogos definidas por Yu-Kai Chou [1]. Nesta análise foram definidas as semelhanças com cada uma das componentes do Octalysis, e detetadas possíveis formas de aumentar a presença de cada uma delas no iPortalDoc.

Para além disso, foram ainda realizadas um conjunto de entrevistas com vista a estudar os diversos utilizadores da plataforma, procurando estabelecer quais as funcionalidades mais utilizadas e os principais aspetos críticos desta utilização, bem como tentou determinar-se um padrão para o perfil de utilizadores.

Após esta análise ficou reunido o conjunto de elementos necessários à aplicação da framework de Werbach & Hunter [2], a qual foi concebida de modo a definir o conjunto de comportamentos que se pretendem desencadear com a introdução da ludificação, seguindo os objetivos de negócio da empresa e tendo em conta as diferentes características dos utilizadores. A escolha recaiu nos comportamentos que permitam uma melhor compreensão das funcionalidades da plataforma e a promoção da comunicação e colaboração entre equipas. Por fim, através desta framework, foi definido um modelo constituído pelo conjunto de elementos de jogos que permitam promover tais comportamentos.

Este modelo foi dividido em três diferentes níveis de ludificação, de modo a definir uma base de implementação para outras plataformas de âmbito semelhante. Cada um dos níveis foi também definido tendo em conta: as críticas que existem para outras soluções de ludificação, a inclusão de mecanismos que possam melhorar o quotidiano dos trabalhadores de uma empresa, e consequentemente o seu rendimento em termos profissionais. Um dos exemplos disso é a inclusão de um mecanismo de feedback construtivo para a análise de um eventual incumprimento de tarefas e dos seus prazos.

Abstract

This thesis consists in the definition of a gamification strategy for a document management software for companies, mainly oriented to the management and organization of the tasks associated with the documents, through a workflow system, which can include for each document a set of tasks allocated to different users. The main challenges of this definition are to find a strategy that fits the profile of the users majority and avoid the current negative aspects pointed to some gamified systems.

The developed project starts with a theoretical investigation where the main concepts are associated with games, the Werbach & Hunter and Octalysis frameworks for gamification design, as well as the controversies to gamified systems. A critical analysis of some related projects has also been discussed in this literature review. Subsequently, the conclusions obtained were applied to the study of the iPortalDoc platform, a document and process management system for the treatment and archiving of documents related to a company's procedures, as well as the documents organization and allocation of all its associated tasks.

The analysis of the iPortalDoc platform started with the application of Octalysis framework, which allowed to analyze the platform according to the eight main components of motivation in games, core drives defined by Yu-Kai Chou [1]. Through this analysis, the platform similarities with each of the Octalysis components were defined, and possible ways of increasing the presence of each of them in iPortalDoc were identified.

In addition, a set of interviews was also carried out to better define the various users of the platform, trying to establish which are the most used features and the main critical aspects of this use, and to determine a standard for platform users profile.

After this analysis, the set of elements necessary for the application of the Werbach & Hunter framework, which is defined following the business objectives of the company, and considering the different types of users, determines the set of behaviors that are intended to be triggered by the introduction of gamification [2]. The choice was based on the behaviors allow a better understanding of the platform functionalities, and the communication and collaboration promotion between teams. Finally, through this framework, it was defined a model composed by the set of elements of games which aim to promote such behaviors.

The defined model was divided in three different gamification levels, which allow to define an implementation base for other platforms of similar scope. This model was defined considering the criticisms that exist to other gamification solutions, due to it was thought in order to include tools that improve workers' productivity, for example through the inclusion of a feedback mechanism for workplace procedures, as well as promote employees productivity.

Acknowledgements

First, I would like to thank my parents who invested in me and my education to give me a solid basis for my future, in the most altruistic way, and which I will never be able to return. Also, I thank my brother, who is the oldest and most certain friend I have made, and whom I also thank for always forgetting our fights quickly.

I would also like to thank IPBRICK SA for the opportunity to develop this thesis, and for everything I learned within the company. Also, I would like to thank my company colleagues for all the patience they had to listen to all my theories, and who probably can no longer hear about gamification.

One of my main sources of motivation are words, which come mainly from books or from conversations with someone. In this project, I was fortunate to have the advisor António Coelho, who always found the best words to motivate me, either to convey the information I lacked on the subject, or to give me the motivation I needed to move the project forward. Thanks for all the help and empathy he has always had with me.

Thanks to all the friends this journey gave me, and for that I feel really lucky and privileged. I will not name them all so that I do not forget anyone, but a special thanks to Carolina Janeiro and Elsa Moura, who helped me a lot in the revision of this document.

At last but not least, I would like to thank Miguel Lucas, my boyfriend, since he has shown me the fascinating games world, which inspired me for this thesis. Also, I would like to thank him for always having the perfect smile and the perfect joke helping me to null my frustrations, and to improve my life in so many ways.

Ana Rita Mendes

"By being unknowable, by resulting from events which, at the sub-atomic level, cannot be fully predicted, the future remains malleable, and retains the possibility of change, the hope of coming to prevail; victory, to use an unfashionable word. In this, the future is a game; time is one of the rules."

Iain Banks

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Abreviaturas e Símbolos

B2B	*Business-to-business*
SaaS	*Software as a Service*
CRM	*Customer Relationship Management*
SEO	*Search Engine Optimization*
HCI	*Human Computer Interaction*
ROI	*Return of Investment*
GBL	*Game Based Learning*
DMS	*Document Management System*

Chapter 1

Introduction

> "Gamification is design that places the most emphasis on the human in the process. In essence, it is human-focused design" [1]

Document management is essential to the good performance of any company and a direct reflection of its internal organization. The existence of large amounts of information, produced internally or externally, leads to loss of documents, hinders access to information (including its physical location), and can prevent the control of information flows. This reason justifies the development of electronic document management systems, to organize the information, making it easily accessible. This process of controlling the documentation, may also be associated to the tasks control related to this documents, for example when a document needs to be approved by different employees within a company, this document workflow is now controlled in a document management system that includes the treatment of the document procedures too.

There are no (legal) businesses without documents, even the smallest company needs to have at least some documentation related to bureaucracies. Likewise, document management system (DMS) software have been widely developed and some of them are particularly focused in companies documentation processes. It follows that, since this processes are employee's tasks, they are included into workplace, and they are a aim of the human-computer interaction (HCI) study, which depend on the system and user characteristics.

Game design principles and design thinking have been studied to understand what is different in games, that makes them so exciting. As Deterding (2011) [4] defined, "gamification is the use of game design elements in non-game contexts", this means, gamification is the bridge between game design principles and game elements, and the design outside a game-context.

In this thesis, a gamification design strategy is modeled to a document management system. This report presents the theoretical background about documents and procedures management systems, the gamification concepts needed to understand the work developed, and a detailed description of the gamification design model created.

1.1 Motivation

A document and procedures management software is an important element throughout a company's operations and an improvement in its organization. In spite of this, due to the fact that this tool is based on a set of company procedures, it requires a level of software complexity that allows the adaptation to different processes and their specificities.

iPortalDoc was the platform studied in the development of this thesis. It is a document management and workflow system developed by the company IPBRICK SA. This product is intended for an heterogeneous group of companies, in a business to business (B2B) strategy. It is developed in order to satisfy the customers' needs and the procedures details within their companies, due to this complexity the user experience is not always a priority in the platform development.

Therefore, the motivation for this work is to define a gamification strategy for a document management system. This project aims to find design solutions to the platform, in order to facilitate users information access and the fulfillment of the tasks related, considering the users motivations.

1.2 Research problem

The problem consists in the definition of useful gamification strategies to a document management system, also related to the gamification in the workplace. The challenges of this work consist in the different kind of: users, companies that use the product for different purposes, and all the controversial about the effectiveness of the gamification and its risks.

According this, the following research questions were formulated:

- **Which target behaviors are expected for this platform?**

  The aim of a document management system is to organize the documents and the tasks associated to them. The challenges of this two parts are defining the desired behaviors about the user interaction with the documents and with the tasks associated to them. The answer to this question is the definition of the common behaviors to a document management system. These behaviors will allow to define the target behaviors to the gamification framework.

- **Which are the activity loops to promote this behaviors?**

  The gamification strategy also goes through the definition of the activity cycles that are intended to be included in the platform. The document insertion and the tasks related to them already follow a cycle, which could be compared to game cycles in order to have a structure to further define the game's elements and mechanisms needed to implement them.

- **What gamification elements are most effective to strengthen motivation and user engagement in the platform?**

  According all the differences in the users and companies, this question was formulated to create a design framework solution that promotes the target behaviors defined and that could be replicated in another software of this kind. The gamification could be a design technique

to promote a specific behavior, although some of the gamification techniques do not produce the expected results, and some of them could trigger undesired and/or negative effects.

1.3 Project aim and goals

The main objectives of this thesis are:

- Study and detect the major problems on document management system iPortalDoc;
- Elaborate a gamification design framework to solve some of the detected problems;
- Develop a prototype of the design solution implementation in the iPortalDoc platform.

1.4 Methodology

The methodology followed in this thesis consisted in a theoretical study about software requirements specification, gamification, document systems and workplace environments, followed by the development of a gamification design framework prototype applied to iPortalDoc, a specific document management system. In order to formulate the requirements elicitation, semi-structured interviews were made to users and developers of the platform [12].

Octalysis provides a powerful tool for the evaluation of a software, which was made in an initial stage of this project to determine the actual existing gamified elements in the software, in spite of gamification were never been intentionally included in the platform before, and it may be useful to determine which platform areas are most suitable to improve.

It was decided that the best procedure for this investigation was Werbach & Hunter's six-step gamification design framework, since it is a complete and practical methodology to apply to a real system with defined business objectives, followed by a new Octalysis assessment. Contrary to expectations during this thesis project it was verified that the introduction of the gamification elements in the platform were not a business priority, although the developed prototypes could be implemented in the future based on the expected results suggested by the research done on the topic.

1.5 Document structure

This dissertation is organized in 5 chapters. The first chapter corresponds to the introduction in which are presented the motivation of the work developed, as well as the research questions and a general overview of the project. Chapter 2 presents the literature review, which includes some software requirements specification methods, gamification practices and the main characteristics about document management systems. Furthermore, the limitations and criticism to the gamification process are described. Finally, related work is also presented, and a short description of the solutions developed in them is described. Chapter 3 details the gamification design of the

iPortalDoc process, which was defined based in the Werbach & Hunter framework that has a six steps sequence. First step framework defines the business objectives. Then, the target behaviors are described , which precedes the definition of the users profile and its activity loops and the fun elements included in the design. The chapter finishes with the choices made for this document management system. Chapter 4 consists in the application of the results from the developed framework, where are described the solution architecture, the implementation process, as well as the usability tests made, and a discussion on obtained results. The fifth chapter includes a new octalysis framework overview about the design model defined, the main conclusions of the project, and the major outcomes and suggestions for a future work.

Chapter 2

Literature review

This chapter presents the theoretical details of this thesis. First, some theoretical details about software requirements specification are introduced, then, the gamification theory, including on Octalysis and Werbach & Hunter gamification frameworks. Furthermore, the results from some research about document management systems are clarified. Finally, related work with examples of gamified projects is presented.

2.1 Software requirements specification methods

2.1.1 User research methods

In order to find a pattern for a platform users type, two types of methods to perform this search were defined [13]:

- **Qualitative**

  This method is done from small samples of the users set. This can be achieved by conducting interviews that may even be only semi-structured, so as to seek the information according to the user being interviewed, or usability tests. This allows to discover usage issues and obtain information to help details decisions about some features. Since it is not supported by a statistical representation, it is not considered a scientific validation subject. In spite of this, there are models allowing quick constructive feedback, specially at the level of usability tests, useful mainly in the testing of new applications.

- **Quantitative**

  At the level of quantitative research, this is done from the exhaustive analysis of a large sample of users. This research involves choosing criteria of interest at the level of statistical inferences, so that valid conclusions can be drawn. This survey type can be done in the form of surveys or by collecting data, such as browsing statistics on a website. This research methodologies can be used to support the results obtained in qualitative research.

2.1.2 User personas

In order to obtain information about how a user interacts with the platform, it is possible to try to define a platform user pattern. This definition of a default user is known as user persona. Garret (2002) [14] defines this persona as a fictional character representing the needs of the actual set of users,and most of its objectives [13].

An example of the characteristics to include in a persona are [15]: name, age and gender; occupation, key motivations and needs and more frustrations. More elements could be included in order to characterize the person.

These characteristics should be defined in such a way as to establish a restrictions set and satisfaction requirements for the user interaction with the platform. The goal is to adapt the functionalities according to the characteristics of these personas. Thus, a primary persona is defined for which certain specific characteristics are considered, these definitions are chosen in two respects: this persona would not be satisfied with any other design, but the other personas will not be at least dissatisfied with these choices. [13].

2.1.3 Use cases

Use cases is another way of detailing the user interaction with the platform, where a set of representations is used for the interaction of a real person with the system's functionalities. [3]

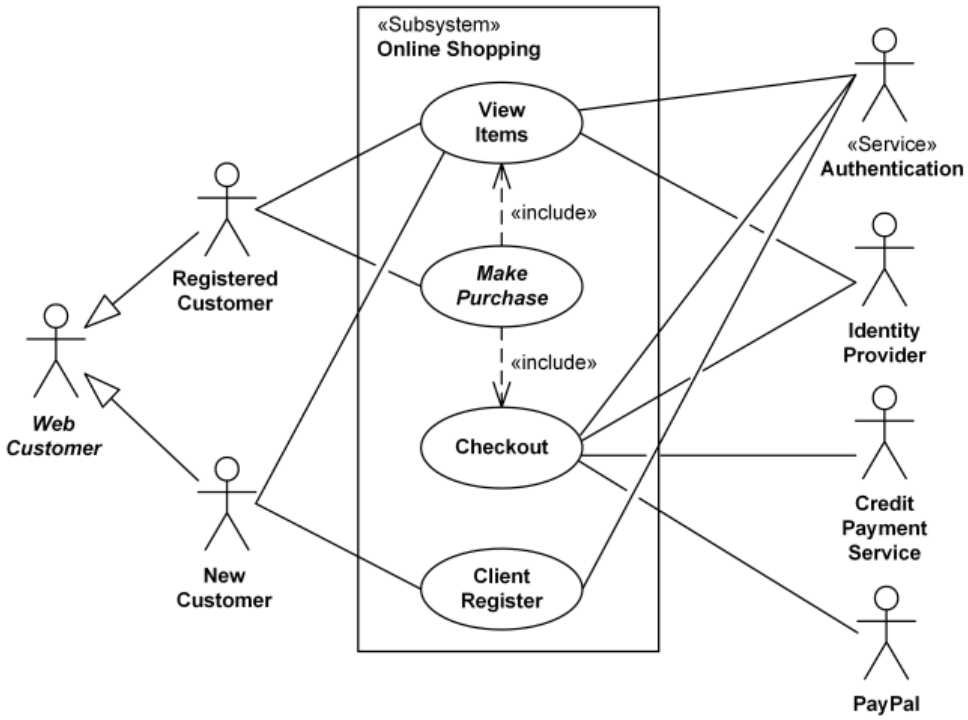

Figure 2.1: Use case example [3]

In this case the main elements are [3]:

- **Actor:** this element is drawn as stick figure, and represents a person, organization, or external system that plays a role in one or more interactions with the system.
- **Use case:** an use case is drawn as an horizontal ellipse, and describes the actions that had something measurable and valuable to an actor.
- **Associations:** this element is indicated by solid lines between actors and use cases, and exists whenever an actor has an interaction with a use case.

Other optional components are: system boundary boxes, a rectangle around the use cases that indicates the scope of the system, of which all that is within it is part; and packages that are represented by a folder icon and include use case diagrams and class diagrams, which are used when simplifying the system is needed.

In addition, there may still be inheritance between actors, which is represented in the example of the figure, where a registered customer is a web customer type, and there are also three types of relations between use cases, which are: extension, inclusion and inheritance, of which examples can also be found in the figure example 2.1.

2.2 Gamification

Gamification is a term often confused with turning any activity or system into a game, or adding new elements to make the platform automatically more fun. In fact, these are separated concepts as demonstrated by the model proposed by Deterding [4] in figure 2.2. As a first definition, gamification can be considered to be the "use of game design elements in a context that is not a game"[4]. This should be understood not as a game but as an adaptation of the platform to the user motivations. The first step should be focused on the analysis of what motivates players during a game experience. This can be replicated in a real context, including both regular players and non-players, since games and the analysis of their use allow to perceive human behavior patterns, which are not necessarily just player characteristics.

In this way, the interest in games and the way in which they can absorb the attention and the effort of the people began to be a study object, and Csikszentmihalyi (1990) [16] defined this form of interest in the game through the definition of gamer's flow, in figure 2.3. The flow channel corresponds to the period in which the player keeps playing, and one of the main interests of the games and their application in other contexts is to see how this flow works. As we can conclude from the figure, this flow depends on the challenges kind and the player skills. Challenges can not be too high as they will cause anxiety to the player, nor too easy to not cause boredom, and the goal is to keep a balance between the two, taking into account that the player skills will tend to increase depending on the time he plays, so the challenges will also need to increase. The flow channel was defined as a sine wave and not as a straight line to illustrate the correlation between skills and challenges. The reason for this lies in the fact that the player may increase his motivation in a particular level, if the difficulty of the level is lower and therefore allows him to improve his

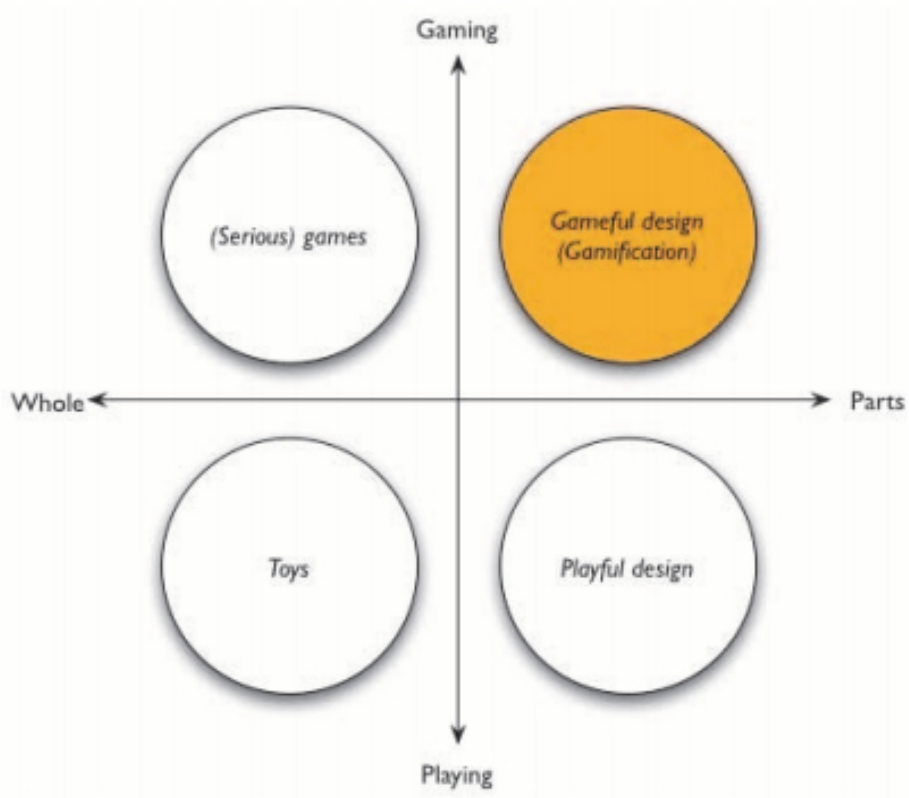

Figure 2.2: Separating the term gamification [4]

skills, until he is able to get to the next level, where the difficulty is increased and this process restarts.

2.2.1 Self-determination theory

Besides knowing the game characteristics, it is also important to understand the factors which influence the players behavior, concerning his internal motivations. One of the most important theories about this subject is the self-determination theory(SDT) [17].

This theory suggests that people are proactive and have the inner desire to grow, but the external environment in which they are inserted must support that desire. Therefore, SDT presents factors that facilitate or reduce intrinsic and / or extrinsic motivation.

Intrinsic motivation consists in performing an activity for inherent satisfaction of an individual. When a person is intrinsically motivated he acts in pursuit of his own amusement and challenges involved, rather than being motivated by outside pressures or rewards [17]. According to Pink (2009) [18], the intrinsic motivation is that which starts from the individual himself. That is, the person performs a certain action for the simple fact that it finds it rewarding, pleasant, fun and exciting. In addiction, Pink (2009) [18] also divides motivation into four main areas:

- **Autonomy**: the user being able to do what he wants

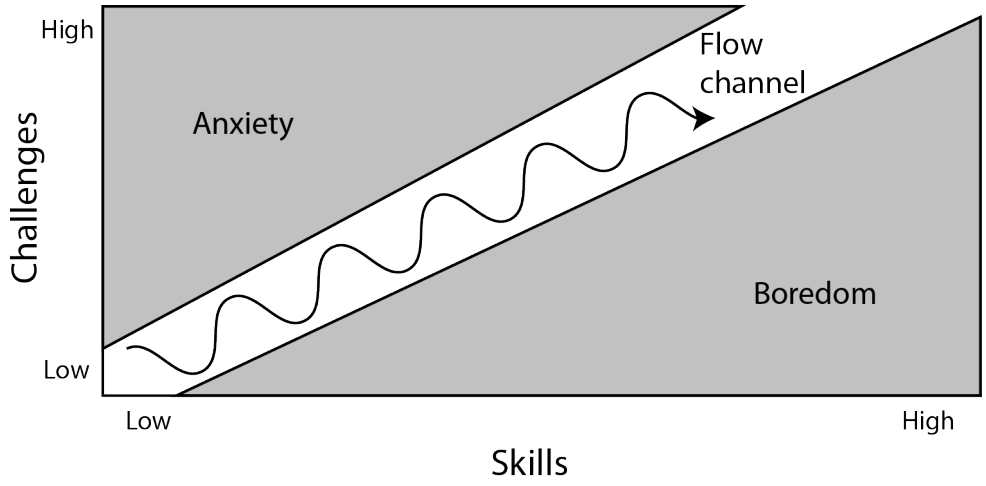

Figure 2.3: Flow theory based on Csikszentmihalyi [5]

- **Mastery**: the user learn from what he wants to do
- **Purpose**: the user knows the reason for performing the action
- **Relatedness**: the user feels connected with which he is doing

2.2.2 Game Elements

The games elements and characteristics are fundamental for the definition of the gamification strategy. These influence the players experience, and therefore will also influence the user interaction the gamified platform [4].

Werbach and Hunter (2012) [2] suggest the elements of the game follow a regular pattern in game design, from which they can be selected for the gamification strategy.

The game elements are divided in three main fields, as represented in Figure 2.4:

- **Dynamics**

  It is the most abstract level of gaming elements. These are the themes around which games are structured. Dynamics are closely related to the user experience as they support the "story" and the way the user/player interacts and creates expectations about the system. Dynamics are present in most games and can be exemplified through the following components[6]:

  - **Constraints**: they are present in the games to limit the freedom of the player, therefore creating interesting problems and meaningful choices. Such choices are responsible for the player's engagement in the game, and the decisions he makes should reflect the outcome of the game.

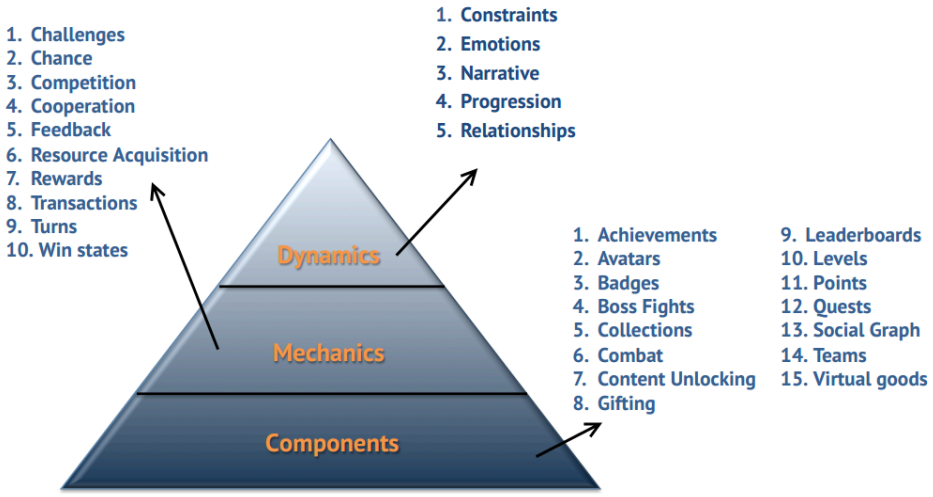

Figure 2.4: Game elements pyramid [6]

- **Emotions**: games can generate a variety of emotions, from happiness to sadness. Fun emotion is important for the gaming experience, as it enhances a positive feeling towards the game and encourages continuity in the participation.
- **Narrative**: is the structure through which the game maintains its coherence. It does not need to be explicit, such as a script. It may be implicit as a large collection of ideas.
- **Progression**: gives players the idea that they are moving forward and improving. Instead of performing repetitive tasks, they feel that their games makes a difference in the result.
- **Relationships**: refers to interactions with other players, those can be friends, teammates or opponents.

- **Mechanics**

  These are more specific elements of the games and deal with the actions that can be performed. They direct the players in the expected way. Mechanics, even without direct visual representation, make the transition between user experience and the detailing of human-computer interaction and serve as guides for game designers to include such elements in information systems. Several mechanics may be included in a dynamic. For example, feedback and rewards can give a sense of progression. The main mechanics are as follows[6]:

  - **Challenges**: defined goals for the player to achieve.
  - **Chance**: not everything is defined by skill. A random result may be associated with a player's action and create a sense of surprise and uncertainty.

  - **Cooperation and competition**: both deal with the feeling of winning and losing. The players can act together or against each other.
  - **Feedback**: allows players to check how they are advancing in the game. Supports the sense of progression and says whether the player is doing the right thing to win the game.
  - **Resource Acquisition**: the player can collect items to help him win the game. Sometimes the items can be collected in a specific order.
  - **Rewards**: this is a benefit offered to the player by reaching a milestone.
  - **Transactions**: indicates acquisition or sale of something. They may be performed between players or directly with the game.
  - **Turns**: each player has the correct time and opportunity to perform actions.
  - **Win states**: conditions which, once completed, indicate that there has been a winner in the game.

- **Components**

  Components are specific elements that can be viewed and used in the game interface. These elements are the most concrete object in the design of a game and it is usually what comes first to the mind. The components are clear elements of the human-computer interaction and are commonly dealt with visual parts in the elaboration of an interface. As examples we can cite medals merits and unlock content as part of a rewards system. The following are some components [6]:

  - **Quests**: given to players who performed a specific set task.
  - **Avatar**: visual representation of the player.
  - **Badges**: visual representation of an achievement within the game.
  - **Boss fights**: a really complex challenge, typically at the end of a level and necessary to go to the next level.
  - **Collections**: similar items grouped within the game.
  - **Combat**: fight and defeat of an opponent.
  - **Content unlocking**: possibility of only releasing access to certain areas of the game once the player has performed actions correctly.
  - **Gifting**: possibility of free exchange between players within the system.
  - **Leaderboard**: lists the players and their points in an orderly fashion.
  - **Levels**: representation of the player's ability within the game. Increases with the course of the game and the evolution of player engagement.
  - **Points**: means that the actions performed have a desired meaning and are in line with what the player is expected to do.

- **Challenges**: a structured set of expected actions.
- **Social Graphs**: ability to see what your friends and colleagues are doing within the game and interact with them.
- **Teams**: possibility to work with others in search of an ideal.

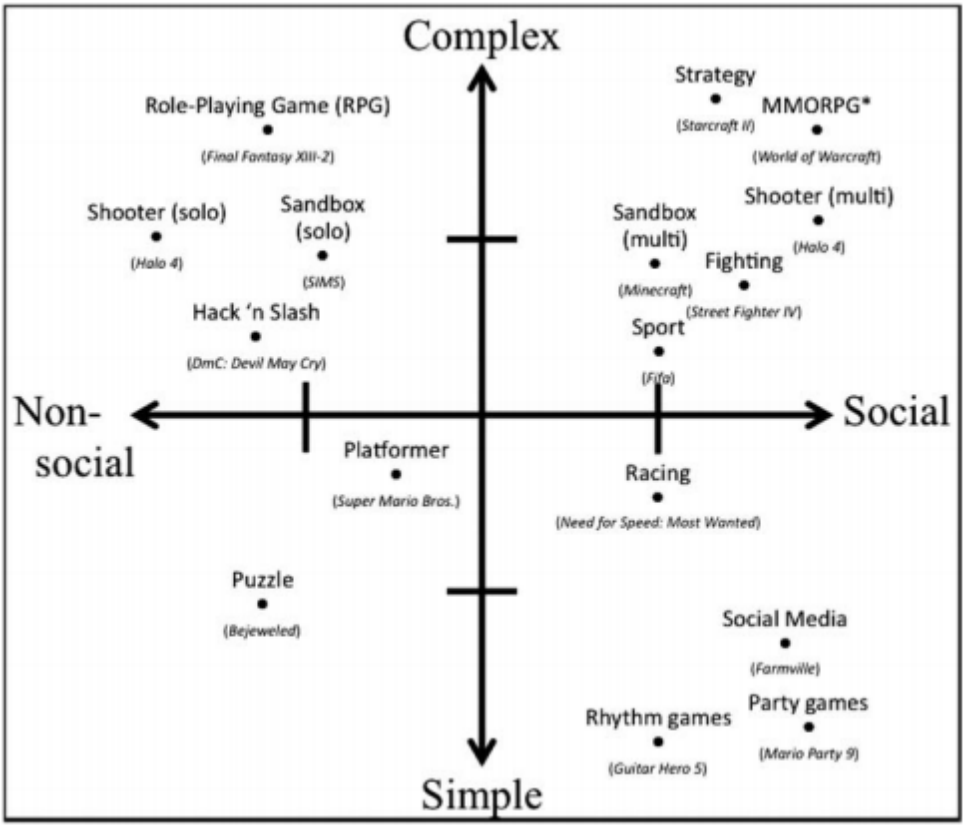

Figure 2.5: Different kind of games related with their complexity and sociability [5]

Figure 2.5 groups the game kinds according its complexity and social interaction. This structure has some games names purposely repeated since they can belong to different quadrants, which means they include different characteristics [5]. These groups could also be a guide to the elements choice in complement to game elements pyramid.

2.2.3 Werbach & Hunter Methodology

Werbach and Hunter (2011) [2] have developed a gamification strategy according to the business objectives for the platform where it is inserted. This framework allows to define the set of gamification options along an iterative process, divided into six steps:

1. **Define business objectives**

   In this step, the objectives to be achieved are defined. For this, first it is necessary to define the most important ones, and select those are ends in themselves. In addition, it is necessary

to justify the advantages of the objectives chosen being accomplished with the framework implementation. These are the company goals and might not be aligned with the goals the user of the gamified system expects to achieve.

2. **Delineate target behaviors**

   Here are defined the behaviors that users are expected to have when using the platform. These behaviors should be specific, quantifiable and, if at all possible, viral, which means leading the user to attract other users to the platform.

3. **Describe your players**

   The players profile will influence the chosen options effect, in this case the users of the gamified platform.

   Player types

   In order to describe the users, it is first necessary to know the player types that exist. This definition is somehow trying to group people in the kind of interests that will awaken in them the strategies of gamification developed. For this, Bartle (1996) [7] defined four types of players grouped by how they relate to the game, from an analysis of a set of players of a game multi-user dungeon. In figure 2.6 these player types according are grouped by their relation with other players, the world and if they prefer acting or explore it. This differences according the player types aim to infer that socializers have more interest in the interacting process with the game and with other players [7]. However, this does not mean that a player can only belong to one of the four player types, Zichermann and Cunningham (2011) [19] argue each player can present characteristics of various types, but always tends to belong to one player kind.

   - **Explorers**

     The main characteristic of this players group is wanting to discover all the secrets and experiences that exist in the game, which extrapolating for a gamification context corresponds to the kind of users who want to explore the system to its maximum and who are capable of dedicating a long time into finding solutions to specific system challenges. In addition, they are by nature curious and usually discard support from other users, but can even enjoy some of their contribution to his game experience. These players are also proud of the knowledge they have acquired about the game, and they particularly feel it when being able to share it with new players.

   - **Achievers**

     Achievers are usually competitive, taking great pleasure from the sense of victory, even if it is provided by meeting goals with little importance, and reaching a state of immersion in the game very easily. For this type of players social connections are not important, but they look for them when displaying their personal achievements, in a competitive way. The main problem in applying gamification strategies to this kind

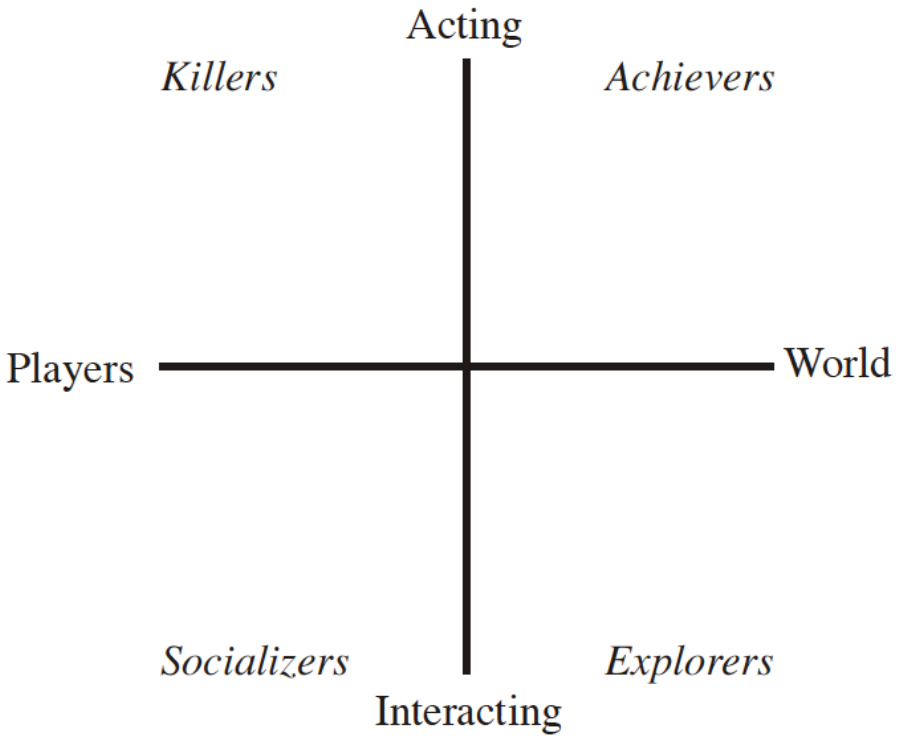

Figure 2.6: Player types according acting/interacting and competition/world [7]

of player is that it is extremely difficult to develop a system where all players win, since such players do not deal well with defeats, they may lose interest in the gamified platform when they lose.

- **Killers**

  In a game, killers are the player type whose main goal is just to win and defeat all opponents. The main interest of this player kind is to be the best as possible, which can makes their behavior aggressive during the game. Leadership is something that motivates them, which makes them also a very competitive player. In order to win, killers do not care about any other players, and they will try to destroy them if they try to prevent their success. This type of player prefers to play against opponents controlled by humans, rather than fictitious characters, because it makes them value the victory more.

- **Socializers**

  Zichermann and Cunningham argue that socializers are the largest percentage of players, noting that about 80% of players have characteristics of this profile. The socializers are interested in social interaction and value above all the possibility of establishing connections with other players, although they also want to win. Socializers prefer cooperative games, in which progression happens through interaction with other players

4. **Devise your activity loops**

Most game elements can be seen as a cycle, as shown in figure 2.7, where there are repetitive and recursive structures that may diverge in different directions. Activity loops can be grouped in two different categories [6]:

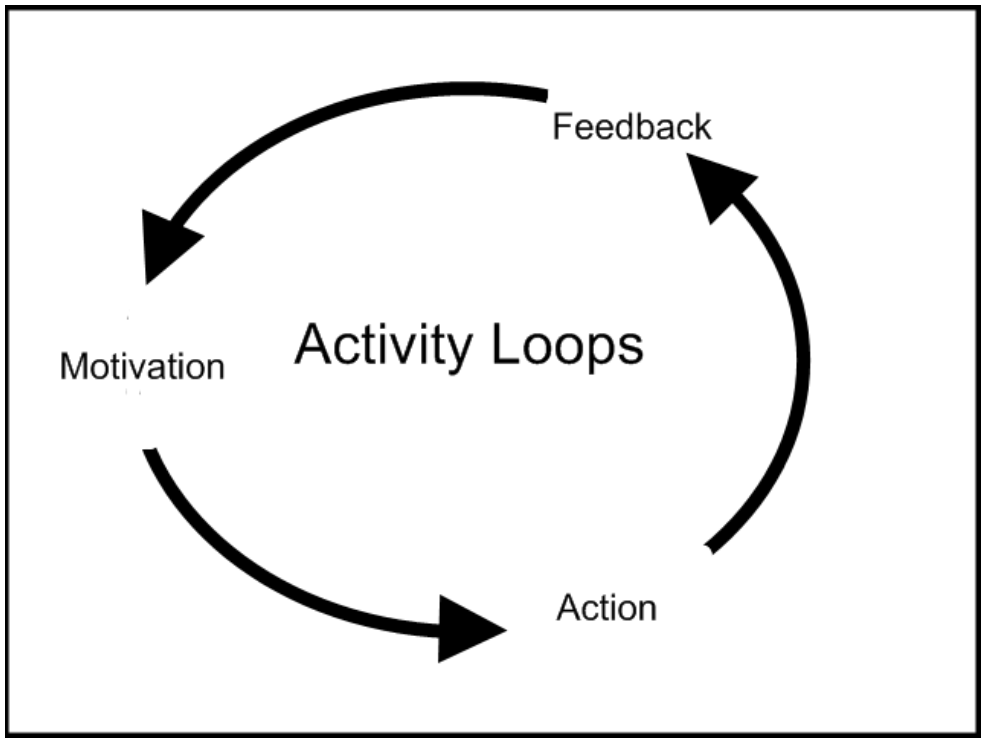

Figure 2.7: Activity cycle generalization [8]

Engagement loops

The engagement cycle corresponds to the cycle analysis at a micro level, which defines the individual actions, and is divided into the three categories of the activity cycle:

- **Motivation:** something that leads the player to take an action, which leads to a certain challenge, and in gamification can be equivalent, for example, to what makes the user go to a site.
- **Action:** when the player performs the action itself, that may corresponds to when a user visits a website.
- **Feedback** the information player receives after he has performed the action, which corresponds to the action reward. Examples of this may be points, which are intended to keep the player motivated.

One of the assumptions of this gamification framework is that players characteristics and their motivations are common to people who do not play virtual games. It is possible to support this theory with the analogy that exists between the engagement cycle and the habit cycle described by Duhigg [9].

It is possible to verify that there are similarities between the cycle that defines an « habit and an engagement cycle, in the figure 2.8.

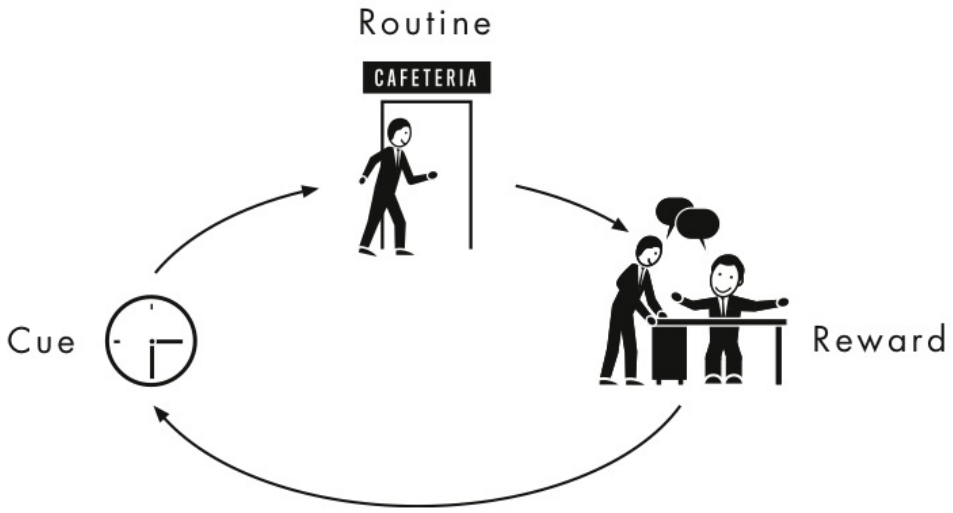

Figure 2.8: Habit loop example [9]

According to Duhigg (2012) [9] definition these similarities are explained as follows:

- **Cue** - this is the hint which leads a person to perform certain action.
- **Routine** - corresponds to what a person does when determined cue happens.
- **Reward** - the kind of return a person receives and the impact it has in the person's feelings.

This analogy allows us to justify that gamification can be applied in very diverse contexts, since the habit cycle is transversal to different activities and persons, and which may be distinct, as with the activity cycle, is which motivate an action performance.

However, this is one of the reasons why the decision to perform a certain routine is not always made in a conscious and sensible way, and which causes people to have bad habits, in which they can sometimes not even realize which cue led them to perform a certain routine. This theorem that explains how habits work, also explains that the most effective way to correct a bad habit is to identify the cue, and when it happens replace the routine with one that agrees with our personal goals. In this way, this is one of the reasons why some gamified systems are criticized, as in known social network Facebook for example,

where the notification system may resemble the constant creation of cues, which lead users to have routines in which they may feel out of control and time wasting [20].

However, one of this dissertation main goals is to find ways to identify and define systems where gamification is used to improve user experience, but always promoting their self-control and conscious decision making.

Progression loops

This cycle is analyzed at a macro level. In this case it can be divided into a set of activity cycles, where motivation is achieved at each iteration in order to reach an end. This cycle is exemplified by Werbach (2014) [6] as shown in figure 2.9 by a game quest, but which can be applied to the division of an activity into smaller activities organized in an evolutionary way, such as the example of a progress bar where the user needs to pass different phases until he/she finishes it.

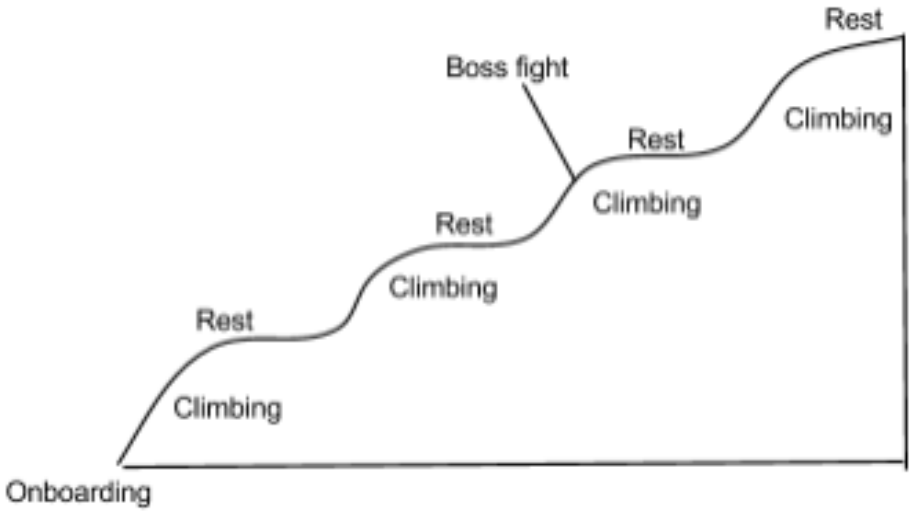

Figure 2.9: Progression loop [6]

5. **Don't forget the fun**

   Fun can be achieved in a number of ways, but it will always be necessary to take this into account, as this is one of the reasons the user engages. For example, fun could be the feedback of a progress bar, where the user has information about how much he accomplished already, and how little he has to do more.

6. **Deploy the appropriate tools**

   The most appropriate tools will depend on the conclusions drawn from the previous steps, that is, it can go through different techniques, tools and options. Since it is an iterative process, the most appropriate result is to test the developed tool and repeat the set of steps whenever it is necessary to improve the platform again.

2.2.4 Octalysis

In this subsection, the Octalysis tool is detailed. This tool is used under the scope of this dissertation to evaluate the game motivations existent, and the opportunities to include them, in the platform.

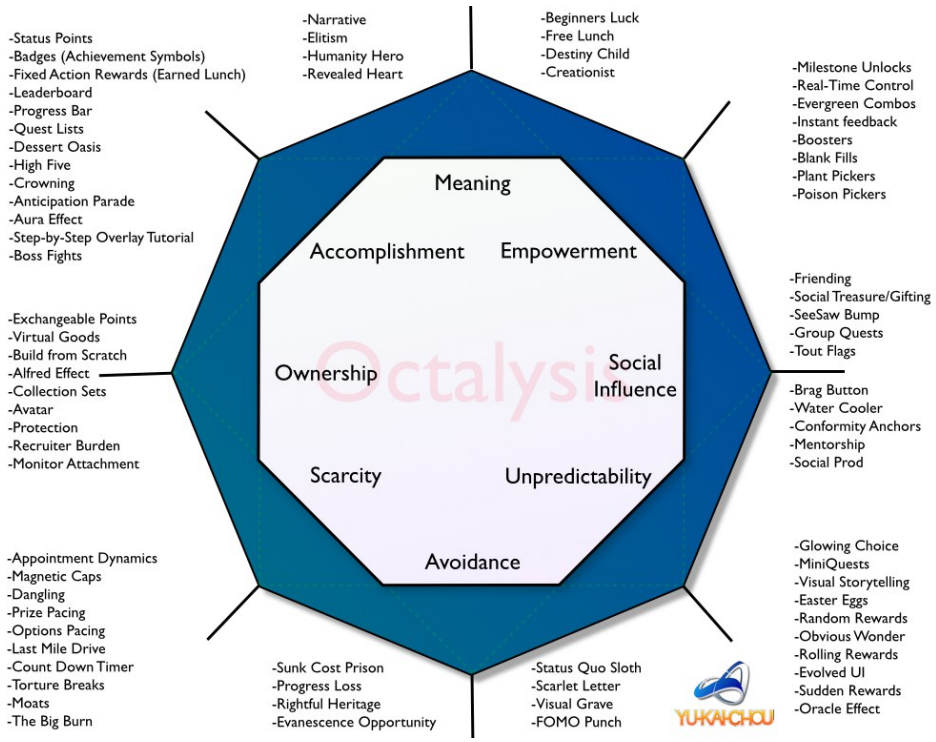

Figure 2.10: Octalysis Diagram [1]

This method was developed by Yu-Kai Chou [1], a gamification specialist, and is divided in 8 fundamental parts, as represented in the figure 2.10, measured in a 0 to 10 scale, as follows:

1. **Epic Meaning & Calling**

Each individual has a vision of his life mission. This unit represents the importance to the player of the factors that motivate him related to his own individual interests about the mission that surrounds him. Examples of this unit are a player who: devotes much of his free time to maintain a fan club, helps creating whole communities (Wikipedia for example), or participates in the development of open source systems.

2. **Development & Accomplishment**

This is the internal unity which enables progress, skill development, and eventually overcoming challenges. The word "challenge" here is considered as the achievement of an emblem or trophy, for example. This is also the central unit allows user to have points, emblems and rankings.

3. **Empowerment of Creativity & Feedback**

This unit represents the kind of users who are involved in a creative process where they must suddenly discover things and try to combine different situations. People not only need ways to express their creativity, but also need to be able to evaluate the results, get feedback and respond to situations.

4. **Ownership & Possession**

In this core drive users are motivated by owning something. This item represents the core to accumulate wealth, dealing with many virtual goods or virtual currencies within the systems. As an example, if a person spends a lot of time customizing their profile or their avatar, he automatically owns that element. Finally, this is also the central unit which allows collecting stamps or fun puzzle pieces.

5. **Social influence & Relatedness**

This unit incorporates all the social elements which lead people to gain influence, including: mentoring, acceptance, social responses, fellowship as well as competition and envy. When an individual observes another who possesses mastery in a certain subject, it is impelled to reach the same level. Another characteristic is if it leads the player to remember his/her childhood, he gets a nostalgia feeling and this will probably increase the chances of him buying the product. This core is widely studied considering some companies observe these factors to position themselves in the market and to create online social strategies.

6. **Scarcity & Impatience**

This unity reflects someone's desire to achieve something which he/she cannot have at the moment. Many games include this dynamics, for example, coming back 2 hours later to get your reward. The fact that people can not get something right now can motivate them to think about it all day long. This unit, for example, was used by Facebook when it started: in the beginning it was only for Harvard, then they were opened to some prestigious schools and later to all colleges. Many people wanted to participate simply because they could not enter before.

7. **Unpredictability & Curiosity**

This characteristic stimulates in the individual, the desire to discover what will happen next. If he does not know what will happen, his brain is involved in the situation, causing the person to think often in the game dynamics. However, this drive is also the main factor causing gambling addiction.

8. **Loss & Avoidance**

This central unit is based on events prevention. At a small scale, this unit can be used to prevent loss of previous work. On a larger scale, one can prevent the individual from admitting that everything that has been done up to this point was useless, avoiding him from giving up. In addition, this unit may produce in the individual a feeling opportunities are disappearing and may no longer be recovered. For example, people feel the opportunity loss, if they do not act right away, they feel that they can lose the opportunity if they do not act immediately

More generally, the structure of octalysis groups the core drive associated with extrinsic motivation on the left side, and those that are more related to intrinsic motivation on the diagram's

right side, in an analogy with the brain sides, considering the left side is more related to logical motivations, and the right side with the more emotional ones.

The Octalysis is also divided into two groups by the vertical axis, with the lower part of the diagram corresponding to the set of motivations related to the motivation by the emergency and time limitation.

This system can be used both for the development of new gamification solutions and for the evaluation of the level of each core drive in the current platform.

2.3 iPortalDoc Platform

A document management system implementation is a key factor for the business of any company, since it allows to effectively manage all the information processed. Benefits of implementing document management solutions are for example the reduction of time comparing to manual document processing, and the information access to all of the system users, when they have permissions to access them. Some of the most common benefits that improve companies who adopt this type of solutions are [21]:

- Reducing time of documents processing;
- Improving employees' efficiency through:
  - Easy way to participate in creating and managing documents at any stage of a project;
  - Reduction in the documentation meetings number;
  - Documents centralization, leading to easy management and retrieval of any document type;
  - Facilitating the inclusion of external agents to the company, allowing them to access documentation, which may be relevant in the business relationship with partners, consultants or clients.

iPortalDoc is a documentation and workflow management system for companies and institutions, which allows its users to manage document workflows, as well as archive them for later management. This document management system includes, not only the management of documents, but the management of all the tasks associated with them.

This document management system is a digital information solution and aims to substitute paper, rather than being an adjacent technology to it. iPortalDoc can not work alone, and is part of another system, IPBRICK from IPBRICK SA, and the users and groups of users are introduced and managed there, not directly in the platform.

When correctly implemented iPortalDoc allows for a better activity of the organizations, where the main features stand out:

- different documentation types integration;

- several profiles assignment with permissions control;
- reduction of paper information and processes management.

In a general context, a workflow system interprets processes, creates and manages instances, and interacts with application participants. It aims to regulate the activities resulting from a process, and the users tasks related to them, from the beginning to the end of the process. During its lifecycle a process can be assigned to different participants, and their assigned tasks will be controlled by the workflow management system, ensuring its correct development [22].

In the context of process control, within iPortalDoc this process is done by dividing the tasks associated with a document into a actions group, each of them assigned to an user, allowing this flow to happen within the platform, simplifying the communication process between work teams.

In the figure 2.11 an example of a workflow is represented and where one can see that a workflow can involve a set of diverse users that can be of different teams within the same company. This structure thus constitutes a set of utilization details and of a wide range of users that could benefit from the inclusion of gamification in the platform.:

In iPortalDoc, this workflow concept is an important part of the organization structure of the documents. In this way each user is assigned an action when he is assigned to a document. Thus, a user has all his actions organized in the actions window.

An example of an user action window is represented in figure 2.12. The red icon next document's name indicates the workflow to which this action belongs is not yet finished. When this action is completed the icon will appear green in every place the document is listed. Also there are two additional tabs dividing personal and group actions.

Actions are also sent by email. In addition it is possible to associate documents with emails and send documents directly to the platform from the email. iPortalDoc archiving mail window example is represented in figure 2.13.

On the actual archiving of documents, there are four ways to add new documents in the hierarchy:

- manually in the input menu;
- via operating system shell;
- from the email;
- via web services.

An example of documents hierarchy is shown in figure 2.14.

One of the most important aspects in document management systems is the easy access to documents. Due to this, a search tool is a structural part in a document manager, an example of the iPortalDoc search window, including a simple search inputs and additional parameters to a detailed search, is shown in figure 2.15.

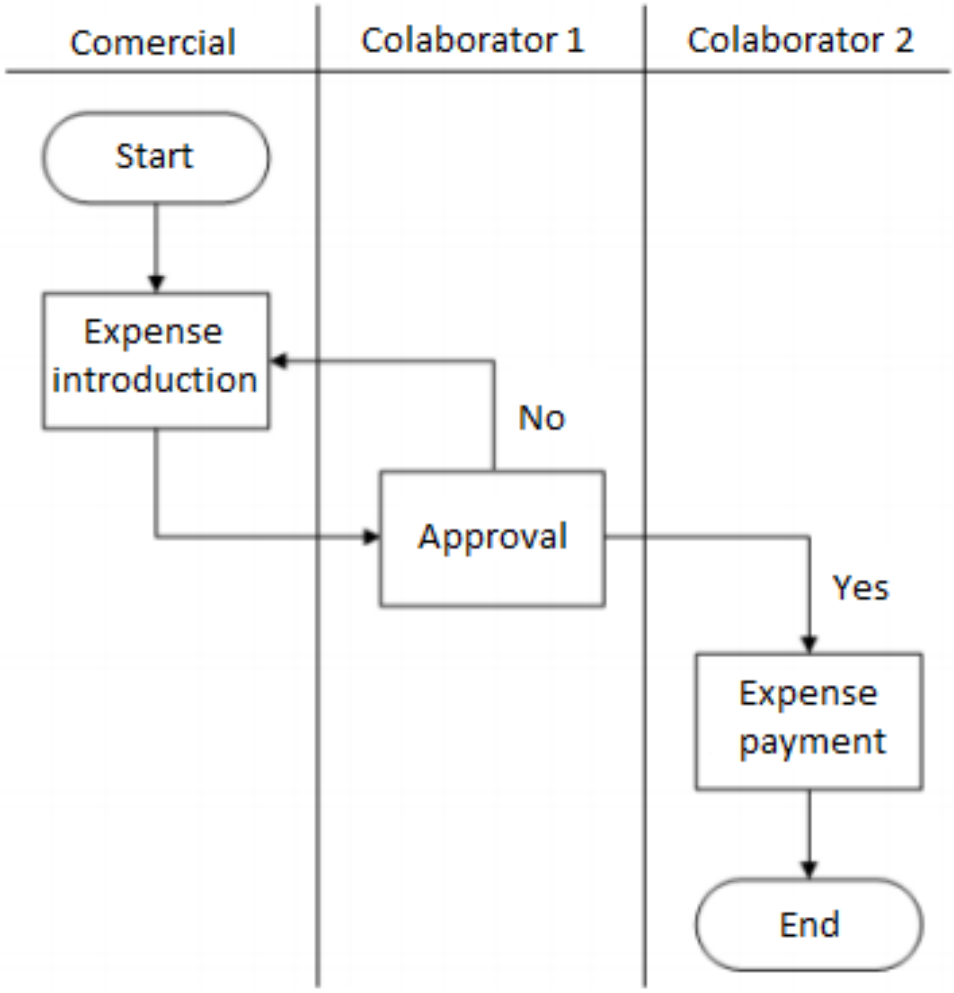

Figure 2.11: Expense workflow example adapted [10]

With the aim of assist the user's integration into the platform, IPBRICK SA made some efforts, namely through the creation of platform usability tips, which were sent to customers by email. These tips may be the basis for some of the improvements expected with the introduction of gamification on the platform.

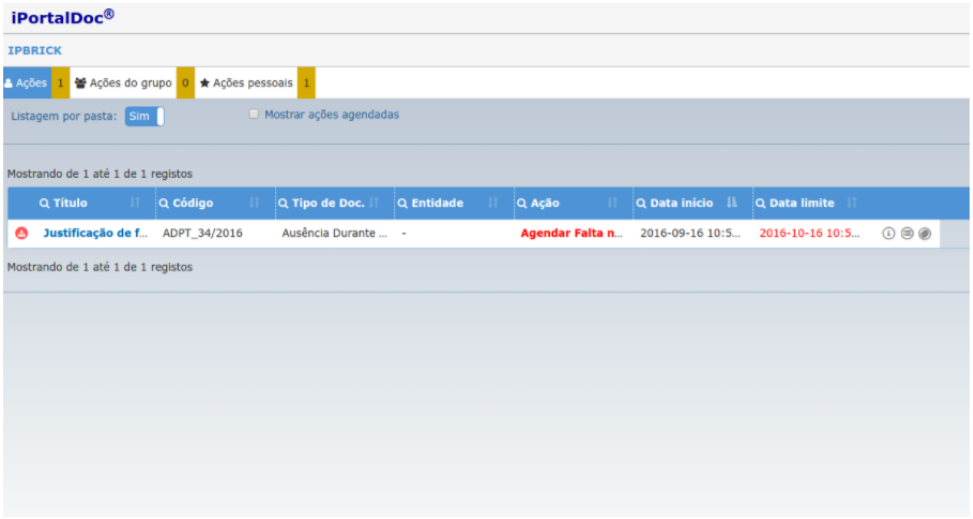

Figure 2.12: Actions window example

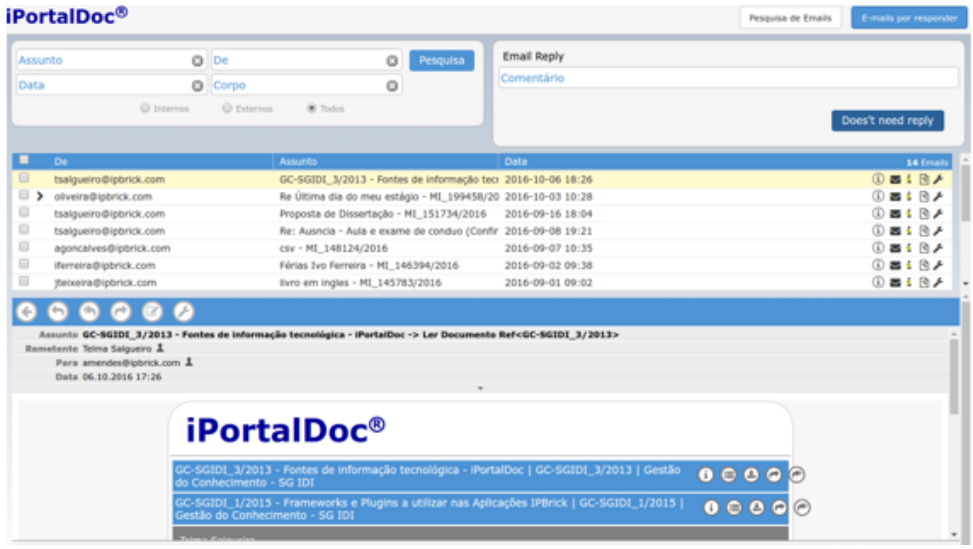

Figure 2.13: E-mails window example

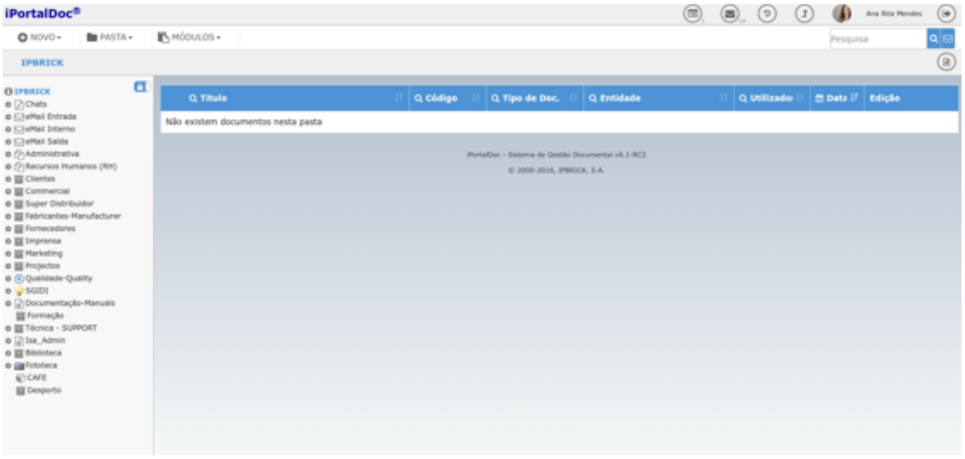

Figure 2.14: Hierarchy window example

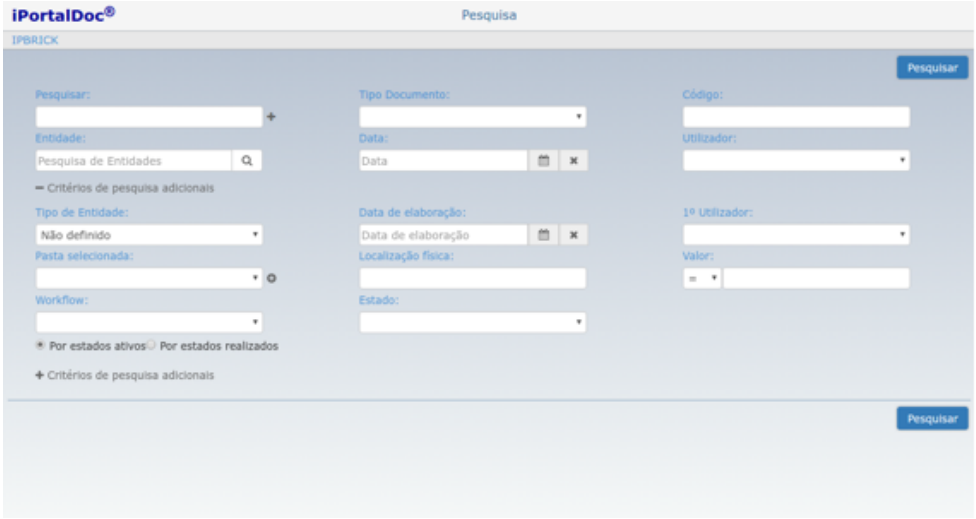

Figure 2.15: Search window example

2.4 Productivity paradox and gamification controversies

In addition to the set of details about the features and what the technology can do to improve the productivity of people, there is a paradox called productivity paradox. The main purpose of technology, especially in this case that we want to focus on in the business world is to simplify processes and use technology so that it is in our favor and allows us to accomplish the tasks in less time and with less effort. One of the problems related to productivity is that technologies have evolved, changing what can be considered as input and output in the measurement of productivity, as well as the time it takes for one to become the other. This paradox was defended by Robert Solow in 1987 [23], and the tendency of gamification and the criticisms that it has suffered are mainly regarding its role in the reduction of this same productivity. It is urgent to make researching allowing to establish metrics where which is a success measurement of an application is the quality time a user spent on it and the good purposes it has served, and not how many time users are spending on it [20].

Two design specialists Joe Edelman e Tristan Harris defined these changes in a transversal way as [24]:

- **Take Control** One of the suggestions is to define systems and digital tools with settings that promote better social habits increasing life quality, instead of technology addiction.
- **Transform Business** In order to have a business technological transformation, attention at any cost should not be considered the most valuable achievement.
- **Transform Design** Technologies should be designed in such a way that would allow the user to have the power to decide what he wants to do, rather then being controlled.

In this sense, two of the aspects pointed out to solve this problem are:

- **Asynchronous communication**

  Asynchronous multiplayer games are an example of games does not require an immediate data exchange [25]. The application of similar structures in platform gamification allows to ensure that the flow of information continues to exist, when not all users are online, the equivalent to not all of them "playing" at the same time. This is an important factor for concentration and focus on a certain task, without losing information about what is being communicated. On the other hand, since the structure is thought to be asynchronous and allows the possibility that the user might not be available, this removes the obligation of an immediate response, which does not affect attention moments. It is also clear this should also be designed in order for urgent information to continue to be communicated as soon as possible.

- **Permission to fail**

  One common games characteristic is the possibility to retry even if the player failed in the game, “in video games, losing is not losing, and the point is not winning easily or judging yourself a failure" [26].

In this case, it is the opportunity to start again and learn from past mistakes that allows the player to evolve throughout a game without being paralyzed by the fear of failure, this component should be one of the aspects related to the understanding of the user's psychology and be included in a good gamification design.

2.5 Related work

This section includes examples of gamification in a real context. The chosen examples are focused on a more "serious" gamification. This means the examples try to escape from the points, badges and leaderboards (PBL) logic, and include a more structural logic where the game elements are related to the concept more then the visual impact. The choices were based on the kind of company, and intend to show gamification could be applied in different sectors. Although the visual concept and most of the articles are about the gamification in a digital context, the term includes examples of gamification before the term gamification was defined.

2.5.1 Energy-management program at Sony Pictures Entertainment

Energy-management program of the Energy Project applied in company Sony Pictures Entertainment, which is based on concepts about the motivation of workers divided into four main areas [27]:

1. **Physical health**: achieved through nutrition, sleep, daytime renewal, and exercise;
2. **Emotional well-being**: which grows out of feeling appreciated and valued;
3. **Mental clarity**: the ability to focus intensely, prioritize, and think creatively;
4. **Spiritual significance**: which comes from the feeling of serving a mission beyond generating a profit.

Despite the fact that the strategy followed in this program is not called gamification, this company's improvement is based on the principle "enduring organizational change is possible only if individuals change their attitudes and behaviors first" [27] which is also the basis of the implementation of gamification in an organization.

This project focuses on the performance of workers and aims to reduce their lack of motivation with work, in this case through a system that seeks to manage the energy of workers rather than their time.

An example of this strategy is turning off the email for a few hours,"so you can tackle important or complex tasks without distracting interruptions" [24]. The whole set of strategies is grouped into something that the project managers designate as the development of a new "ritual", which consists of identifying the triggers, motivations in a gamification context, so that the actions can be changed.Examples of these activity cycles are:

- **Positive reinforcement**

  Create activity loops calling and writing notes to employees to recognize them for their accomplishments.

- **"Code" loop**

  It was defined that this word "code" "became a way to surface unspoken feelings and concerns without attack or disparagement" that means to "I really want to know what you're feeling, so be straight with me." creating an emotions unlocking cycle [27].

Some of the measures go through rules such as:

- the team agreed on an 8 AM to 8 PM weekday limit on the hours the employees do not feel any obligation to respond. This attitude reduces the stress on the response, and allows the employee to be released into his personal life, which can be an indirect way to improve the environment in the company and employee motivation;

- whitin the company, ignore e-mail while talking to people on the phone. This is an example of which does not happen with the notifications and allows to maintain the focus, and to improve relations and communication between teams.

The purpose of this implementation in a company was to put the workers themselves thinking about their own habits and define new loops to improve the workplace. This can be compared to games keeping their fun due to allowing a random combination that continues to feed the fun and creativity, without the need to add new elements to the game, as with minecraft game [28].

With this project, engagement has been fostered within the company, and satisfied the company's goal of improving the performance of its employees, while promoting their emotional intelligence, which in addition to being promoted, is recorded so as to be accessible to all the workers. This project has improved worker productivity and conflict management, based on the idea this depends on the employees's internal motivations and can be adapted to them.

2.5.2 Alcoa

The Alcoa example is from several years before the word gamification was referred as one of the emerging technologies, but can be considered as a good example of the application of an activity loop, and habit loop at the same time, applied in a company context with a business objective well-defined. It is also at a sufficient time distance so that the results can be considered consistent and reliable.

The initial business goal, like in any company, was to increase its profits. In this case, the analysis of the company's operation showed that when there was a work accident, financial losses would increase due to two main factors: aluminium expenses would increase; workers had to request days off. Based on these facts, the company had the objective of reducing the number of work accidents.

If this structure is analyzed according to Werbach's strategy, it is possible to verify each of the six steps was correctly followed:

1. **Define business objectives**

   The initial business goal, like in any company, was to increase their profits. In this case, the analysis of the company's operation showed that a specific objective should be attained: reduce the number of work accidents. The basis of this goal lies on the increase in aluminium expenses that resulted from the accidents and on the number of workers who had to request days off.

2. **Define the target behaviors**

   The behavior that was intended to instill in the workers was that there would be fewer accidents. To do this the first intended behavior was to record all the causes of work accidents that happened in the company.

3. **Describe your players**

   The players group included the company's employees. Given the profile of the players which was used, there was the possibility of losing something, in this case being fired if the accident had not been reported, appealing to a competitive player profile, and a real feeling of losing the job that impacted the responsible employees.

4. **Devise your activity loops**

   The activity cycle defined corresponds to the cycle represented in figure 2.16, where in this case we can verify that this is similar to the cycle of activity of a game, where the motivation is the fact that an accident happened, and the reward is not to be fired if it does not happen.

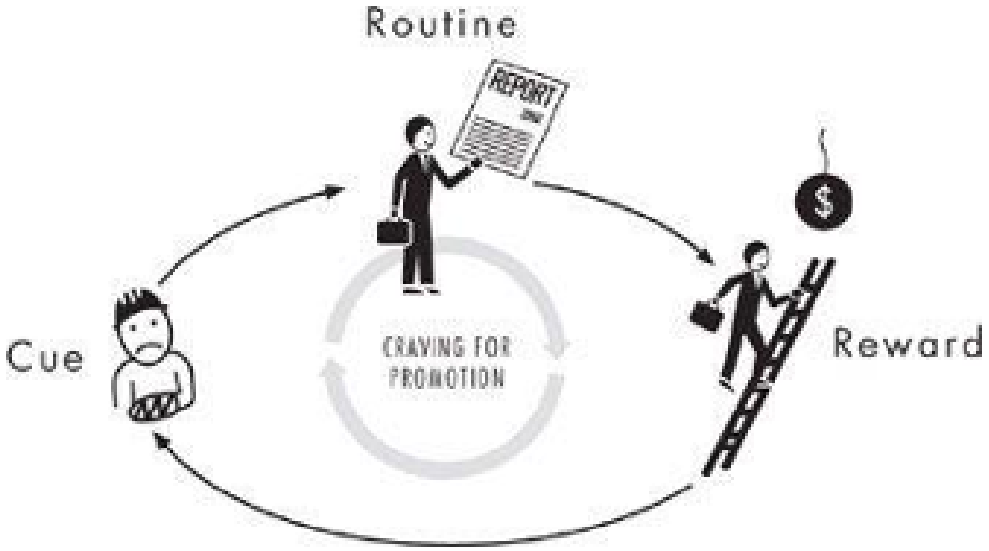

Figure 2.16: Alcoa habit loop [9]

In his analysis of Alcoa's institutional habit loop, Duhigg [9] defined:

(a) **Cue:** Any time someone is injured

(b) **Routine:** The unit president had to report it to company's CEO within twenty-four hours and present a plan for making sure the injury never happened again

(c) **Reward:** The only people who got promoted were those who embraced the system

5. **Don't forget the fun**

   Regarding the fun components that can be included, and since this is related to emotions, not only there may be feelings about contributing to less people being hurted, making the company a safe place to work, but also promoting the feeling of being able to keep a job while performing it well.

6. **Deploy the appropriate tools** In this case the tools used included the cycle implementation, which includes elements characteristic of games such as fear of losing and cooperation. As at the level of technology this has translated into the development of the e-mail system communication [9].

This implementation of this idea was highly criticized, since the focus of the company's previous managers did not go beyond aspects related to the safety of their workers, but it is an example that can be considered a strategy of gamification as described in the approach made on Werbach framework implementation.

2.5.3 Asana

Asana is an example of project management software, which includes the perspective of including gamification strategies where the main objective is to increase the productivity of the teams in a company, organizing their tasks.

The platform is divided into four main areas: tasks; my tasks; projects and inbox. Its main features are:

- All tasks are grouped in the platform and have the option to include a customizable tag per project;
- Tasks are easily updated if there are deadline changes from the team leader and priorities can be set;
- It is possible to customize the notifications so as to choose, when for example the user wants to be notified if a task is fulfilled;
- Communications are separated by team and project so as to keep them organized;
- A set of productivity statistics exists examples of which are figures 2.19 and 2.20.

This platform includes the possibility to communicate and promote users' socializer profile. It also transmits data that allows the user to perform actions based on the information he receives from it. Furthermore, there is a focus on the quality with which the platform is used.

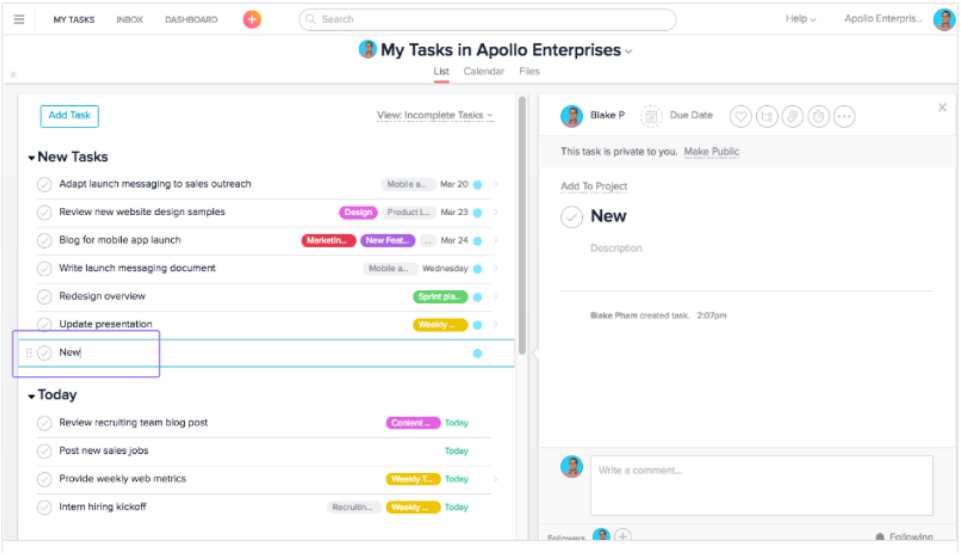

Figure 2.17: Asana "tasks" interface example [11]

Other game elements are also used, such as leaderboards and levels, which represent gamification strategies. The platform has been developed in such a way that the users feel the need to use it, in order to manage information and communication. As the company claims "communication is an emergent side-effect of keeping yourself organized" [11].

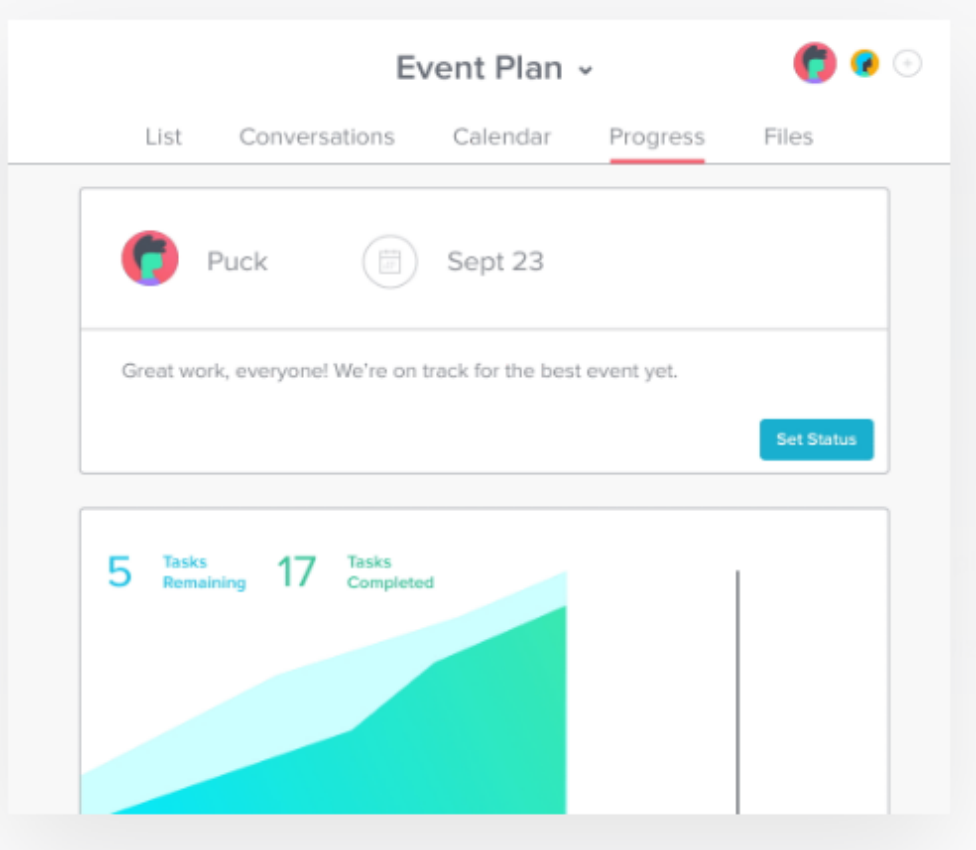

Figure 2.18: Asana "my tasks" interface example [11]

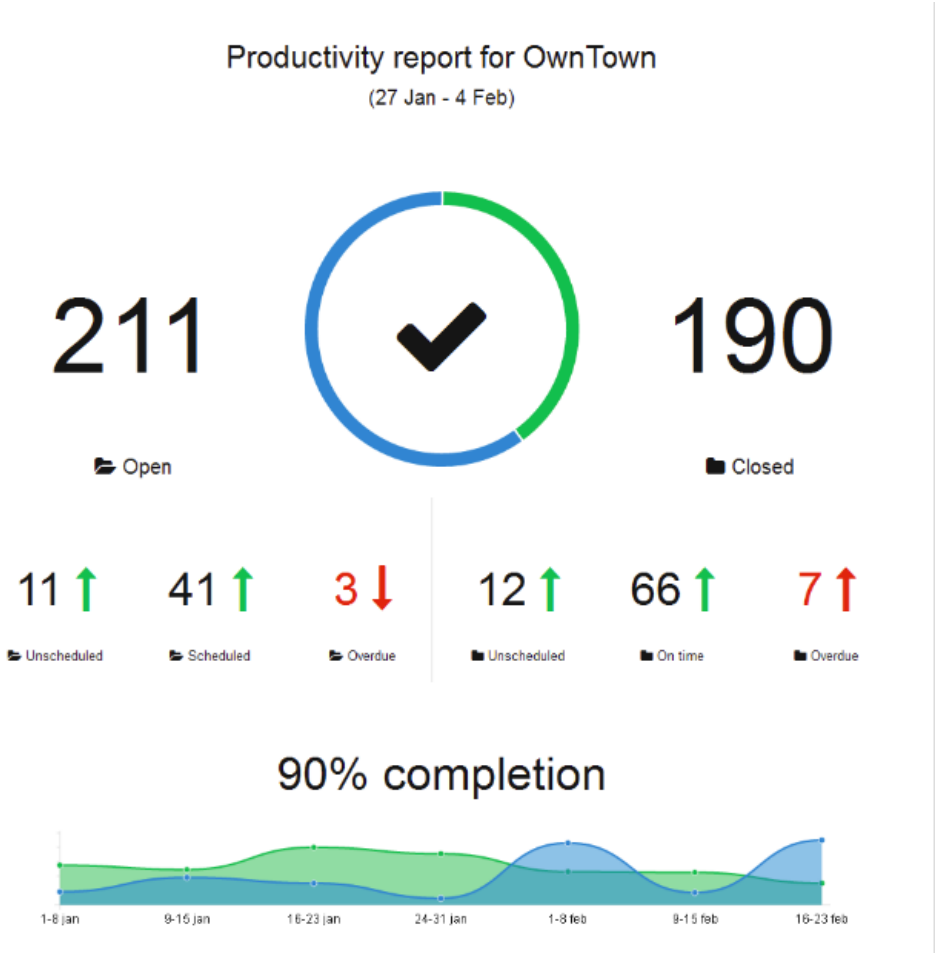

Figure 2.19: Asana "own statistics" interface [11]

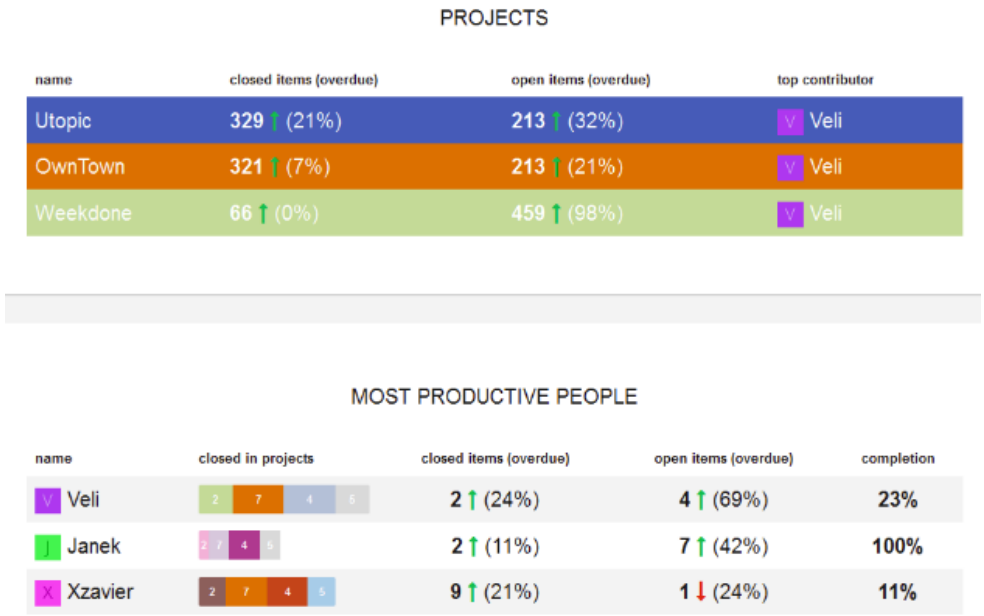

Figure 2.20: Asana "group statics" interface [11]

2.6 Summary

In this chapter, the theoretical revision of the main concepts associated with user experience, gamification, which included details about the motivation and productivity, the game elements, and the Octalysis and Werbach and Hunter frameworks used during this project. Finally, the aspects related to three different projects applied in companies are referred. Two of them focus on the structural functioning of a company, and use game elements to improve it, and another one is a software example for the management of tasks in a company, aiming to improve the communication between teams and users productivity.

Chapter 3

Gamification framework for document management system

The structure of this chapter begins with a previous evaluation of its current gamification level done through the Octalysis framework. In order to define better how the platform is used and the pattern of behaviors that are intended to be achieved through gamification, interviews were carried out, which will be described later in this chapter, as well as details of the business objectives for the platform and the introduction of gamification in the Werbach and Hunter framework application, which is also detailed at the end of this chapter.

3.1 Octalysis's evaluation

The Octalysis framework can be used either for the evaluation of a software at the level of the game elements present in it, or within the scope of the development of a gamification model itself, however, since this thesis was carried out in the context of a company and any possible generalizations to the developed model will always maintain this focus, the chosen option for the development of the model was the framework Werbach and Hunter, since this framework is based mainly on the business goals to define the target behaviors which will ultimately define the gamification options. In addition, the choice of using two different frameworks allows to obtain a more comprehensive perspective of the possible solutions, and to chain the results of both analyzes, which can be considered similar to a triangulation technique.

As described in the literature review, Octalysis core motivation drives in games are grouped into eight distinct areas. In the following items, a brief review of each concept is performed and the presence of each of these core drives on the iPortalDoc platform is analyzed. Also being described in each of the core drives possible elements that could be added to the application in order to increase the presence of each of them:

1. **Epic Meaning & Calling (8)**

   In a general way, this document management system facilitates the:

- communication with the clients;
- work procedures and responsibilities organization;
- archive of the company documentation.

The characteristics described above are an example of this core drive that already exists in the platform, since it is a service to the clients, it has an important meaning in the construction of this relationship with them.

In a game context, an example of this core drive is called "beginner's luck", in which the player is randomly chosen to complete a mission, and feels that he is the only one capable of doing so [1]. In the perspective of a document management system, this core drive can be found in the allocation of tasks, which can not be arbitrary in this case, obeying the organizational structure of the company, but can also stimulate the sense of mission to be fulfilled. The user being responsible for an action may also feels that he is the only one capable of doing so.

2. **Development & Accomplishment (5)**

   This core drive is related with the progression, which in a game context is for example the completion of a level. In the actual platform, the actions window gives the user informations about the tasks that need to be completed, and gives the information when one is finished, which could be considered an example of this accomplishment feeling.

   Also, a document workflow has now a red icon until all the procedures on the document are finished, and green when the workflow is completed, which also could be related with this core drive.

3. **Empowerment of Creativity & Feedback (5)**

   Feedback is an important component in games and in many systems in general. Feedback alone can trigger behavior by providing information on which to make decisions and make necessary adaptations. In this platform, there are several ways to include more feedback in the current design, it is now possible to obtain feedback regarding statistical information about documents and workflows, which includes a set of different fields. In this way, this information could be more personalized and adapted to each user so as to provide personal parameters about performance and work effectiveness, such as the duration of the last tasks completed, or the number of actions completed during a month. This customization would allow to increase the presence of this core drive. On the other hand, it should be noted that at the moment this customization, already mentioned, exists at the level of the system user, and it may be interesting to replicate some functionalities for the final user, for which this gamification solution is developed. Additionally, game elements promoting users creativity may also be added in the platform to increase this core drive.

4. **Ownership & Possession (4)**

One of the main differences between games and other forms of art, such as books, movies or music, is that the player feels part of the reality of the game, and their actions and decisions directly influence his game experience, which is pointed out as one of the main reasons for engagement in the games. In this way, one of the strategies of gamification may be to increase this "ownership and possession" core drive with the inclusion of a personal area, including for example individual user performance data and customizable settings, in which the user can experience the feeling of ownership and personal space within the platform.

5. **Social Influence & Relatedness (4)**

   The social influence is one example of intrinsic motivation, due to something that is done for a community benefit. An action completed within a workflow is the accomplishment of a document procedure, since the workflow is related to different users with different tasks, the execution of an action is part of the social influence core drive as team cooperation.

   The choice of the word "action", related to the workflow tasks, in the replacement of the word “task” could be an example of the feeling of social influence. This means the user can act accordingly, instead of having the obligation to do something as the word "task" might suggest.

   Another way to include this core drive in the platform in a company context, is the acculturation, which means the promotion of the feeling of being part of a group, in this case the company group is what makes the employees feel related to. It could be done for example by the inclusion of a help system to other users of the system, or some elements that promote the communication and personal information shared between employees, for example: the inclusion of game based challenges about company's human resources.

6. **Scarcity & Impatience (3)**

   The possibility to miss a thing is a motivator of the action, intensively used in games context, such as temporary achievements or time limited missions. In order to gamify a system it could be used for example when an offer is limited in the time, or if its scarcity is promoted, which make it overestimated. In iPortalDoc, the actions already have a limited time to be done, although one way to promote actions completion is to redesign, or include more features about this time limit in order to motivate the user to complete them. However, this could be done in a positive perspective, where it could be used as a positive reinforcement for the completion, or even when an action is out of date, this should be reported in a way that shows how the problem could be solved, and not in order to cause too much user's anxiety.

7. **Unpredictability & Curiosity (3)**

   Since, a document management system pretends to organize and simplify the company documentation it should be clear and predictable where to find the information desired. On the other hand, the unpredictability and curiosity core drive are game motivations that could be

used as a gamification tool to maintain the engagement of the user, through the feeling of discovering something new, for example the advertisements about new products that include the "new" label. Likewise, in the case of this document management system, one of the options is to include suggestions to use new features or never used ones, or for example the use of new tips or facts about document organization. One example of curiosity applied in other gamified applications are the notifications system, where the user goes to the website for the curiosity about what the notification is about, in iPortalDoc information about the actions exist but the notifications could be done in a different way to promote the curiosity motivator.

8. **Loss & Avoidance (5)**

   This core drive is about the fear of losing something or to be forbidden to access it during a period of time. This is a concept that could be found in other gamified systems, such as the example of Facebook platform, where the fear to lose all the created information on the website represents a new concept known as "digital suicide". Similarly, the use of a platform to organize all the documentation of a company also includes this core drive, because if all is organized on the website, the fear of losing all the documents or lose the access to them already exists. One of the ways to increase this core drive is the personal area customization, referred in the Ownership & Possession core drive, that promotes the website access importance, and could increase its use.

The diagram in the figure 3.1 summarizes the weight of each of the core drives, it is possible to verify that at this moment the platform already has some weight in the part of its importance and meaning for the work of the company. However, it can be seen that on the right side, the factors of social influence empowerment and feedback can be included as user motivations within the platform. About the left side, the accomplishment related to the fulfillment of the workflows and the ownership and possession while improving the personal area of the platform can also be increased.

It is also important to note that the core drives at the bottom of the graph now have a lower weight on the platform but it is not intended that this gamification design increase them, since the criteria of urgency and scarcity should not be employee motivations to use a document management platform at a business level.

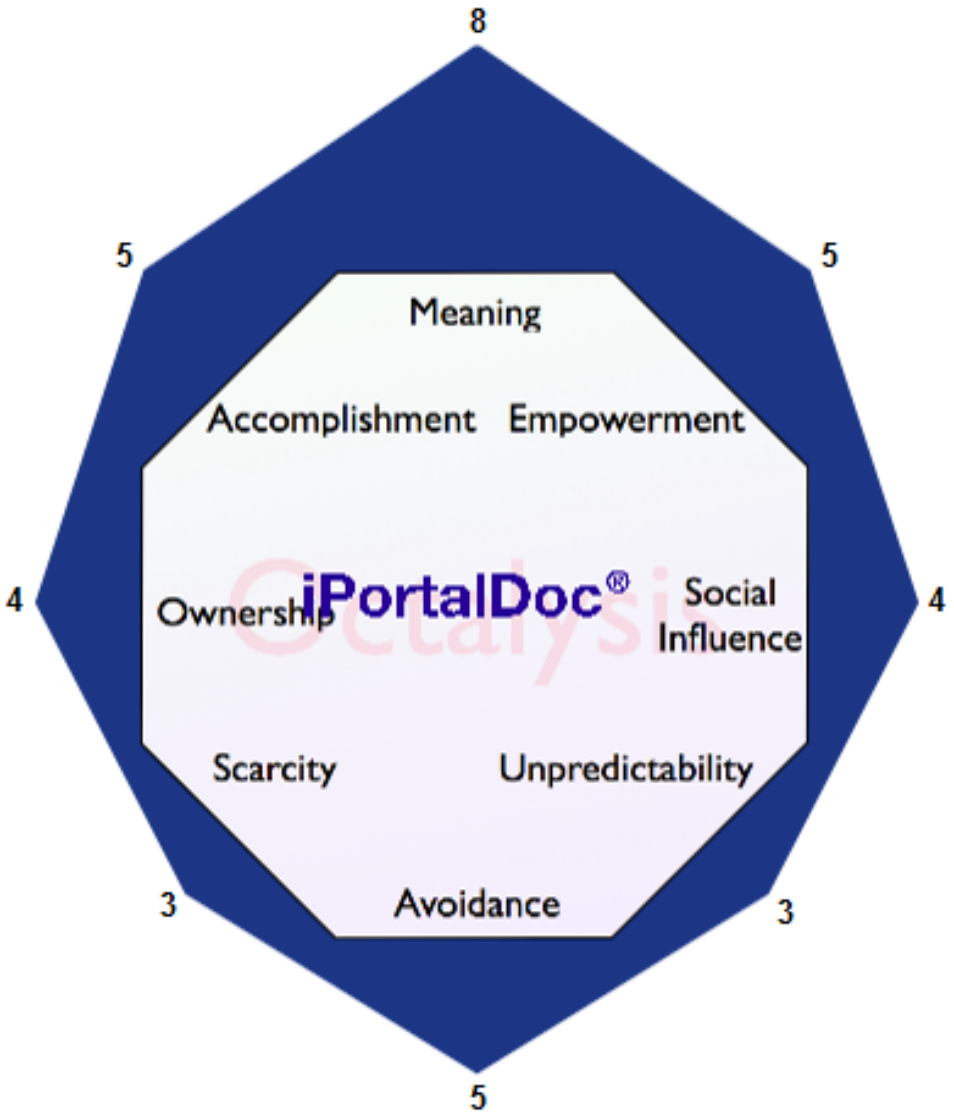

Figure 3.1: Initial evaluation with the Octalysis framework diagram

3.2 Semi-structured interviews

After the previous evaluation made from the Octalysis framework, a qualitative research was conducted, which consisted on a set of semistructured interviews with a group that allowed to represent the iPortalDoc users.

The aim of the interviews was to acquire qualitative information that were later analyzed to bring an understanding of the main issues of the platform, and to detect possible behavior patterns and improvements needed.

The choice was to interview IPBRICK employees with different positions in the company, who all use iPortalDoc during their workdays, with different frequencies, for different time periods and purposes, representing the final users. On another hand, some of the interviewees are in contact

with the clients in different ways, responsible by their suggestions and claims treatment, and for some previous design choices.

This group was chosen because it is one of the most practical and agile ways to infer conclusions considering the diversity of clients, and the difficulty and logistic limitations to choose a representative and reliable sample of users.

Concluding, there were made 11 interviews, 20 minutes of average duration, from the IPBRICK sectors: client support, commercial, development, financial and quality.

The interviews were made in Portuguese and audio was recorded to be analyzed further. The interviews had slightly different approaches according the interviewee, for example, if the interviewee has a commercial function, the feedback about the clients was a more relevant field.

Although a strict structure was not followed, there were three main themes covered in every interview and it can be categorized into three main sections: personal use, clients's feedback and improvement suggestions.

Also, according to the two business goals previously defined, limiting the number of claims and increasing the website's use , two solutions were outlined:

- improve the personal area to increase the use of the website;
- promote the communication between users during the workflow.

In order to analyze the receptivity for this two solutions, the opinion of the interviewees about them was also requested.

Below, the more relevant findings from the interviews are presented, including a small description about the aim of each question.

- **Findings from the interviews**

1. **Personal use**

   In this part of the interview, it was attempted to draw conclusions about the personal use of the platform of each one of the interviewees: which are the main functionalities that they use and to determine any limitations about it. The last question was thought in order to verify the interest and/or the need to increase the communication during the accomplishment of the workflow.

   - **Question 1.1 - What is the relevance of iPortalDoc in your work? What are the main functionalities that you use?**

     The purpose of this question was to find the different areas where the application is used. The findings demonstrate that it has an important role in the administrative functions, such as the billing processes, and where it is mainly used in combination with the e-mails management. Inside of a company, there are different utilities for the product, now some of the users, only use it for the holidays management or to view some specific document sporadically. This happens since the roles of the employees even

without this document management system include different quantity of documents. The most common bureaucratic roles are the financial functions, and also the commercial sector. Support is an intermediate between the developers and the commercials.

- **Question 1.2 - Is there something that demotivate you from using the platform?**

  In this topic the interviewees had different experiences and consequently the reported problems were different.

  Also, since the users are not first-time users the problems reported are in the systematic use, and the problems about the first time users are reported in the client's feedback section.

  The problems vary depending on how important and intensively the iPortalDoc is used in their daily work, as expected the ones who use it less report more problems, than the interviewees who use it as an essential tool to their work.

  Some of the pointed problems are:

  - processes are too bureaucratic;
  - too many steps to do something;
  - some features are not intuitive.

- **Question 1.3 - Do you need to contact other users during a workflow action? When and how?**

  This question was to analyze the receptivity in a more direct way of contact, excluding the option of the use of "Café" application, that was previously referred. The responses about this were not that favorable for two reasons:

  - the platform should be for storing the last version of the documents and not the temporary ones;
  - the use of e-mails produced an official regist of the problems

  Although some users admit it could be an interesting feature to simplify the communication process and to solve problems quickly.

2. **Clients's feedback**

   Although the respondents' knowledge of customer feedback varied according to their function, it was possible to obtain information about clients from the majority of respondents. With regard to the goal of reducing the number of complaints, two questions have been raised in an attempt to determine a pattern in complaints and to understand how their treatment is handled.

   - **Question 2.1 - What are the main reasons to use iPortalDoc in other companies? Why and how are other companies using iPortalDoc?**

     The conclusions regarding the main reasons for adopting the system were the following:

(a) **Substitute a paper system:** this is to simplify the processes, invoices, billings and to save all the documents produced internally and from outside;

(b) **Adapt to a specific project:** some clients choose a specific module and it is only used for that functionality;

(c) **Replace an existing software:** the functionality about the tasks and procedures having a special function and organization, the e-mail versatility.

The obtained examples of processes are:

- organization of the financial procedures;
- mailing and mails management (internal and external);
- classifying all the phone calls;
- external contacts (example in a city hall management external contacts are used to communicate with the citizens and allowing to check the state of their processes);
- control deadlines of projects.

- **Question 2.2 - How are the suggestions and claims treated?**

  The claims and suggestions are treated differently. The suggestions from each client are registered and if a number of users want the same improvement it starts to be a priority. The claims are treated by the quality sector and create a workflow, that includes the claim analysis and the respective feedback to the claimant customer. This question was also oriented to understand if the process of managing a claim is easily replicated and the conclusion is that there is no difficulty of replication because the access to the machine is available, although they might have different levels of difficulty.

- **Question 2.3 - What are the main negative aspects reported?**

  The results for this questions include typical problems that are not specifically related to the software but about some specific procedures problems within the companies, like in the financial sector some wrong value in a billing process, or some specific problems related to a business sector. Additionally the interviews results about the software problems can be grouped in:

  - **Getting started**

    The general idea is that it is difficult to understand the processes intuitively, some interviewees suggest that the workflow procedure is a complex theoretical concept to some users. Therefore it is difficult to know how to do something without having previous training.

  - **Search engine**

    Since the platform includes a large quantity of files one of the most important features is to find the documents easily. The problems reported about this are about the way it works and how it does not work like Google, for example. Additionally even if someone understands the process the searches are not saved and the process needs to be repeated constantly.

- **Browser dependencies**
  When some browser updates occur sometimes some conflicts happen, and some problems that are not directly related to the software developments may occur.

3. **Improvement suggestions**

   In the improvement section, the interviewees had the freedom to express their own ideas about possible solutions of the problems reported. The receptivity to include a personal area was also tested.

   - **Question 3.1 - How do you work around the negative aspects?**
     Regarding the problems reported, the suggestions could be defined in three main areas:
     - **Improve the communication between teams**
       The suggestion for this area was to include a shared working area in the platform to produce a way to have feedback and communicate quickly with other users.
     - **Simplifying the use and the processes**
       This topic is mainly about simplifying some procedures in the platform, one of them is about the document update simplifications. The other big problem and one of the most important aspects of a document management system is the capacity to find a document easily, therefore some improvements in the search engine were suggested like search masks for typical searches according the user needs, for example easily finding previous searches, and in a general way to make it more intuitive and agile with less parameters.
     - **Increasing the help menus**
       The adaptation process to the software is one of the difficulties and some of the solutions are pointed around the feedback to the user about how it works, like define the basic functionalities, a set of standard procedures and documents, and have help information about menus, types of documents and directories, that could be general described as the increase of help tips in all the procedures.

     The other group of problems reported was the browser dependencies, and the only complete solution is the desktop application, yet an offline platform limits the access and has many disadvantages. Another question discussed was the actual limitations of the platform in mobile devices, although a simplified mobile version to solve this limitations is now being developed. Also specific suggestions for specific clients scenarios and for their repetitive tasks were found, but it is not interesting to define in this general solution to a document management system.

   - **Question 3.2 - What do you think about more options in your personal area in the platform?**
     Related to this, the conversation about this topic were oriented for the inclusion of a section for personal documents, since it was one of the ideas previously outlined to

increase the use of the platform and the ownership feeling, such it is to the documents purpose. Although, some interviewees argued it was not the purpose of this document system management, but instead to be a good platform to archive the documents final versions, even if it could be updated but it was important to have a perspective of a new final version update, also that this feature is not solicited by other customers, and that there are already some kinds of templates for documents.

Or the other hand, some of the users reported the fact that the update of the version is a complex process, and that in this kind of system it should be easy to change and edit a document. Other reason for the reluctance about this edition functionality is the kind of introduced documents, for example image or video edition are a functionality computationally complex to have there, this may happen in business areas such as architecture or marketing.

Additionally, some possible features of this personal area were addressed according some improvements suggestions, for example the workflow process allocates the actions to the users and all the user's e-mails, although when some document informations have been updated they are not easily accessed later, to solve this problem the options suggested are for example the inclusion of the recent activities in the website, not only including the actions and e-mails that already appear in the historic, but also the possibility to have an historic about searches, or even the most common ones.

- **Question 3.3 - Is there something you think should be possible to do in the platform and is still not possible? Do you have any further suggestions?**

  This topic includes additional ideas that were not addressed before, and additional functional improvements were also discussed, although this thesis is more focused the improvement of the actual operation instead the insertion of new functionalities these opinions contributed to a better perspective about the software.

  Regarding to this point, one interviewee's sentence resume the main reported idea: "possibilities can not mean complexity", this means the complexity of the software in the number of options and customization to fit different companies procedures, could have been the cause to the missing of some helpful usability functions and improvements in the user experience.

  The findings could be summarized as follows:

  (a) Improving the feedback in the errors occurrence;

  (b) Promoting the communication between teams about the improvements;

  (c) Reviewing the e-mails information dependency;

  (d) Including search tips and masks;

  (e) Facilitating the access to recent documents.

  Other two additional suggestions were the possibility to edit documents within the platform and the development of a better access in mobile devices, but it was previously explained that this options are out of thesis objectives.

3.3 Werbach Framework

3.3.1 Business objectives

This design framework was oriented by the business objectives of the company IPBRICK SA, to its document management system iPortalDoc, although, the founded results are replicable in softwares with the same purposes. iPortalDoc is part of the company communication solutions in a B2B strategy, responsible for the document and procedures management for different kinds of companies. In a generic way, the iPortalDoc platform is useful within a company to:

1. Register and organize all kind of communication related to a company's business;
2. Use standard workflows for document procedures;
3. Customize a workflow for different types of procedures and needs of a company.

The last item in the previous list is one of the main advantages of this platform, since this makes it possible to adapt the workflow for different types of procedures, according to the specifics of each company. However, it is also this feature of versatility that makes the platform's development base more open to developing a set of diverse options and as customizable as possible, this reduced the user experience priority, and this is one of the reasons justifying the interest of this project.

As a result, the main business goals with the definition of the design framework strategy are to:

- limit the number of claims;
- increase the number of platform users and how often they use it;
- attract new companies or business areas.

According to these objectives, and due to the high number of possibilities to approach this analysis, in accordance with the interests of IPBRICK SA, it was necessary to define some restrictions for this framework:

- **User type**

  In each of the companies in which the product is installed, there are two different types of users: end users and system users.

  System users are responsible for adapting the platform to company procedures, which includes customizing workflows and setting permissions for each document, as these vary depending on the responsibilities of each user within the company.

  The end user, who constitutes the majority of the company's employees, is why this user has been defined as the priority user for this project, and also because he is the one who handles the documents themselves. However, at the system user level, there is also much scope for gamification research, which will be briefly discussed in the section on future

work. It should also be noted that this distinction between users is not equivalent to the separation between back-office and front-office, since the system user also deals directly with the common interface to the end user and also because it is also a client profile.

- **Platform areas**

  Due to the fact that there are several areas and functionalities within the platform, it was also necessary to define which ones should be used first. In this way, the design framework focused only on the action windows, the document list, the search, and the management and archiving of emails.

- **Platform applications**

  As previously mentioned, iPortalDoc is only part of the set of telecommunications solutions developed by IPBRICK SA, of which an example is the corporate social network called "Café". Due to its nature related to the communication, this platform would be an important application to be taken into account in this gamification strategy, relating it to iPortalDoc, however, it was defined that this strategy at an initial level would not include this application, focusing only in the document management system and its challenges.

3.3.2 Target behaviors defined

According to literature review and the findings from the interviews, the target behaviors were defined. This definition also consists in determining the behaviors and how to verify and quantify its occurrence. A set of target behaviors had been established for a document management system, aimed to unify the communications within a company and to manage the main procedures associated to them:

1. **Communication and collaboration between teams**

   Communication is an important component within a company environment, one of the essential factors to its successful and correct operation, and also this behavior can trigger the company acculturation. The iPortalDoc actions window includes a set of tasks that one user should execute, this tasks are allocated from user to user (according the user functions in the company) and it is part of one document workflow. The aim of this target behavior is the clarification of eventual doubts between users during the tasks conclusion, for example a user may need to communicate about the task that was allocated to him or the document associated to it, with other users in the process. Nowadays in order to solve this problem it is already possible to produce comments about the document in the platform, but it is not a fast solution, and alternatively it is done using the corporative social network or the e-mail. On the other hand, the existence of an alternative instant messaging could discard the official register of the conversation. The quantification of this behavior could be made when a conversation inside the document happens.

2. **Tasks accomplishment**

In iPortalDoc, uncomplete tasks are presented in the actions window, when a task is accomplished it disappears from this window and moves to the historic, this information allows to quantify the number of tasks completed per user. A way to increase the number of tasks for all the users is to unify all the tasks allocation in the platform, when this software aims to register all the procedures within a company, this change means for example if there are user tasks allocated in other application extensions, since this tasks are outside of a document workflow, this inclusion in the actions window may produce more information about the user performance. The quantification of this behavior could be done easily with the information about the tasks completed. First, the feeling about the accomplishment of a task could be promoted with the redesigning the personal area. Statistical data about the tasks completed could be generated in the personal area, and the tasks completed by each team, which could promote the competition between companies and increase the feedback.

3. **Organize all the work in the platform**

   The use of the platform to the management and documentation of all the company activities could concentrate all the kind of work procedures in the company document management, instead of the only documentation related ones. In regards to what was previously stated, within iPortalDoc it consists in clarify and facilitate the comprehension of the tasks that could be done there, this could be obtained using a more detailed and oriented help system that follows the user activity, in a way he feels guided during the process. Moreover, the possibility to associate more tasks not only related with the documents workflow could be an option in the personal area, this satisfy the purpose to document and register all the procedures of the company and it is also another customization option.

4. **Find and acess the information easily**

   One of the main reasons to use document management system is to facilitate the organization and information access, in order to organize their work in a way that when it is necessary to find or share a document information it is easily accessible to different users, according the users permissions.

   This process could be done by the implementation of an intuitive search engine, the organization of document in personal and team area, which match with the next behavior too.

5. **Company acculturation and relatedness**

   The personal interest about the company may come from an ownership feeling, this could be made by the development of a personal area, the recognition of the work done in a certain team, and from an effective feedback system for the work done. This behavior may also appear from the implementation of elements that include more information about the company in a way that it makes the user feel related to the company where he works, for example with the use of games about company details.

3.3.3 Players

The iPortalDoc users are not an homogeneous group, since it is a B2B software that act in multiple areas. The qualitative research made using the semi-structured interviews helped to determine a pattern for different kind of users, represented here in different user personas with fictional data:

- **User Persona 1**
  - **Name:** Clara Rodrigues
  - **Age:** 55
  - **Job role:** Administrative in a City Hall
  - **Main functions:** Financial procedures, for example: process invoices, consult documents and sent documents to clients.
  - **Personall needs:** Methodical and repetitive processes to complete her daily tasks.
  - **Main frustrations:** Clara worked with a document paper system and she has difficulties to adapt to new technologies, now the iPortalDoc works perfectly for her but she is afraid of non-classified documents, any changes is her regular searches process or in the document insertion brings her anxiety and she can not work properly.
- **User Persona 2**
  - **Name:** Joana Sousa
  - **Age:** 35
  - **Job role:** Commercial in a Power Solutions company
  - **Main functions:** Contact with the client, share documents with him and deal with different kinds of documents from different users
  - **Personall needs:** Find the documents that passed by her easily by simple keywords
  - **Main frustrations:** Joana is not adapted to iPortalDoc yet, she does not always have the complete list of parameters from a document, due to this reason she finds it hard to find a document with the actual search engine.
- **User Persona 3**
  - **Name:** Tiago Silva
  - **Age:** 38
  - **Job role:** Technical support in an heating solutions company
  - **Main functions:** Tiago has a technical function and usually contact with clients personally or with phone calls
  - **Personall needs:** He is adapted to intuitive systems

– **Main frustrations:** Tiago works in the company for a long time, but he does not need to use the document management system regularly. Now, he needs to introduce a new document for posterior approval but he does not know how that workflow works.

These personas represent the kind of users, in a more general definition a huge part of them are not technologically adaptable, and some of the business areas have very conservative structures such the example of Portuguese public sector, reason why the introduced gamification design elements need to maintain a polite design aspect. The activity cycles, that will be described in the next step, intend to be in accordance with the needs described in these personas, and the other users characteristics mentioned.

However, the defined solution will include two different sets of players, although their profile is the same as described here, there will be two groups for the gamification levels defined. In one of them the set of players cover all platform users in different companies. In the other these are considered as an independent group by each company. These aspects will be explained in more detail in chapter 4.

3.3.4 Activity loops

In order to choose the activity cycles, the target behaviors defined and the opinions about the two solutions initially thought (personal area and communication between team members) were taken into account. According this, the choice of the activity cycles was made trying to facilitate the understanding of the functionalities of the platform and improving the communication and collaboration between the teams, for two main reasons:

- the most reported problem was the search for a document being difficult, and the fact that some of the other platform features are not very intuitive;
- according to the results of the interviews, one of the solutions was the increase in communication between teams, which would help to solve different types of problems.

Thus, three levels of gamification have been defined:

1. **Feedback set**

   This level includes a set of activity cycles and this allows an increase in feedback that the user receives, in this case this feedback is the same for all users in the same circumstances. This level consists of: user onboarding, updates notifications and errors fun. Each one will be explained in detail in the next chapter.

2. **Help center**

   In the help center the user can search for solutions to problems that were not included in the user onboarding of the feedback set level. This level includes all users of the platform, including from different companies, which increases the chances of collaboration. Within this level the user can: search for doubts that have already been answered by other users,

ask questions if he or she does not find them in the search results, and earn points whenever questions are answered, or feedback is given on current responses.

3. **Cooperation dashboard**

   At this level, that includes the previous two, a collaboration model is defined within each of the companies separately. In this case, there is a scoring system associated to the fulfillment of individual tasks and the accomplishment of team objectives, as well as the possibility of asking for help when doubts exist about a certain task, and the inclusion of constructive feedback in the analysis of the non-fulfillment of some task by a particular user. The points can then be converted into rewards.

Thus, three levels of gamification have been defined in which different cycles of activity are present. Each activity loop is constituted by: an **action**, produced by the user, a **reaction**, which constitutes the response that is given through the gamified platform after such action, and a **modifier**, that consists in changing the user experience as a result of this new platform reaction. In each of the activity cycles only one action is referred to as an example, but this will also happen in the occurrence of similar situations.

The first level is the feedback set, which includes three activity cycles:

- **Updates notification**
  - **Action:**user goes to the application and something was updated
  - **Reaction:**the user is notified, within the changed area, about the differences and he can see them
  - **Modifier:**the user experience was modified when an update occur, the user does not feel confuse with the change and knows exactly what happened
- **User onboarding**
  - **Action:** an employee login in the platform for the first time
  - **Reaction:** a guide tutorial about what he can do in the platform, but the user can follow it or skip it
  - **Modifier:** the user knows which he can do and how to do it, improving his user experience, though if the user already knows how to do it he can skip it easily, without negatively affecting his experience.
- **Error feedback**
  - **Action:** an employee is using the platform and the 404 error, that is generated when the page is not found, occurs, page not found.
  - **Reaction:** the platform has customized page to this specific error, that includes a funny message and gives the user information about what happened.

  - **Modifier:** now the employee knows the problem and may even have been less displeased with the situation, due to the funny message that was set for this kind of error in the system.

In the second level "Help Center" activity cycles can be described:

- **Question and answer help system**
  - **Action:** in the user onboarding the user knows where to find help, nonetheless if the user is still needing help he can search for it, or to ask a question if he stills need it.
  - **Reaction:** the user has the option to search for answers, and to ask for help if it is not already answered.
  - **Modifier:** the user feels secure and guided during his experience, also this promotes the cooperation and the community belonging.

In the last level called "Cooperation Dashboard" are defined different cycles of activity:

- **Recapture cycle**
  - **Action:** a user can not fulfill the task assigned to him within the deadline to do so.
  - **Reaction:** the user now has the opportunity to justify the reasons why he was unable to meet the deadlines of the task, these reasons are sent to the person responsible for this workflow and then analyzed in order to produce constructive feedback for the user, and about causes that can produce delays in deadlines.
  - **Modifier:** the user who failed to complete the task feels that he is heard about what has happened, and from a set of feedbacks from different users, a pattern of errors to be corrected can be constructed.

3.3.5 Fun elements

The fun elements related to this gamification framework are:

- The sense of security and the convenience in archiving documentation and improving the way the information is easily available;
- Promote self-organization, teamwork, and feedback information about the employee performance, since the statistical information is also one of the engagement elements in a games context;
- Foment a healthy competition between users in the help process, where the more altruistic and collaborative wins more points;
- Literally fun elements are also present in the errors feedback;
- The similarity of the personal actions to be fulfilled with an individual quest and the set of actions of a workflow as a group quest can be considered as fun elements of this model.

3.3.6 Proposed solution

In this project, the defined tools consist of the set of game elements to be included in the gamification framework, which were chosen from the pyramid of components, mechanical and dynamics referred to in the theoretical review.

Since the platform is especially oriented to the public sector in Portugal, and in general the group of client companies manage their processes in a very bureaucratic way, one of the objectives also taken into account in the chosen options was to try to include only components with a reduced visual impact, which will be explained in detail in the next chapter.

For this reasons, in this gamification framework, the **dynamics** promoted are:

- **Progression** according the getting started activity cycle and within the actual process of completing a workflow.
- **Emotions** at the level of emotions these depend on the user on a personal level, but this model is intended to promote the company acculturation, which means a positive adaptation to the values and culture of the company, promoting a sense of belonging, moreover, it is also to emphasize the feeling of comfort by knowing that doubts can be clarified, and failures are analyzed and not only penalized.
- **Choice** the choice is present in the opportunity the user has to choose the kind of reward he wants, after having enough points to do so.
- **Constraints** since it is a platform of a workplace, there are some restrictions that are for example: the tasks kind, the allocation of the same and the deadlines to fulfill each one of them.
- **Relationships** in terms of relationships these are established on the one hand in terms of users of the same team, who cooperate together to fulfill the workflow tasks. In addition, at a wider level, collaborative relationships are promoted among users who may be from different companies but who can clarify doubts among themselves through the help center.

In **mechanics** this choices are described as:

- **Rewards:** this mechanic is included when translating the accumulated points into benefits for the user, or for a set of users in case of completing a workflow.
- **Feedback:** is the mechanic that is included not even when it is asked but it should appear when it is needed, and permits the user to have information, and feel secure and oriented in the process. It occurs in conditions like an error happened and the user does not know what is going on. Another important aspect of this feedback mechanism is that when there is a non-fulfillment of an action there is a feedback loop between users, which allows the user to feel some kind of permission to fail as what happens in games and improve themselves, as well as the responsible side better understands the causes and what can be improved in the process.

- **Cooperation:** is the collaboration between teams that is present in the mutual help and communication, and also for the cooperation to fulfill all the tasks of a workflow.

And finally, the **components** included are:

- **Teams:** which are a defined division in every company that can be placed as a motivational tool, to produce an acculturation feeling and to increase the team communication advantages.
- **Points:** will be one of the elements associated to the activity loop of giving help which has associated a punctuation.
- **Levels :** are introduced in the getting started loop where the user has a progress bar for the platform initial introduction.
- **Content unlocking:** once the user can earn points, these can be translated into rewards that were previously known but which he could not benefit until he had the number of points needed to have access to them.
- **Quests:** in games this component is a challenging task that requires players to have a set of heroic efforts, a kind of mission that can be completed by group efforts or individually. In this case it can be considered that the fulfillment of a workflow by the set of task managers is an example of this component in group, that at the individual level can be compared to the fulfillment of an action.

3.4 Summary

Throughout this chapter the results of the methodology adopted for the construction of the gamification model were described.

In order to produce this set of information, a previous evaluation of the current level of gamification present in the platform was done first. Next, the interviews were described and their main results, which allowed to conclude that the main aspects to be improved were to facilitate access to information and to organize communication between teams.

In this way it was possible to start the Werbach and Hunter framework, in which after designating the business objectives and determining the target behaviors desired, it was established that the most appropriate strategy to produce these behaviors would be the inclusion of a gamification model divided into three levels. This levels include a feedback system to clarify the operation of the platform, a help system shared by all users of the platform, which promotes sharing and cooperation between users, as well as a system of cooperation between teams, which intends to take into account the importance of not letting the inclusion of gamification to affect productivity, and therefore the importance of asynchronous communication is also considered and the permission to fail is one of the games components that was also included. These aspects will now be detailed in Chapter 5.

Chapter 4

Gamification options and integration with iPortalDoc

In this chapter are detailed the options that have been determined for a document management system that has or may also consider the inclusion of tasks associated with these documents. These options were defined based on the iPortalDoc platform. Except for the interface enhancement that is specific to this platform, the defined models can easily be replicated to software with similar objectives. It should also be noted that these options have been grouped into three separated levels in order to satisfy different types of business interests.

4.1 User experience improvement

According to the company business goals, it was needed to simplify the document edition and to improve the search engine: joining document edition and change revision, which means placing the document edition all in one place; and optimize the search engine for all the kind of searchable parameters with the same input, unfortunately it was not possible to finish this two developments since the business goals have changed during the process and other tasks within the team such as the updated software testing have taken place, although an improvement about the document edition was made.

In order to make this change, it was necessary to understand how this document management system is structured, and more specifically the windows that includes the change of information within the document.

At the interface level, the document information window is composed by a group of cells containing different details about a document. The cells number varies according to the settings chosen for each document type, an example can be seen in figure 4.1.

The edition window (figure 4.2) permits to edit the document but the user needs to access it in the menu, and the revision window (figure 4.3) permits to edit the document and actualize information that is not in the edition window:

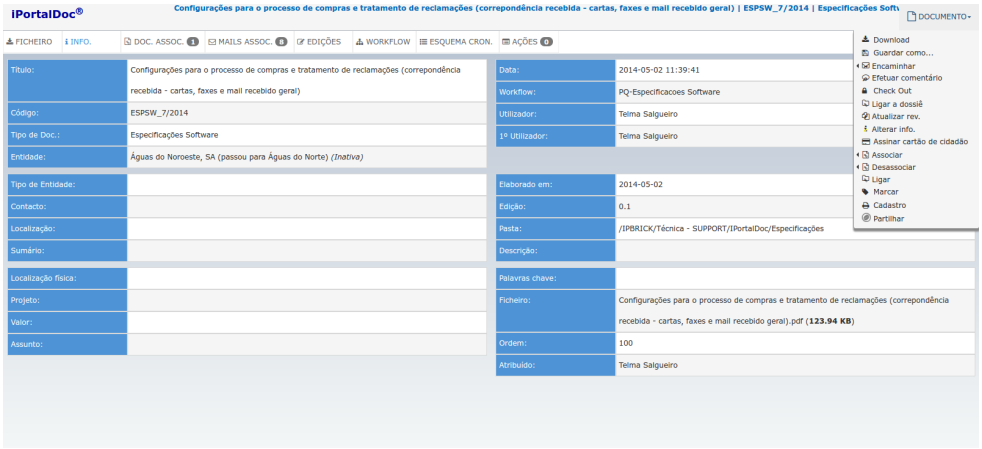

Figure 4.1: Interface with document information

During this process it was necessary to understand how this document management system is organized. First, every function that drew every cell of each window was studied, since the revision window and the edition window have different parameters, the example function chosen here, are for the title in the show and edit window, respectively.

Initially the intended goal was to change the document information window to make it editable, causing each of the cells to become an input at the click.

With the purpose of doing this, it was necessary to analyze each of the functions that draws each cell to the current edition interface of the document, as well as all the functions from the information visualization window, in order to make possible its unification.

This process consisted in passing the return of the function that draws each cell in the edition to the view mode, so that in cases where there are for example selection buttons with information that must be pre-filled, it is included in the cell when it becomes an input.

In figure 4.6 is shown an example of cells before the click in the viewing window that was changed.

After this change it is possible to verify in figure 4.7 that the clicked cells have become editable. This process is done through an Ajax request that occurs when the click is produced, in order to fill the cell with the input design, and with the input data if it exists for that cell.

This change also includes two buttons that serve to validate or cancel changes made to the input. The cancel button, to revert changes made by the user, did not already exist in the edition window.

However, the company verified that although it initially proposed this solution, the difficulty for the user in knowing which cells are editable, since these cells vary according to the users permissions, was no longer convenient. The company decided that the best solution would be to have a button that automatically makes all cells editable, although in terms of information processing this change may be computationally heavier, it is preferable within business objectives.

This change meant that it was necessary to study the whole process again and to understand

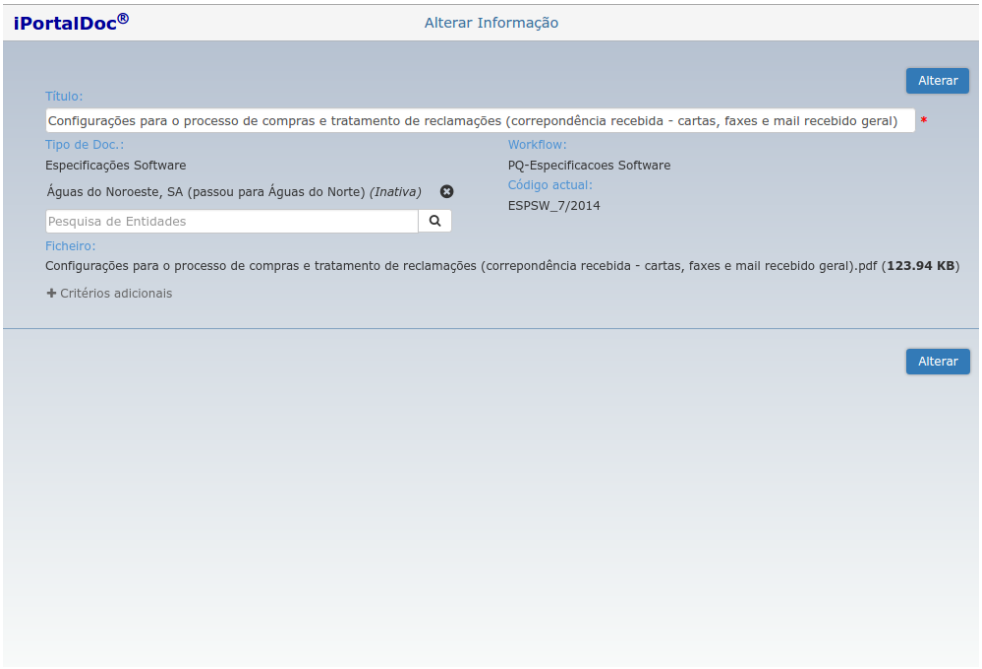

Figure 4.2: Initial window to edit document information

how the functions are called, in order to change them so that they can include the design of the inputs. This process has been lengthy and has not been fully completed, but once the explanation of this process goes beyond the scope of the gamification theme, and can not be replicated in other document management systems, the explanation of the other defined gamification models follows.

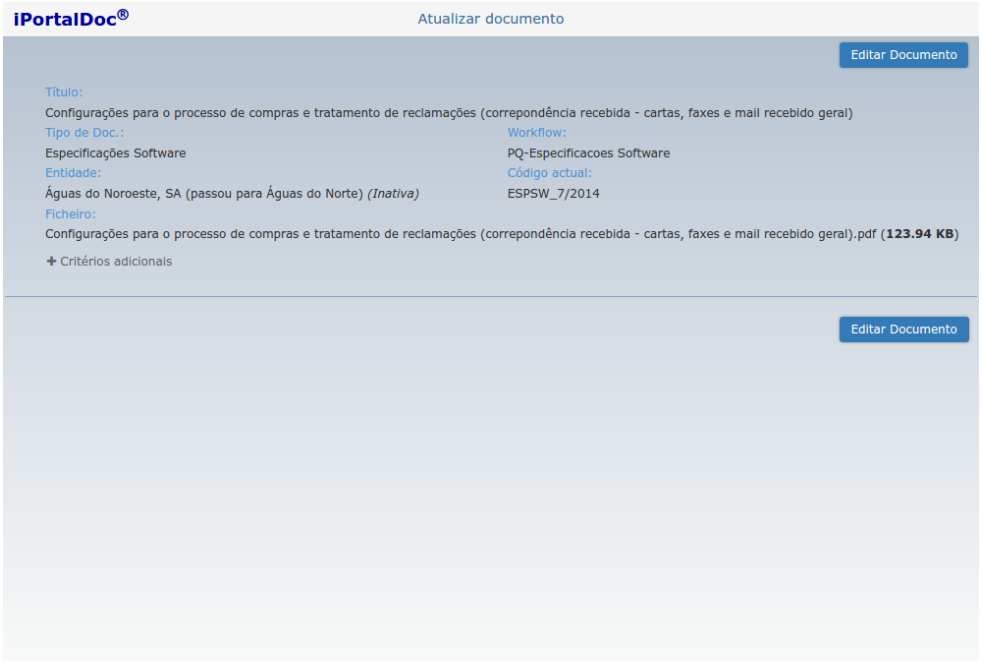

Figure 4.3: Initial window to edit document revision.

```
private function printShowdocinfoTitle($description, $inforevision)
{
        $str_aux = $inforevision->titulo;
        $attributes = Array();
        $attributes["class"] = "titulos nowrap formclassifcell " . $this->getFieldDescrAlign ();
        $cell = libElementsHtml::gridCell (
                $description . ":",
                $this->getCellDescrWidth(),
                $attributes
        );
        $attributes = Array();
        $attributes["class"] = "leftAlign formclassifcell";
        $attributes["id"] = "id_title";
        $id_element='title';
        $element_type = 'text';

        $cell .= libElementsHtml::gridCell (
                $str_aux,
                $this->getCellinputWidth(),
                $attributes
        );
        $str_output = libElementsHtml::gridRow ($cell);
        return $str_output;
}
```

Figure 4.4: Function to print the title cell

```
private function printElementFormTitle($description, $name, $titulo, $titlecomponents=array())
{
        if (count($titlecomponents) > 0) {
                $titulo = libGenericLayout::replace_code_by_description($titlecomponents , $titulo);
                unset($arr_params);
                $arr_params[0]["width"]               = $this->getCellDescrWidth();
                $arr_params[0]["value"]               = "";
                $arr_params[0]["attributes"]["class"] = "titulos nowrap " . $this->getFieldDescrAlign ();
                $arr_params[1]["width"]               = $this->getCellInputWidth();
                $arr_params[1]["value"]               = libGenericLayout::create_choice_table($titlecomponents, 3, "80%", "left");
                $arr_params[1]["attributes"]["class"] = "leftAlign nowrap";
                $str_td1 = $this->gridCells($arr_params);
        }
        unset($arr_params);
        $arr_params["name"]                   = $name;
        $arr_params["value"]                  = str_replace("\"", "&quot;", $titulo);
        $arr_params["attributes"]["maxlength"] = 200;
        $arr_params["attributes"]["id"]       = $name;

        $str_input = libElementsHtml::drawInputtext($arr_params);
        unset($arr_params);
        $arr_params[0]["width"]               = $this->getCellDescrWidth();
        $arr_params[0]["value"]               = translate_lang($description).": ";
        $arr_params[0]["attributes"]["class"] = "titulos nowrap " . $this->getFieldDescrAlign ();
        $arr_params[1]["width"]               = $this->getCellinputWidth();
        $arr_params[1]["value"]               = $str_input . $this->printElementFormMandatory($name) . libGenericLayout::createLoader ("title_loader_id");
        $arr_params[1]["attributes"]["class"] = "leftAlign nowrap";
        $str_td2 = $this->gridCells($arr_params);
        unset($arr_params);
        $arr_params["value"] = $str_td1;
        $str_output =$this->gridRow($arr_params);
        unset($arr_params);
        $arr_params["value"] = $str_td2;
        $str_output .= $this->gridRow($arr_params);
        return $str_output;
}
```

Figure 4.5: Function the title cell editable.

Título:	Nome
Código:	PMF_8/2016
Tipo de Doc.:	Pedido de Marcação de Férias
Entidade:	
Tipo de Entidade:	
Contacto:	
Localização:	
Sumário:	
Localização física:	swswqfw
Registo:	
Centro de Custo:	
Funcionário:	

Figure 4.6: Before click in document info

Figure 4.7: After click in document info

4.2 Gamification levels

Finally, the three levels of gamification defined in the Chapter 3 model are now detailed.

These models reflect the conclusions obtained from the analysis of the use and the users from iPortalDoc platform, and trying to avoid solutions that have been strongly criticized, when this goes against self-control and decrease the productivity of its users, especially since it is an application developed for the workplace, these factors can be detrimental to compliance the company's business objectives.

In this way, the defined model is based on the use of the platform and its current functionalities. This gamification framework is divided in three levels: feedback set, help center, and cooperation dashboard. Each next level includes the previous levels. The "Enterprise Architecture" software was used to design the use cases and class diagrams required to the design of the database model, in order to define the levels two and three structure.

1. **Feedback set**

   This first level includes only one non-personalizable help, this means feedback will be the same for any user in the same circumstances. The options chosen for this first level are aimed at giving the user basic information about the platform functionalities, inform him whenever changes occur at the interface level and include feedback in the occurrence of errors, so that the user feels informed about what happened.

   Accordingly, the options chosen were designed for the following situations:

   - User is a beginner on the platform;
   - Platform software has undergone some changes with reflex in the operation of the interface;
   - Occurrence of an error of a set of common errors in a website.

   In this way, this first level is divided into three parts:

   (a) **User Onboarding**

   This concept is related to how long a user stays on the page the first time he uses it, where he decides whether to like it or not. Although in this case the platform users do not have this decision power, the purpose in this case is not to prevent the user to leave the page, which is usually done using for example a trigger to create something before the register, so that the user feels he/she might lose something if he decides to leave the page without registering. This is not applicable here since this solution is intended for company employees, already registered in it, and the platform sales strategy in this case do not go through this user experience neither.

   In this case, the user onboarding process must include all the necessary information to the user so that he can perform the tasks that he needs within the site, without needing an initial help. Thus, in the case of a document management system, this should

include a presentation of the most used functionalities, for example: the introduction of a document and the documents search.

(b) **Updates notifications**

The majority of interviewees felt there are usability issues when an update occurs, for example when a button disappears and there are a misunderstanding if it is a bug or a change, even for the other teams not responsible for the development it is useful if this modification is clearly identified within the platform. On the other hand, the specification of the change in the place where the interface has been modified makes the user to be informed only when, and if, he needs to use it, and until he use it. This implementation includes an additional requirement in the platform improvements or bug corrections, where the responsible produces the before and after details about the feature changes, in order to the notification to be positioned in the right place and correctly detailed. The reflection of this change in platform development is that whenever there is a change on a particular page or section, and the user goes there for the first time, a notification appears informing the user of which the change was.

(c) **Errors fun**

The third aspect of this feedback set is the errors customization. The most common case is the 404 error page not found, and this page error has been personalized in many different websites to give feedback to the user about what happened. This is an example of applying a fun component directly, aiming to reduce user frustration when something does not work properly.

2. **Help center**

This level includes all the features of the previous level with the addition of an area where help is centralized, this means that this level consists of a new platform section where the user can look for platform usage tips and ask for help from other users, if he could not find the information he was looking for. Since this project is aimed at several companies (B2B software), to optimize the help center's capabilities, it should include all users of the platform. Multitenancy is the way to connect users from different companies, a tenant is a group of users that share certain characteristics of access to a software instance, so multitenancy consists of having an application in which a single instance runs on a server that can serve multiple tenants. In this case, although this multitenancy functionality is not yet fully developed in iPortalDoc and it may not exist in other document management systems, this solution can also be applied only in one installation, only with the disadvantage of having a smaller and less diversified users group.

- **Use case**

Figure 4.8 shows the use cases for this help center, where the main processes and activity cycles described in the previous chapter can be observed. Here, the main structures of user interaction with the help center are defined.

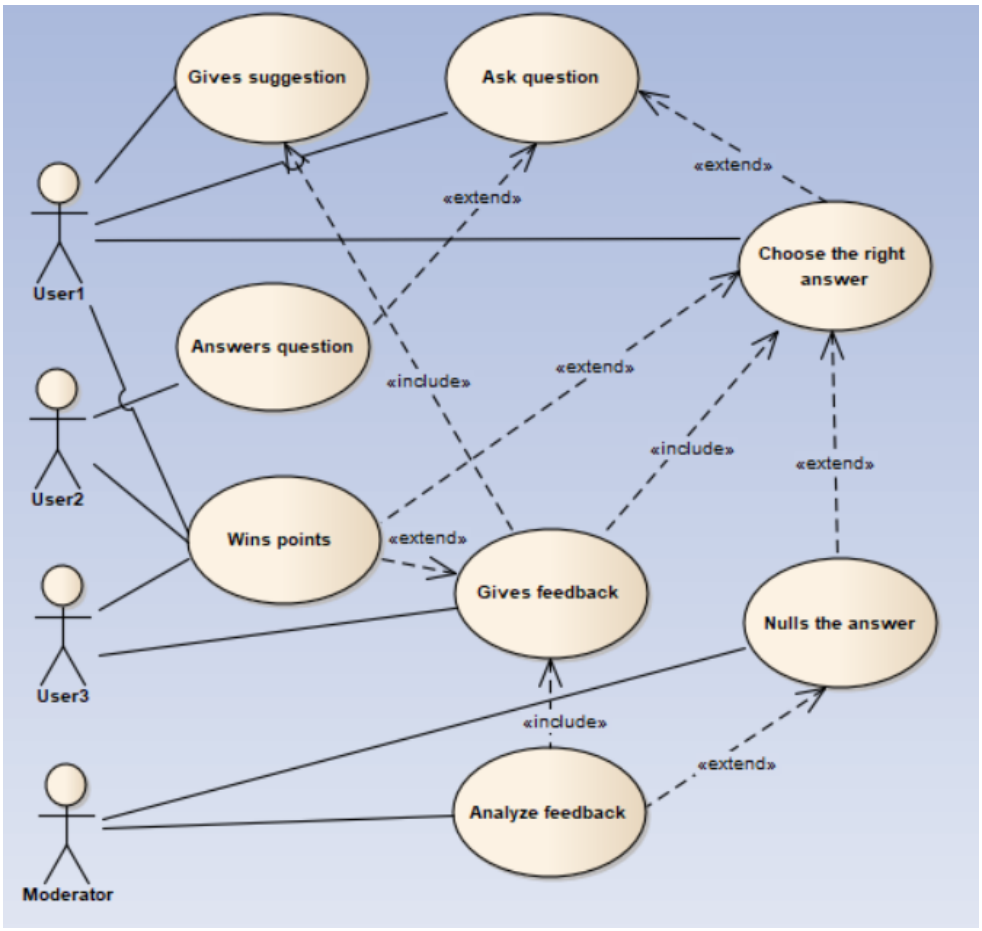

Figure 4.8: Use case to the help center

– **Actors**

  The actors represent the humans interacting with the system, in this case only the two most important are mentioned, although there are some other actors common to the whole platform that were not mentioned here for simplification, for example an administrator profile with the management and control roles common to this kind of user.

  User - each user can perform different interactions with the platform, the user in this case refers to who accessed the help center to search, ask questions or give answers.

  Moderator - in this case, the main function of the moderator is to manage the response system manually whenever necessary.

– **Use cases**

  The cases associated to searching information within this new help center page was not represented, due to no new relevant requirements about that cases were defined. Furthermore, the main function of the moderator is to manage the re-

sponse system manually whenever necessary.Therefore, the represented cases associated with the two actor types are:

User:

* **Ask question:** the user can enter a question on the platform, after doing a search.
* **Choose the right answer:** the user who introduced the question decides which response is most appropriated. The other answers will no longer appear, in order to promote the search objectivity for a response by other users
* **Gives answer:** the user can reply to the question posed by other users, or for himself.
* **Gives feedback:** users can evaluate positively or negatively the suggestions and responses chosen.
* **Gives suggestion:** a user can share usage tips.
* **Wins points**

  Points can be obtained in four different ways:

  Answer to a question

  The answer to a question is always valued to encourage users to collaborate.

  Deciding the right answer

  The user who asked the question should decide the correct answer, and the fact that he does not leave the question opened is valorized with points.

  Chosen answer to a question:

  If the user's answer is chosen for that question, he receives more points.

  Feedback to suggestions or answers chosen

  The feedback options are only positive and negative, since it is a help system for usability tips, and not a system of code suggestions such as Stackoverflow. This definition and the choice of only one response is intended to reduce the information transmission time and the visual noise of unnecessary comments.

Moderator:

* **Analyzes feedback:** the moderator is responsible for analyzing the feedback given to the suggestions and answers chosen.
* **Nulls the answer:** the response can be canceled if negative feedback is greater than a certain value or the moderator has reasons to do so. This will change the state of the question, allowing this question to be answered again.

- **Database model**

  Next, the class model for the database, shown in figure 4.9, is presented.

  – **Tag:** this table allows classifying the helps which will allow to create filters for the organization of them in the help center section.

  – **Post:** each user text entry is considered a post, which can be a question, suggestion or comment.

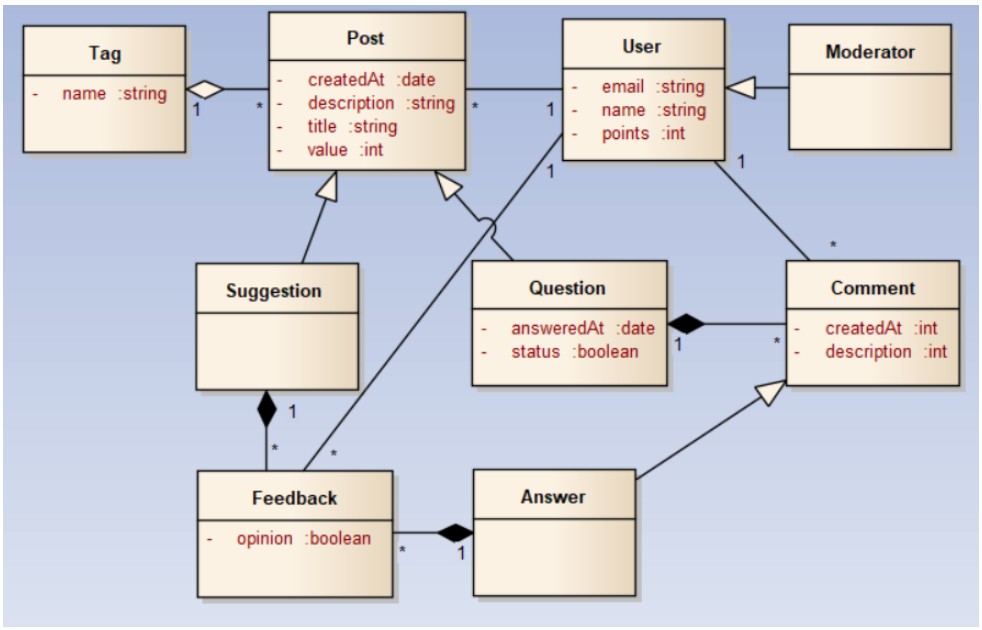

Figure 4.9: Database model to the help center

– **User:** the user table includes user information as a help center user, including the score obtained from the response to help requests, with an higher value in the case of his answer has been the chosen answer. Choosing the right answer to a personal help request and give feedback to an existing help are also ways to earn points.
– **Moderator:** moderator is a user type. The moderator has in this case the role of regulating the system of questions and answers and is responsible for verifying if a question is necessary in case your feedback is not positive by the users.
– **Question:** the question is a post type that the user creates when he seeks to know a new answer about the platform's operation, and he does not find it in the current list of helps.
– **Suggestion:** the suggestion is also a post type, but in this case it is produced by a user who wants to share his knowledge about the operation of the platform.
– **Comment:** a comment is also a post type, but this post is intended to answer a question from another user, or the user can also answer a question from himself, if he finds the answer. In this case, the user who gives his own question and answer has exactly the same points as if he only created an suggestion. According this, a question just by punctuation will not be created.
– **Answer:** the answer is the comment chosen by the user who created the question as the most appropriate response to the problem.
– **Feedback:** feedback class represents the option user has to give feedback to a response or a suggestion in order to value the contribution of the person who

shared their knowledge and to evaluate the helps quality.

Additionally, figure 4.10 is an illustrative example of the help center level. In the figure is showed an example of help categories as well as user participation statistics. The research would allow the return of results from any of the different categories, and the user should make their suggestions or questions only after verifying that they are not already mentioned in the current help list.

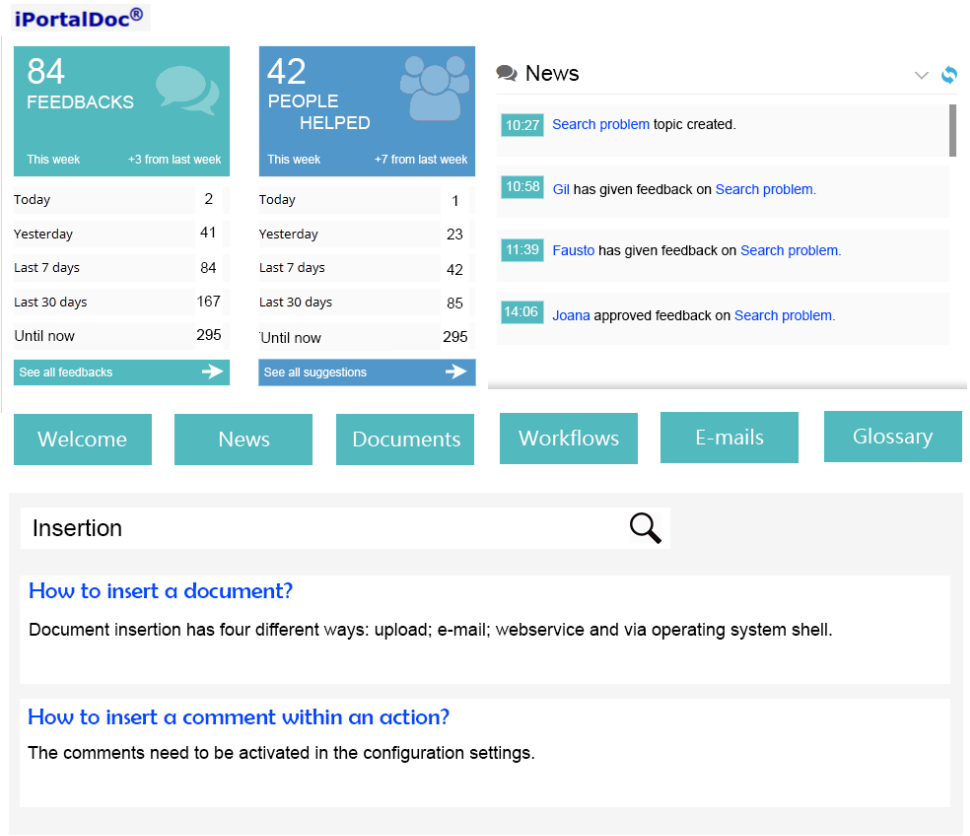

Figure 4.10: Illustrative example for the help center interface

3. **Cooperation dashboard**

This level can be included in the personal area of a document management system. It was thought according to the details of the current structure of the iPortalDoc platform, which already include a focus for personal tasks, while not having many components of team spirit promotion. In addition, at this moment in the platform statistical components that aim comparing users performance in different parameters already exist.

According to this, the model was defined based on some of these details to organize and improve the actual cooperation between the employees within a company, but such could be easily expanded and adapted to other document management systems.

- **Use case**

  Figure 4.11, 4.12, 4.13 and 4.14 show the use cases for this cooperation dashboard. Here, the main structures of user interaction with the cooperation dashboard are defined.

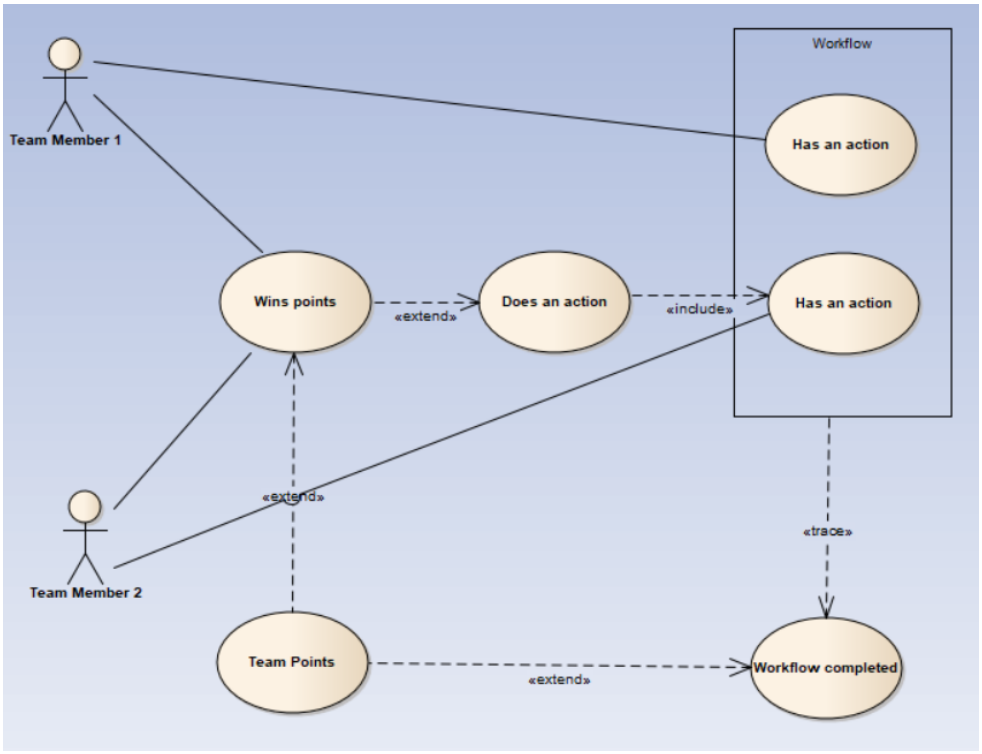

Figure 4.11: Use case diagram representing workflow and actions in the cooperation dashboard

  – **Actors**

    As in the case of the help center, other actors interacting with the system may exist, but in this case it was also chosen to represent those more specifically related to this "Cooperation Dashboard" model. Furthermore, in this case unlike in the case of the help center, the set of users to consider are only of one company, this does not invalidate the combination of the two levels, since this is an inclusion in the user's personal area and all the previous level was considered as the creation of a new section on the platform.

    Team Member

    In this use case a Team Member is the representation of an element of a workflow, where the set of users who have actions in this workflow constitute a team. For document management system, these actors are the elements set with actions on a particular document. However, this model can be applied even within this document management system to any other tasks with different users and actions that may be included in the platform, or for example be easily applied to any project team. A team member may take actions, ask for help in performing an action, and

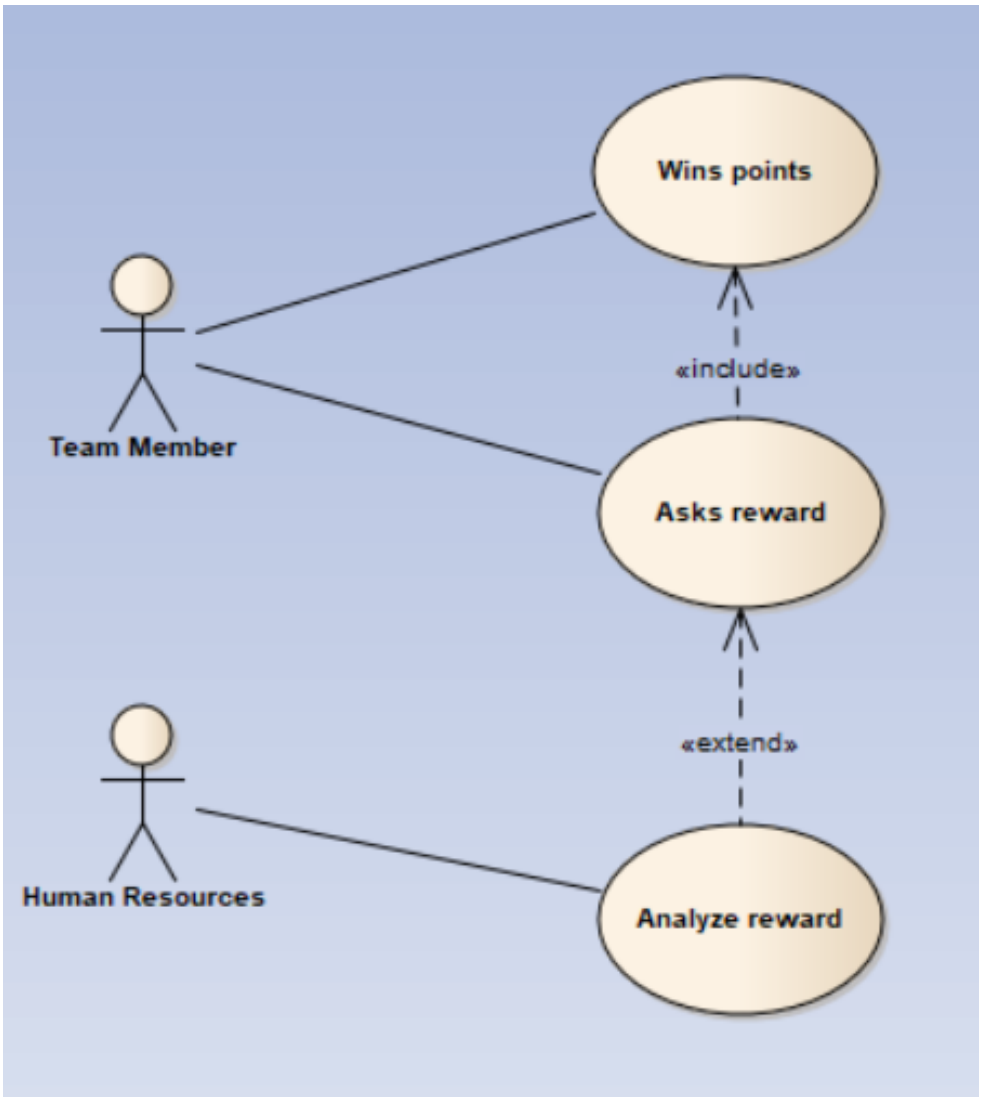

Figure 4.12: Use case diagram representing reward cycle in the cooperation dashboard

in case of an incomplete action, he will not be immediately judged, but instead he will provide feedback on why he was unable to meet the deadline.

Workflow Responsible

This actor is responsible for guiding the team and analyzing the tasks accomplishment, in an objective and empathetic way. The workflow responsible will analyze the team member feedback report when a deadline is passed, verifying if the reasons were team member responsibility and / or if future strategies to avoid this can be implemented.

HR

The role of the human resources manager in the cooperation dashboard consists in the bureaucratic validation of the rewards chosen by the team member. Not all HR interactions with whole system are represented but only in this new component of

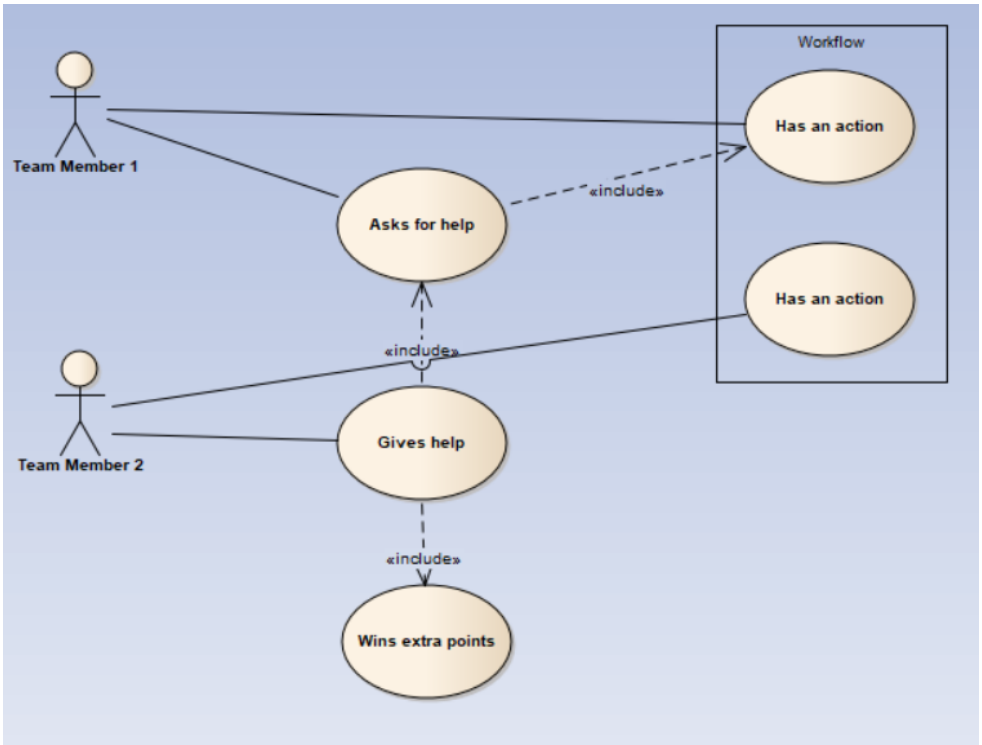

Figure 4.13: Use case diagram representing help cycle in cooperation dashboard

the platform.

– **Use cases**
For dashboard cooperation, the interactions of each of the actors with the cooperation dashboard system are now described
Team Member:
  * **Has an action:** the team member has an action associated with a document workflow.
  * **Workflow completed:** this use case corresponds to the moment in which all the actions of a workflow are complete. Currently, in iPortalDoc this moment is signaled through an icon that stops being red and turns to green when all the document actions are properly finished.
  * **Asks for help:** during the period established for the action accomplishment, the team member can raise questions about the workflow, which can be answered by the other team members.
  * **Gives help:** a team member may respond to another user's questions, but it is not obligatory to do so.
  * **Does an action:** in iPortalDoc tasks associated with documents are called "actions". This use case corresponds to the finalization of a task performing on the document, but it can be equivalent to completing any team task that might be included on this platform type.

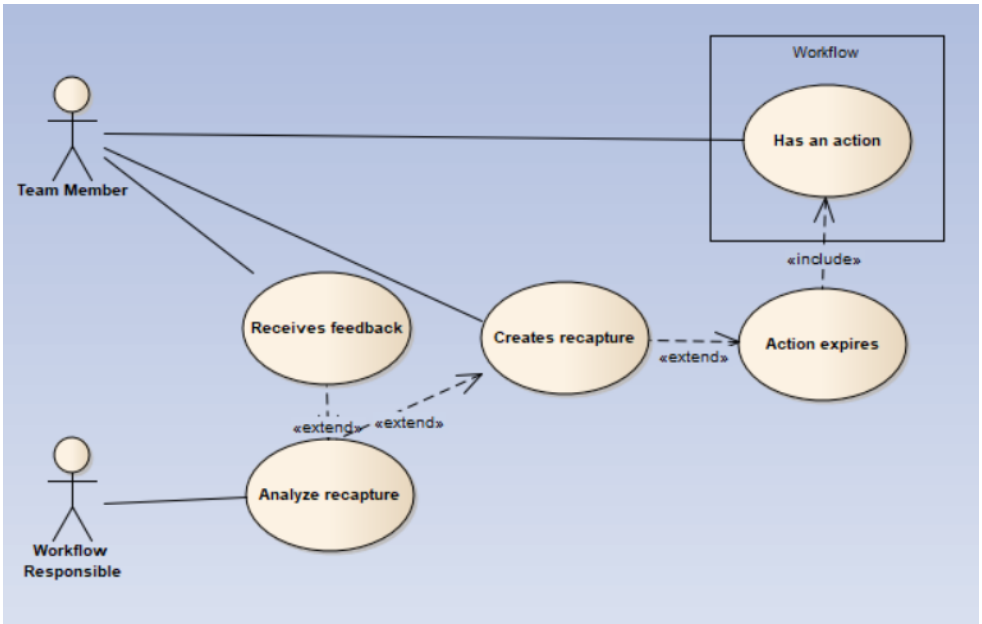

Figure 4.14: Use case diagram representing recapture cycle in cooperation dashboard

* **Action expires:** an action generates a notification informing the user that it expired. Currently, the trigger that produces an e-mail to the user, when his action is close to deadline, is an actual iPortalDoc mechanism that can also be included in this cooperation dashboard.
* **Creates recapture** if an action expires, a small survey is sent to the user, in which he can express the reasons why the action was not completed within the deadline.
* **Receives feedback:** the team member whose action has expired will receive feedback from workflow's responsible about the report produced.
* **Wins points:** a team member earns points every time he completes a task.
* **Wins extra points:** the bonus points are earned when some user collaborates in the clarification of doubts of another team member
* **Team points:** whenever a team manages to complete a workflow, points are earned for the team, which can be converted into benefits for its team members.
* **Ask reward:** the user can convert his points into benefits, defined according the company business strategies, such examples are:
  - days off;
  - work schedule flexibility;
  - next task's choice.

Workflow responsible :

* **Analyzes recapture:** this use case corresponds a feedback system that allows to include the permission to fail, characteristic of many game environments, in which the player manages to evolve, not being paralyzed by the fear of failing.
  The idea is in a constructive way, instead of a merely authoritarian attitude, also to analyze the failures causes, registering them in order to develop better work methodologies when needed and possible, but maintaining the commitment and responsibility character of the team member [29].

HR :

* **Analyzes reward:** since the rewards affect the general workflow defined by the company, these rewards should be a compromise between the company needs and the team user intents. Therefor, it is necessary to introduce a mechanism sufficiently adaptable to find a symbiotic equilibrium for team members and the company.

- **Database model**

  The database model for cooperation dashboard is represented in the figure 4.15.

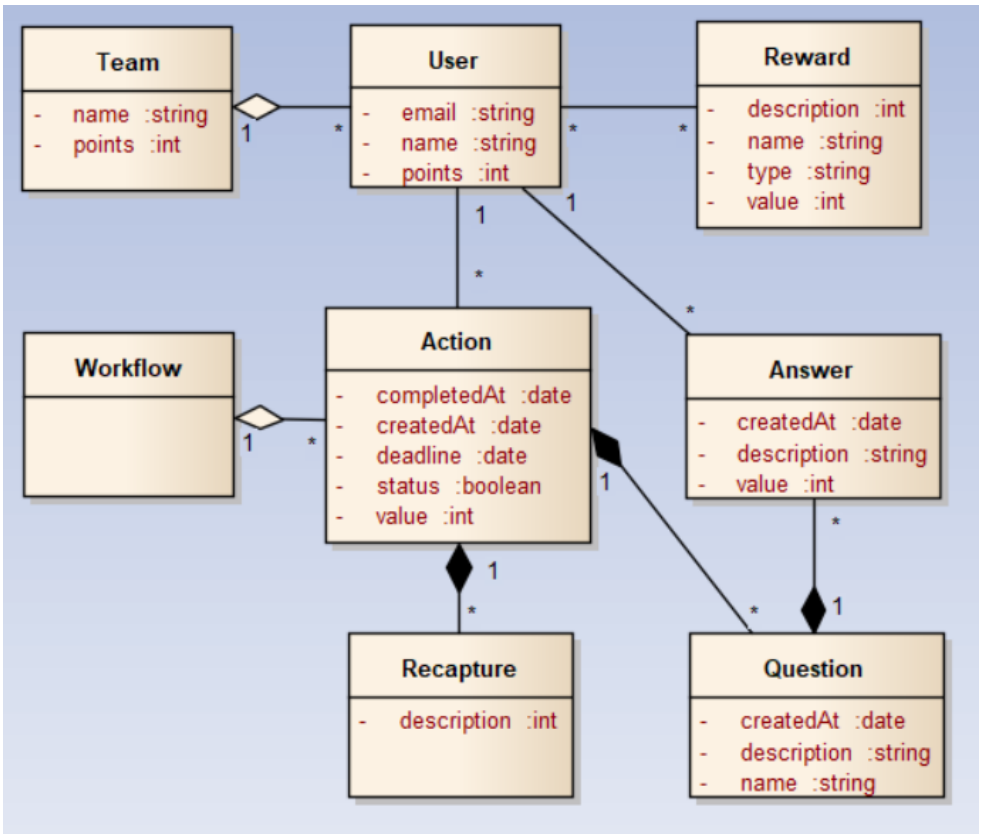

Figure 4.15: Database model to the cooperation dashboard

- **User:** the user class contains the user information including the points he/she already owns, also the connection with the other classes will allow the statistical data production customizable by the user.
- **Team:** the team is the workflow users group, which also have a score according the number of completed workflows.
- **Workflow:** each action belongs to a workflow. A workflow can be compared to the mission of the team, which in this case will promote cooperation among team members because everyone benefits from meeting the established goal.
- **Action:** each workflow consists of actions belong to different users. The action, when completed allows to win points that could later be converted into benefits within the company, and in case of an action not being fulfilled, an analysis of the causes of such situation will occur in order to establish some team work improvements if needed.
- **Reward:** this class has different reward types with different values corresponding to the points that the team user needs to achieve this goal. This reward can be either individual or for the team, thus also promoting the development of a team spirit and cooperation.
- **Question:** a team member can create a question whenever he has a doubt about the task he has to perform or related to the document to which his action or actions are associated. When a workflow is completed with unanswered or not canceled questions, a slight decrease in the score by the end of the workflow occurs, in order to avoid these unnecessary questions, taking time from other users searching for a response when it is no longer needed, or promoting a future collaboration in case the team user has not obtained a response.
- **Answer:** the response of a team member allows him to collaborate with other elements of the team and help in finalizing the workflow and earn points in reward. In this case the user can close his question as soon as a response that satisfies his need is obtained, to minimize the time wasted with this. This time is controlled by the difference between the time a question is created and answered, having a higher value when this difference is shorter.
- **Recapture:** in case of an action not being fulfilled, an analysis of the causes of such situation will occur in order to establish some team work improvements if needed. This process starts with a notification to the user with a feedback survey about the delay causes. This will happen when the user can not meet a task deadline, and it will be useful so the team member can explain and understand why it failed, and improvements, if identified, can be made. The document will be included in the document management system, in order to produce and provide useful data about the procedures evolution.

Additionally, the figure 4.16 is an illustrative example of an user interface for this level definitions. In the example are represented: on the right side information regarding the user's punctuation and its current actions, on the left side, the messages menu which include: the answers to the help requests, the "recapture" messages, which indicate that the user should fill in the feedback on the expired action deadline, as well as the messages regarding the rewards' requests and approvals, for team or personal rewards.

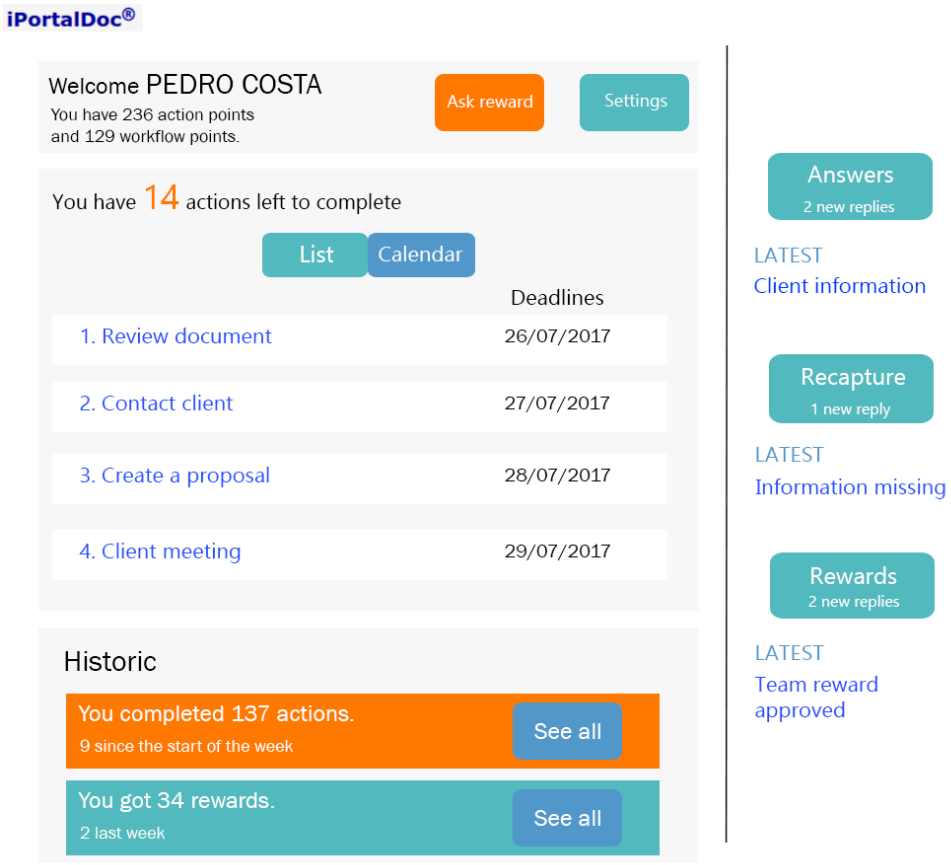

Figure 4.16: Illustrative example for the cooperation dashboard interface

4.3 Summary

In conclusion this chapter has explained the gamification framework model developed. This model details an user experience improvement in the iPortalDoc platform, and three gamification levels defined: feedback set, help center and cooperation dashboard. The main details of each level were explained, and use cases and database models diagrams for level two and three have been included. These levels were intended to include, in particular, game elements that promote easy access to information and efficient communication between teams.

Chapter 5

Conclusions

This thesis goals were to define a set of elements that would allow to apply a strategy of gamification in a document management system, shaped for different companies processes. The main criteria was defined considering the solution versatility in order to be suitable for different users, and also trying to avoid criticisms made to current solutions as to their influence on productivity and self-control in the workplace.

5.1 New octalysis evaluation analysis for the purposed solution

A new evaluation of the platform with the inclusion of the proposed solution is represented in the diagram 5.1. In general, it is possible to verify that there was an increase in the weight of elements at the top of the diagram, which did not happen with the other ones as intended, due to not motivate workers to perform actions more influenced by the speed how they do it, instead of the quality how it is done.

Particularly, there are three major core drives increases:

- **Empowerment of Creativity & Feedback (8)**

  The level one of the model purposed (feedback set) increased this core through the inclusion of different feedback kinds. Other feedback type can also be found for example in level three through recapture cycle, where the user receives feedback in a constructive way, which can motivate him by indicating him tips to carry out his work better, continuing to use the platform to do it.

- **Social Influence & Relatedness (8)**

  This core drive was included in the solution proposed primarily at levels two and three, help center and cooperation dashboard, respectively. In the case of the help center the social influence is present when the user can contribute, in a visible way, to help other users, and win points and recognition from them. In the cooperation dashboard area, this level increases the user's relatedness to the platform and increases the cooperation between the teams and the users social influence.

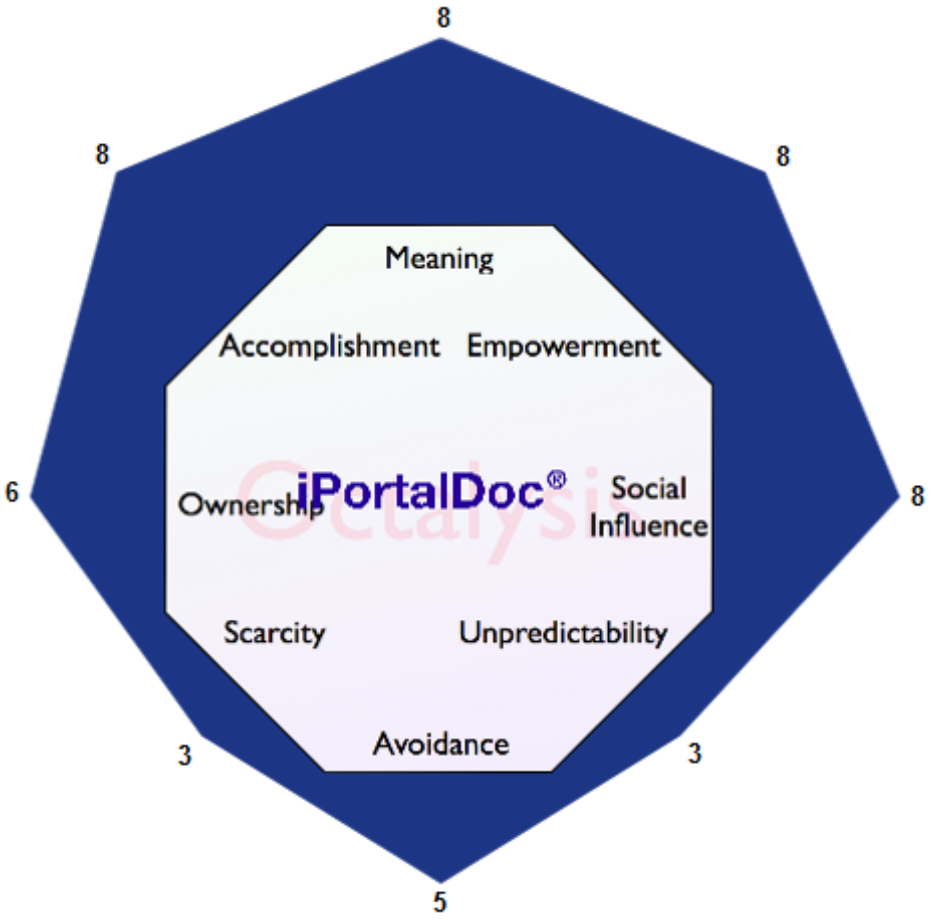

Figure 5.1: Final evaluation with the Octalysis framework

- **Ownership & Possession (8)**

  Since the the user's personal area have been increased, as well as the way how the user now becomes more informed about the platform operation. This allows to increase this core drive motivation and making the user feel related, and that he has personal data and space within the platform, for example by the information he may now collect in the cooperation dashboard, and the help information he can produce within the help center.

5.2 Results analysis and objectives accomplished

Regarding the first research question, the intended behaviors for the software use were determined, according to the platform analysis in combination with the interviews results, as being: the communication and collaboration between teams; the promotion of the tasks fulfillment; the organization of all the work on the platform; the easy information access and the promotion of company acculturation and relatedness.

These behaviors have been determined in a specific way according iPortalDoc platform users, but these are considered sufficiently versatile to other platforms intended to organize documentation and tasks within a company. It was decided to focus on these two behaviors, that allow easier access to information and the promotion of company acculturation and relatedness, since these behaviors may satisfy some company's objectives and also because these were the most described in the interviews.

In this way, the activity cycles established were defined considering the promotion of these behaviors. The choice was a gamification strategy divided in three levels.

The first level includes feedback activity cycles, which are the same for each user in the same circumstances, allowing the user to have clear information about what happens on the platform and how he/she can use it, which is intended to promote the platform engagement.

The help center is the second level and differs from the previous one in that the user can ask specific questions and can also share his/her own suggestions, in order to express his/her creativity.

Finally, the third level is the cooperation dashboard that aims to optimize the tasks accomplishment, to facilitate the communication between teams, and to produce constructive feedback regarding the performance of each user. Therefore, the inclusion of these activity cycles may improve the user experience.

Unfortunately for time constraints, the goal regarding the implementation of the solution developed could not be completed. However, the analysis of the platform users allowed to obtain important conclusions about its behavior and some of the platform limitations that could be corrected. In addition, it was not possible to effectively consider some accessibility issues which should not be disregared in the design of an application and in the platform user experience.

5.3 Future work

It is suggested the full implementation of the proposed solution as future work, according the defined requirements set, which already include extensive details about each level. However, it is necessary to adapt this proposed solution to the company context when this development occur, and the current design of the existing platform.

In addition, it is also purposed the development of a new solution considering all the desired behaviors that were found for the platform through this investigation, which may produce new and interesting results.

Further, the prospect of being able to gamify a document management system, serves as a stimulus for future research on the gamification about other aspects of the company corporation itself, according some other intended behaviors. Since the focus of this study was on the company goals presented it is not inconceivable that similar gamification frameworks of the platform would have arisen if the focus had been on other target behaviors, such as reduction of paper consume. Not only the design gamification of the platform could increase self motivation more effectively, but also further experimental studies are needed to this specific companies to determine the details of the employees behavior, and of the company's environment that could influence why and how

iPortalDoc is used. Another important issue to include in future researches is the analysis of the different possibilities in result of the inclusion of other extension of the iPortalDoc platform, as are examples "Café" and the "Groupware" e-mail, that are social and useful tools to the employee's work and could have important opportunities to improve the gamification framework developed.

More than the exclusive use of gamification in the platform, it could be implemented a gamified system to promote social company behaviors for example, which may influence and also improve the company organization.

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