RE-CONCEPTUALISATION OF INFORMATION QUALITY: A CRITICAL REALIST PERSPECTIVE

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Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

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To my mum,

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به خاطر صبرش و مهربانی و عشق بی نهایتش

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Abstract

This thesis develops methodological and conceptual guidelines to study information quality based on the principles of critical realism. Information quality is a multi-disciplinary and domain specific field of research. Thus literature on information quality spans a variety of research assumptions and research methods and consequently diverse definitions and conceptualizations of this phenomenon. Despite this diversity, information quality studies fail to provide a holistic view on this phenomenon and fail to address practical challenges resulting from complex contextual situations and technological advancements.

To address these problems, this study draws on principles of disciplined-diversity and critical realism philosophy, to provide a basis for information quality research by 1) developing an ontological framework of this phenomenon and 2) providing methodological guidelines associated with the ontological understanding.

The ontological framework of information quality is developed based on the critical realism assumption of a stratified reality, this ontological framework is further developed by defining IT artefact, social context and individual as the main entities involved in forming information quality perceptions. With this ontological understanding of information quality, new research questions and directions emerge in information quality studies. The methodological guidelines are developed based on critical realism principles and the concept of retroduction, and following Layder's (1997) adaptive approach in sociology. These guidelines provide a coding system and typology of contextual structures as analytical tools to hypothesise generative mechanisms in concrete studies of information quality.

This thesis mainly contributes to information quality research by providing research directions and guidelines to study this phenomenon in a disciplined way and in different contexts. Researchers can position their work based on different aspects of the proposed ontological framework and justify their approach based on this framework and proposed methodological guidelines. The methodological guidelines and discussions in this thesis also provide an exemplar of a disciplined approach that could be applicable in the IS domain in the study of other IS concepts and phenomena

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Chapter 1: **Introduction**

This thesis presents a novel approach to the study of information quality (IQ). It aims to shed light on IQ research challenges arising from the development of new technologies and the emergence of new contexts of use, that require changes in IQ's definition and related research methods. This study will address questions such as: what is IQ; how can researchers gain insight into how quality is perceived by information users; and how can IQ can be studied empirically?

This chapter (1) outlines this study's motivation and background; (2) gives an overview of the challenges in studying IQ; (3) describes the research goals; and (4) briefly presents the strategy to achieve the said goals. Finally, (5) the contributions this study makes are summarised.

1.1 MOTIVATION FOR STUDYING INFORMATION QUALITY (IQ)

We live in an interconnected society with a huge quantity and variety of information and information sources available. Thus, a main concern for both researchers and practitioners is the quality of this information. Information and/or data quality has been a topic of study for more than four decades among business analysts, solution architects, data base experts and statisticians (Sadiq, Yeganeh, & Indulska, 2011). This concern with information quality (IQ) has arisen because of the observed impact of low quality information on organisations' performance and on the quality of decisions made based on this information (Blaylock & Rees, 1984; Jones & McLeod, 1986). Poor IQ can impair an organisation's strategy (Redman, 1998) as well as the quality of the services and products it delivers. Consequently, IQ can influence organisational trust and customer satisfaction (Sadiq et al., 2011) and thus the success of information systems within organisations (DeLone & McLean, 1992). In information system (IS) research, IQ has been one of the main constructs used in IS success models (DeLone & McLean, 1992, 2003; Fisher, Chengalur-Smith, & Ballou, 2003).

With the rise of new technologies such as decision support systems, intelligent terminals, word processing, email systems and so on (Watts, Shankaranarayanan, & Even, 2009), the role of technology in providing key information to organisations has become critical. As a consequence, IQ as a research concept has received increased attention from researchers in different disciplines.

The ever-growing diversity of readily available multi-media information, combined with the availability of various technologies to store and collect data (such as social networking technologies and big data), have led to greater accessibility to information both for organisations and for individuals in decisions about everyday life (Sadiq et al., 2011). As a consequence, more problems and challenges have emerged in relation to how IQ can be precisely defined, rigorously studied and effectively measured.

1.2 CHALLENGES IN STUDYING IQ

Information quality (IQ) is a multi-disciplinary (is studied across different disciplines), domain-specific (can be defined differently according to the context of the study) field of research (Sadiq, et al., 2011, Batini & Scannapieca, 2006). Existing studies on the subject stem from three major disciplines: information systems (IS), which focuses on IQ assessment and understanding the relation between IQ and other concepts; computer science (CS), which focuses on the technical aspects involved in improving IQ; and information science, which mainly focuses on people's perceptions and judgements of IQ (Zhu, Madnick, Lee, & Wang, 2012). As a result of IQ's multi-disciplinary nature, the related studies have covered a wide range of topics and employed a variety of research methods, from qualitative (such as action research and case study) to quantitative (such as statistical analysis and mathematical modelling mathematical) (Madnick, Wang, Lee, & Zhu, 2009).

The notion of IQ is mostly undefined, with scholars typically noting that it is an elusive concept, commonly represented only by sets of attributes which are solely based on the intrinsic characteristics of information, without regard to its context of use or the end users (Mai, 2013). Consistent with this, many researchers argue that there is no universally agreed definition of IQ (Batini, Palmonari, & Viscusi, 2014; Ge & Helfert, 2007) and that existing IQ frameworks are mostly ad hoc, intuitive and incomplete (Floridi & Illari, 2014; Price & Shanks, 2005; Stvilia, Gasser, Twidale, & Smith, 2007).

Despite an abundance of literature on the subject and many attempts to develop a measurement framework to evaluate IQ, scholars still struggle to determine the best IQ measures in relation to their specific context of use, including: how different measures are defined; what are the relations between those measures; and how they might change in response to new and emerging contexts. It has been demonstrated that the current approaches in IQ studies are not successfully employed in practice; for example, standard IQ dimensions (such as those of (Wang & Strong, 1996) turned out to be inefficient when designing IQ metrics appropriate for a specific domain (Embury & Missier, 2014). [1] Although some studies have tried to capture certain aspects of IQ perceived by particular groups or organizational users, little has been done to examine the diversity of IQ measures and the causes for this variation, or how understanding of IQ in research can contribute to practice (Stvilia et al., 2007).

Scholars in IQ research have argued that to deal with diversity in IQ studies and to adequately respond to the changing environment of IQ challenges, there is a need for developing a systematic unified framework which is able to provide a holistic definition of IQ based on the current studies. This framework should integrate different views of IQ, and also be predictive and reusable for IQ assessment (Sadiq et al., 2011; Stvilia et al., 2007). A systematic view of IQ creates awareness of IQ landscape and existing gaps, it also facilitates better communication between different IQ research communities to achieve synergy in research endeavours (Sadiq et al., 2011).

However, it is argued herein that it is only possible to have such a unified framework if the diversity in IQ research is disciplined. From the work of Burton-Jones (2005), Weber (2003), Benbasat & Weber (1996) and Robey (1996), non-disciplined diversity in conceptualisation of a phenomenon herein is defined as the existence of a variety of conceptual models and definitions that are disconnected from each other, with a lack of cohesiveness and based on unjustified reductionist approaches.

In this context, it is concluded that IQ as a research concept has not been conceptualised in a disciplined way. IQ can be seen in the literature as mostly defined by sets of arbitrary selected measures. These kind of definitions lead to disparate and inconsistent conceptualisations of IQ, characterised by redundancy or incompleteness in sets of measures and in IQ frameworks, lack of rigour in choice of research methods, and therefore lack of comparability and integrity across different contexts of studies (Price & Shanks, 2005). Non-disciplined diversity is a barrier to achieving integrity across research disciplines and makes cumulative theoretical progress difficult (Berthon, Pitt, Ewing, & Carr, 2002).

[1] Embury & Missier (2014) tried to apply IQ dimensions defined by Wang and Strong (1996) as the starting point to develop software components capable of measuring IQ in different domains expecting that the standard dimension would be helpful, but their experience suggested otherwise. .

1.3 RESEARCH GOAL

Conceptualisation is an under-valued research step in most empirical studies. Much of the existing literature on research methodology focuses more on how to test construct validity and less on construct development (Barki, 2008). A good disciplined conceptualisation of the phenomenon is more than just a clearly worded definition of the concept. Goertz & Mahoney (2012) argue that a good conceptual definition involves theoretical and empirical analysis of the object or phenomenon. To be applied in explanation and causal analysis, a good conceptual definition needs to differentiate between behaviour of the phenomenon and the attributes of that phenomenon.

This study draws on Weber's (2003) reflexive research principles as the general basis to achieve disciplined diversity in conceptualisation of IQ and to address the current challenges in IQ studies. Accordingly, the main goal of this thesis is to develop a conceptual framework[2] that embodies principles of disciplined diversity in the IQ field. Hence, it is driven by the research question derived from analysis of current IQ studies in chapter 2: "how can information quality be studied in a disciplined way?"

According to the reflexive nature of this thesis, the research questions cannot be established in initial phase of the research and solely based on the gaps identified in the existing body of knowledge. Instead developing the research questions is a progressive process. In this thesis, through development of the conceptual model of IQ and identifying new concepts and approaches, the overarching research question above will be evolved in each chapter (Chapter 3, 4 and 5). The revised research questions which provide the basis of the next coming chapters are presented respectively. Table 1-1 shows the overview of research questions' evolvement through the thesis.

Table 1-1: The evolution of the research questions through the thesis

Chapter	Research Questions
Chapter 2: Identifying gaps in IQ studies.	RQ1: How can information quality be studied in a disciplined way?

[2] The term conceptual framework refers to Sayer's definition of conceptualisation as abstracting and isolating fundamental qualities of the phenomenon.

Chapter 3: Introducing critical realism as the philosophical underpinning of the research	RQ1.1: What is information quality? (establishing ontological understanding) RQ1.2: How can we study information quality as a research concept based on CR epistemological and methodological assumptions? o What kind of knowledge can we acquire about the IQ phenomenon? (epistemology) o What are the appropriate research methods to study IQ?
Chapter 4: Introducing a multi-level ontological understanding of IQ based on critical realism	RQ1.1: How are the entities in the domain of real (Figure 4-9) in the interaction with each other, and what mechanisms emerge from these interactions forming concepts related to information quality (EQPI, EDQ and QPI)? RQ 1.2: How can we, as researchers, study IQ concepts as an emergent phenomena in the domain of empirical? (based on CR epistemological and methodological assumptions)
Chapter 5: theoretical re-description of IQ	RQ1.1. A: How can the personal world, through its structures and mechanisms, influence the IQ perception process through changing: • Expectations of the meaning (EQPI)? • Expectations of the sign system (EDQ)? • Perceptions of the quality (QPI)? RQ1.1. B: How can the social world (task, social norms, culture and so on) through its structures and mechanisms, influence: • Expectations of the meaning (EQPI)? • Expectations of the sign system (EDQ)? • Perceptions of the quality (QPI)? RQ1.1. C: How can the material world, through its structures and mechanisms, influence: • Expectations of the meaning (EQPI)?

	• Expectations of the sign system (EDQ)? • Perceptions of the quality (QPI)? RQ 1.2: How can we, as researchers, study IQ concepts as an emergent phenomena in the domain of empirical? (based on CR epistemological and methodological assumptions)

Since such an effort to conceptualize IQ and to provide guidelines to study this phenomenon, requires substantial readings and analysis of literature in different areas (semiotic, critical realism, information quality, information studies and research methodology), the current thesis is scoped solely to the conceptualization part. The empirical instantiation of the proposed framework thus stays out of the scope of this thesis and is recommended as the future work following from this study (See section 7.5.3). However, a hypothetical case example have been provided in appendix A to indicate how the framework can be applied in the research practice.

1.4 RESEARCH APPROACH

The Information Systems field cannot be limited to studying information and communication technologies without a consideration of the effects of the social context in which the information and technologies live.

With the advance of new technologies, information and communication technologies are even more intertwined with different aspects of everyday personal and social life, thus are becoming more complicated to define and evaluate. Scholars in information system (IS) studies generally agree that the IS field and related phenomena such as IQ should be studied in relation to a social context and require a socio-technical emphasis. Methods and approaches in social science can be adapted to study IS phenomena to enable the integration of the social context (Avgerou, 2001; Doolin, 1998; Walsham, 1993).

IQ perception, a complex social phenomenon, (always and only) happens in an open system in the social context, where regularities happen sporadically and any prediction involves a high degree of uncertainty. It is also not possible to study such a phenomenon by providing a closed system within an experimental situation, as natural scientists models in order to study natural science phenomena. Thus, the approach selected to study IQ should accommodate the complex nature of an open system. This approach should also be able to address the current problems in conceptualising IQ and existing inconsistencies between research and practice.

This study argues that the application of critical realism (CR) as the guiding research philosophy can overcome these challenges and provide an overarching conceptualisation of the IQ phenomenon (Gable, 2014). CR as a research philosophy provides ontological, epistemological and methodological directions for research. Ontologically, CR is the least restrictive compared to other philosophical positions and accommodates insights from other philosophies while avoiding their drawbacks. Epistemologically, CR avoids other positions' bias and does not shun any view or aspect of the research phenomenon. Methodologically, CR takes a position beyond both reductionist and anti-reductionist approaches by admitting the complexity of the research phenomenon (Bhaskar & Danermark, 2006). CR-based research can effectively respond to the current calls for improving theorisation and development of theories in IQ research and IS studies (Lee, 2004).

The fundamental methodological argument of CR is that the nature of the research phenomenon determines what kind of knowledge can be obtained about it, and how researchers can have access to this knowledge through empirical study (Bhaskar, 1998). This argument implies that the ontological understanding of a social science phenomenon should be established prior to specifying the kind of knowledge (epistemology) and selecting the research methods (Edwards, O'Mahoney, & Vincent, 2014).

CR provides philosophical assumptions and conceptual tools that can be used to study IQ as a complex social phenomenon (Carlsson, 2005; Carlsson, 2009; Mingers & Willcocks, 2014). More specifically, CR also helps to address the problem of diversity in knowledge and methodological approaches to studying a phenomenon via the assumption of epistemological pluralism, within the restrictions imposed by the nature of the phenomenon under study (Danermark, Ekstrom, & Jakobsen, 2001; Mingers, 2001a). The premise that CR is effective in harmonising a variety of knowledge about the phenomenon relies on CR's multi-layered ontological assumptions (stratified world)[3] which allows for the existence of cumulative and diverse scientific knowledge, explaining different layers of the social phenomenon under study (Danermark et al., 2001)

This understanding makes CR suitable to address the problem of diversity in IQ research and to move towards disciplined diversity (Mingers, 2001a). Relying on CR principles, this study

[3] This is a CR related term that refers to the world as stratified in different ways (see Section 3.2.3).

posits that a multi-layered ontological view of IQ is the basis for a conceptual framework that can be used to examine and harmonise the variety of different conceptions and approaches in IQ studies.

Thus, to develop a disciplined or harmonised conceptualisation of IQ as the research phenomenon (or to answer the overarching question "how to study IQ in a disciplined way?"), this study, based on CR principles, aims to answer the following research questions (RQs related to chapter 3):

1. RQ.1: What is information quality? (Establishing a multi-layered ontological understanding).
2. RQ.2: How can we effectively study IQ as a research concept? (What kind of knowledge can we acquire about the phenomenon and what are appropriate research methods to study IQ?)

To address these questions, this study follows a six-stage explanatory conceptualisation methodology suggested by Danermark et al., (2001), who are among the most influential scholars in CR (Crinson, 2007). During each stage the above research questions are further extended with details as well.

Stage 1 of Danermark et al.'s methodology is about description of the research phenomenon or the research problem. In this thesis, **Chapter 2** presents stage 1, which reviews current studies in IQ and identifies the main research gap as the lack of disciplined diversity in IQ conceptualisations (See Figure 3-1)

Then the main goal of this thesis is to answer the question of "how to study/conceptualise IQ in a disciplined way?" As discussed earlier, the selection of CR as the research philosophy helped to break down this main research goal to the two research questions above. Following the six-stage methodology, this study answers the first research question through stages 2 and stage 3 of Danermark et al.'s methodology, then, in stages 4, 5 and 6, draws on other methodological approaches to propose guidelines for studying and conceptualising IQ empirically (in order to answer the second research question) (Figure 3-1).

Accordingly, **Chapter 3** of this thesis will elaborate on the justification of methodological choices and details of different stages in the research design.

Following Danermark et al.'s (2001) guidelines in developing a conceptual definition of a research phenomenon and consistent with stage 2 of Danermark et al.'s methodology, **Chapter 4** defines IQ in relation to its main elements, quality and information; and then, relying on the ontological assumptions of CR, develops a multi-level conceptual definition[4] of IQ based on CR principles (the principles of ontological depth defined by Bhaskar (1998). This process identifies the entities and concepts involved in forming IQ perceptions. Identified entities include information user, communication media, social context of information use and communicated message. Concepts consist in users' expectations of perceived information, users' expectations of the data qualities, and users' final perceptions of quality of information, all derived by breaking down the IQ evaluation process in users' minds. The main contributions of this stratified conceptualisation are: (1) defining the real world reference of IQ phenomenon, the relevant entities and how these entities are related to this phenomenon (IQ); thus (2) helping researchers to define an entry point to study IQ as a research concept.

After developing a multi-layered understanding of IQ, in **Chapter 5**, through stage 3 of Danermark et al.'s methodology, different theoretical and epistemological lenses will be used and integrated to describe different aspects of the IQ phenomenon. This is the process of abduction, of which the main goal is to re-contextualise current theoretical lenses to better describe the phenomenon under the study. Introducing semiotics as the basis of human communication and the meaning generation process (Beynon-Davies, 2009), this thesis draws on a semiotic framework (Chapter 5) developed by Mingers and Willcocks (2014), and adapts it to position entities mentioned above in relation to each other and also in relation to IQ concepts. Mingers and Willcocks (2014) defined a semiotic framework based on a Peircian theory of signs (Peirce, Hartshorne, & Weiss, 1933) and also a Habermasian theory of the communication act (Habermas, 1984) to be applied in information system research. This thesis adapts this framework to extend the IQ stratified conceptual model defined in Chapter 4 and to develop a general CR meta-theory of IQ.[5] This new model provides a basis for articulating possible research areas and questions, and developing a taxonomy of different theoretical lenses as an analytical tool for studying IQ.

[4] In CR terms it is called a stratified conceptual definition of the phenomenon, as defined in Chapter 4.

[5] A CR general meta-theory refers to Cruickshank's (2003) levels of theorising which will be described in Section 3.4.2.

Finally, in order to determine how IQ can be studied as a research concept, **Chapter 6** proposes an analytical framework (domain-specific meta-theory)[6] to guide the study of IQ at the empirical level, based on the abstract model and theoretical views defined in Chapters 4 and 5 of the thesis. This analytical framework is developed based on critical realist principles and follows Layder's (1998) sociological adaptive theory approach. Layder's approach has been applied in order to define the link between abstract theoretical concepts and empirical study. **Chapter 6** of this thesis provides a more detailed explanation of an adaptive theory approach and how it is consistent with this thesis's assumptions and objectives.

The main contribution of the analytical framework proposed in this study is to establish the link between abstract meta-theories, theoretical concepts and the empirical study of IQ, by: (1) defining the clustering of research concepts that can be used in the research process: and (2) by introducing a typology of contextual concepts, thus providing a coding system which can be used when collecting and analysing empirical data. To better explain how this analytical framework can be applied in empirical studies, a hypothetical case has been introduced in Appendix A of this study, and is referred to in both Chapters 5 and 6, to better show the application of introduced theories and concepts.

Chapter 7 concludes by positioning this thesis in relation to other IQ studies, and more generally in IS research. It discusses how the framework proposed in this study can help in achieving disciplined diversity in IQ research, then outlines the limitations and proposes future research directions.

Since this thesis uses variety terms and terminologies, for the convenience of the reader, Appendix E, itemises the main terms and abbreviations that have been used through the thesis.

1.5 CONTRIBUTIONS

This study provides a conceptual framework that can help researchers to study IQ in a disciplined way, and position their study effectively (and in a complementary way) in relation to other studies on IQ. Thus, it facilitates a holistic view of the phenomenon across different disciplines.

The novel conceptualisation of IQ (stratified understanding + theoretical re-description) proposed in this thesis shifts research directions and approaches in IQ studies from focusing

[6] Refers to Cruickshank's (2003) hierarchy of realist theorising which describes how researchers can move from meta-theoretical and ontological assumptions to empirical studies, avoiding the existing critiques and possibility of tautological outcomes.

on measurement and deriving IQ dimensions to a realistic evaluation of IQ, and identifying the variation of IQ according to different contexts (Pawson, 1997, p.497).

The proposed framework provides a stratified conceptualisation of IQ and defines the entities related to this concept in the real world, thus offering an entry point for researchers studying IQ and assisting them to articulate relevant research questions. The framework also provides guidelines on data collection and data analysis by defining the links between theoretical concepts and empirical data and proposing a typology of contextual concepts.

This thesis argues that the proposed conceptualisation framework facilitates rigorous studies in IQ, and thus can help researchers to better contribute to practice by: (1) better identification of information users' expectations and requirements in relation to the context of use; (2) identifying information users' expectations of the presentation of the message in relation to social context and communication medium; and thus (3) contributing indirectly to better design of information systems or IQ management softwares compatible with the context attributes by considering the material aspects of the communication medium in the proposed IQ framework. These contributions will be further elaborated in the next chapters (see Sections 2.3.1 and 3.1.1) and will be reviewed again in chapter 7 (Section 7.4) of this study. (See Appendix C, mapping examples of IQ studies to the proposed framework in this study)

Beyond IQ studies (across different disciplines) this thesis can contribute to other areas of study in IS which are multi-disciplinary fields of research but are suffering from a non-disciplined conceptualisation of the concepts, and thus are struggling to provide a holistic view of the research phenomenon. This thesis shows a pathway and approach on how to move from non-disciplined to disciplined research by proposing a CR general meta-theory that can be inclusive of different research approaches and different research paradigms.

Chapter 2: **Problematisation**

This chapter aims to identify the current gaps in information quality (IQ) studies in order to define the objectives of this thesis.

This is done by: (1) highlighting the importance of studying information quality (IQ); (2) providing an evolutionary overview of IQ research; (3) from this, the existing challenges in IQ studies are identified and discussed. Then, (4) after reflecting on broader issues of paradigmatic diversity in IQ research, (5) the lack of disciplined diversity in IQ conceptualisation and how it can be remedied are discussed.

The chapter concludes by specifying the main goal of this study, which is to answer the question: "How can we study IQ in a disciplined way?"[7]

2.1 THE IMPORTANCE OF INFORMATION QUALITY

We are living in an interconnected society (Bovee, Srivastava, & Mak, 2003), the so-called information era (Floridi, 2006). Since information itself is now readily available and publishable, the main challenge is the question of the quality of this available information (Floridi, 2012). The quality of information widely available through the Internet has become a growing concern to both users (Rieh & Belkin, 1998) and system designers (Bertino, Maurino, & Scannapieco, 2010). Information users face greater uncertainty about the quality of the information, and system designers face new challenges in understanding customers' quality judgments and linking them to design features.

Since there is a direct correlation between high quality information and high-quality decision making, the latter resulting in positive outcomes (Manis, Fichman, & Platt, 1978), information system (IS) studies have defined the primary purpose of any information system — to provide high quality information for decision makers (Davis & Olson, 1985; Petter, DeLone, & McLean, 2013). Research has shown that poor quality information can have severe negative effects on organisational output (Wand & Wang, 1996). For example, in the context of critical decision making, poor quality information has provoked controversy in political debates and there have been conspicuous disasters (Fisher & Kingma, 2001); clinical accidents

[7] "Disciplined way" refers to the disciplined diversity which is later defined in Sections 2.4 and 2.5 of this chapter.

(Leveson & Turner, 1993); glaring omissions and inaccuracies in online medical information (Biermann, Golladay, Greenfield, & Baker, 1999; Silberg, Lundberg, & Musacchio, 1997); lost productivity (English, 1999; Redman, 1996); and failed enterprises (Huang, Lee, & Wang, 1999). Organisations throughout the world are making substantial investments in the collection and storage of the vast amount of data generated by a variety of existing and emerging communication and information technologies. For example, many software vendors have started to offer data quality technologies as part of their product and services. On the demand side, information quality has become a critical component in both private and public sector E-government and enterprise architecture strategies. As early as 2002, the US government introduced their data quality act[8] (Floridi, 2013) and in private sector, organizations are using a variety of data quality management methods and information strategies (Zhu et al., 2012).

Information or data quality is not a young field of study, but the increasing availability of information in new forms, with new technologies in different aspects of daily life presents new challenges in interdisciplinary research spanning, in example — information systems (IS), computer science (CS), information science, mathematics, sociology and psychology (Bertino et al., 2010).

2.2 EVOLUTIONARY UNDERSTANDING OF THE CONCEPT OF IQ

Information/data quality has been a topic of study for more than four decades among business analysts, solution architects, data base experts and statisticians (Sadiq, et al., 2011). There is a growing community of researchers and research outlets across the world inviting research on IQ, such as the International Conference on Information Quality (ICIQ), the Conference on Advanced information system Engineering's (CAiSE) workshop on information quality (Zhu et al., 2012) and the Journal of Data and Information Quality launched with Association of Computing Machinery in 2006 (Floridi, 2013).

In the discipline of information science, IQ studies can be traced back to studies of the quality of printed versions of publication in relation to quality management in library and information services (Johannsen, 1995; Mai, 2013). In these studies, information is mostly defined (implicitly or explicitly) as a subjective concept or as meaning of a message. The subjective definition of information as the dominant definition in information science studies

[8] Which still has not achieved its defined goals and has been under review since its advent.

have been put forward by scholars such as Bateson (1972), Hjorland (2007) and Brier (2004). This definition implies that information "is a difference that makes a difference" from a human or machine point of view[9] (Mai, 2013, p.676). In these studies, a user-based definition of quality (Garvin, 1984) is also implicitly or explicitly applied. For example, Mai (2013) defines good quality, situational and different for different users in different contexts. Stvilia et al. (2007, p.1722) applies the definition of quality as "fitness for use". In information systems (IS) and computer science (CS) studies, IQ research is motivated by IQ problems observed in organisations (Ge & Helfert, 2007). The issue of IQ came to prominence in IS and CS disciplines when a research group in MIT[10] commenced in 1990, composed of influential scholars in the field of IQ who launched a now thriving IQ community (Floridi & Illari, 2014). IQ studies in IS and CS disciplines have not defined information explicitly in their studies. However, the definition of information in these two disciplines implies that information is objective and independent form the user and context of use (Wang and Wand, 1996, Redman, 1998)[11]. The definition of quality varies in these two disciplines from user-based definitions as "fitness for use" (Juran, 1992) to manufacture-based definition as conformance to requirements. The former is more common in IS studies such as in Wang and Strong (1996), Lee at al. (2002) and English (2009) and the latter is more common in CS studies (Batini and Scannapieca, 2006). Taking a product view of information, these studies investigate quality through the manufacturing process of information as a product. For example, Wang and Madnick (1990) applied data source tags in query processors and modelling methods to assess data quality criteria; Ballou et al. (1998) applied a model of information product manufacturing systems to determine the quality attributes of information (Zhu, et al., 2012). Initially, IQ researchers (both in CS and IS) were mostly focused on technical aspects of building large data warehouses and integrating and querying multiple data sources (Madnick et al., 2009). Examples of these IQ studies in IS can be seen in the work of (Wang & Madnick, 1989, 1990), which addressed the integrity problems in data bases with multiple data sources. Follow-up research included developing quality models for meta-data and entity relationships to design data bases (Wang, Reddy, & Kon, 1995). This stream of research has led to more recent studies on data security and data privacy management. More importantly, this stream of research initiated the inquiry for more systematic, comprehensive studies on different aspects of IQ, and

[9] In chapter 4 these kinds of definitions are discussed as an adaptation view to information.
[10] Massachusetts Institute of Technology
[11] Token and syntax views of information introduced in chapter 4 are the dominant objective definitions applied in IQ studies in IS and CS discipline.

led to the establishment of the concept of Total Data Quality Management (TDQM) in the early 1990s within the MIT group, and initiation of the MIT TDQM program (Floridi & Illari, 2014; Zhu, et al., 2012).

One of the major breakthroughs flowing from this new stream of research and the main message of MIT group was to consider IQ primarily from the consumers' point of view; this viewpoint leaned towards defining IQ as "fitness for use" and placed more emphasis on how organisations use information. Beyond a narrower focus on accuracy the notion that IQ is a multi-dimensional concept (Wang & Strong, 1996) led IQ research towards better identification and categorisation of the IQ dimensions.

2.2.1 Different approaches in identifying IQ dimensions

The approaches to identifying and categorising IQ dimensions are classified by Batini et al. (2006) into two main groups: the first approach, which is called *empirical*, consists in surveying information users and professionals in order to identify what they rate as IQ dimensions (Batini & Scannapieca, 2006). The study by (Wang & Strong, 1996) was the first of its kind to define IQ attributes based on empirical study. The researchers applied the users' opinions to conceptualise IQ in four main dimensions: "accessibility (aspects related to access to the data); contextual (aspects related to the context of the task at hand); representational (aspects related to format and ease of understanding); and intrinsic (aspects related to data in its own right)" (Batini and Scannapieca, 2006, p. 39). This study (Wang and Strong, 1996) is one of the most highly cited in IQ research. Many subsequent researchers have applied these four dimensions in different research contexts to define and measure IQ. However, it was not until 2002 that a comprehensive IQ assessment method (AIMQ) based on (Wang & Strong, 1996) was developed by (Lee, Strong, Kahn, & Wang, 2002). This approach to the definition of IQ was however criticised by researchers for its lack of theoretical basis (Wand & Weber, 1995).

The second approach, defined by (Batini & Scannapieca, 2006), to identifying and categorising IQ measures is called the *theoretical* approach. One example of this approach is the work of Wand and Wang (1996), which applies an ontological approach to the definition of IQ based on representation theory (Wand & Weber, 1995). Its main assumption is that "the purpose of an information system is to faithfully represent the real world domain" (Weber, 1997, p.73). Based on this assumption, IQ measures are defined as deviations from these representation rules (Wand & Wang, 1996). This work is based on mathematical proof, and does not rely on information users' perceptions and the context of use, but is able to justify IQ dimensions in a logical way. Another example of a theoretical approach to defining IQ dimensions is the use of semiotic theory; a prominent examples of this approach is being the work of Price and Shanks (2004; 2005) who devised an IQ framework based on semiotic theory and categorised IQ dimensions in three groups: syntactic, semantic and pragmatic .

Batini et al. (2006) seem to favour an intuitive approach towards identifying and categorising IQ dimensions. This approach, also referred to by Floridi and Illari (2014) as "The Italian School", applies common sense and practical experience to categorising IQ dimensions. Examples are the works of (Batini & Scannapieca, 2006) and (Stvilia et al., 2007). These studies mainly focus on understanding IQ in practice and establishing different IQ measures in relation to IQ problems. IQ problems are then associated with the types of activities related to improve IQ. This approach, although useful in associating IQ dimensions to practice and IQ improvement, fails to make connections between IQ dimensions and IQ as perceived by information users, and does not provide explanation beyond the context of the study.

Other influential IQ studies in the practitioners field and based on intuitive approaches include Redman (1996, 2001) and English (1999). Redman provides an extensive set of data quality dimensions and discusses issues related to data quality improvement. Redman (1996) based on an intuitive approach derived 12 IQ dimensions using an ad hoc approach (procedures adapted from statistic control in manufacturing) (Price and Shanks, 2005). English (1999) provides a detailed methodology for data quality measurement and improvement (Batini and Scannapieca, 2006). However, despite the comprehensiveness of the proposed methodology, he applied an ad hoc method in deriving and classifying IQ dimensions. Both works although influential in IQ studies are missing details regarding some of the IQ dimensions and show some inconsistencies in classification of IQ dimensions (Price and Shanks, 2005)

2.2.2 Main areas in IQ research

Preceding the evolution of IQ studies in IS, CS and information science disciplines from focusing on accuracy and design aspects of the systems towards defining IQ as a multi-dimensional and context-dependent concept is outlined. Three different approaches to defining IQ as a multi-dimensional concept are also briefly introduced.

To better understand the evolution of IQ research, it is relevant to divide these studies into three main categories (Ge & Helfert, 2007): IQ evaluations, IQ management and IQ impact streams.

The IQ evaluation stream provides the foundations for the other two streams (Ge & Helfert, 2007; Zhu et al., 2012). Its goal is to measure the extent to which information conforms to predefined specifications and references such as data base rules (Ballou, Wang, Pazer, & Tayi, 1998), or the extent to which information is deemed fit for use by data consumers .

IQ evaluation studies are mainly concerned with three issues: defining IQ problems (and possibly associating metrics with them); defining IQ dimensions which are connected to IQ problems; and developing IQ evaluation methods. Different methods for IQ evaluation and assessment have been developed based on the different conceptualisations of the IQ concept (Lee, et al., 2002; Pipino, Lee, & Wang, 2002; Stvilia, et al., 2007). Two main approaches can be recognized within IQ measurement models and frameworks: objective (quantitative) and Subjective (qualitative). Objective measures of IQ are mostly based on the efficiency and accuracy of the communicated message; for example evaluating data attributes' conformity to data base specifications, or its resemblance to real-world phenomena. The methods used for objective measurement mostly include sampling techniques embedded within automated tools and software (Ballou, Chengalur-Smith, & Wang, 2006). More recent studies in this area focus on developing measurement models and automated algorithms for measuring the quality of information available on the web and in web 2.0 applications (Figueiredo et al., 2013)

Subjective views of IQ evaluation focus on the perceptions of the information consumer, and how information is used in the context. The methods used are mostly surveys (Lee et al., 2002; Pipino et al., 2002) or interviews (Rieh, 2002; Rieh & Belkin, 1998). The subjective view of IQ can also be categorised into two main groups: studies that define IQ as subjective, but at the same time focus on quantifying and measurement and believe that there are quality attributes which are more intrinsic (Arazy & Kopak, 2011; Knight & Burn, 2005); and studies that argue that quality of information is not measurable by sets of predefined attributes and metrics. The latter mostly use interviews and a grounded approach to defining IQ within a certain context (Mai, 2013; Rieh, 2002).

The IQ evaluation research stream and IQ measurement models have been defined as the main component of IQ assurance and IQ management (Stvilia et al., 2007). The objective of IQ management research is to improve the quality of information through quality management, information management and knowledge management. As mentioned earlier, IQ management has been the main focus of MIT IQ groups and IS studies since the 1990s. MIT IQ group established a program called "Total Data Quality Management" (TDQM) helping organisations to improve their IQ in practice and to help information providers to better understand and control their entire information production process.

With the advancement of the web, social network technologies and emergence of the concept of big data, IQ management studies have shifted their focus from improving the design of the traditional information systems to improving the quality of information derived (information retrieval) from the new communication technologies (Floridi, 2012). These works in CS studies are focused on improving the quality of retrieved data by using techniques such as tag analysis (Figueiredo et al., 2013), machine learning algorithms (Kolari, Java, Finin, Oates, & Joshi, 2006) and social network analysis (Gryc & Moilanen, 2014).

IQ studies in the information science discipline focus on information retrieval in relation to information users' judgement of relevance criteria when selecting information (Blair, 2003; Rieh & Belkin, 1998). An example of these studies is 'data curation', mainly related to information science and library studies (Heidorn, 2011). It involves retrieving and managing data from a wide range of online sources to facilitate its present and future use (Zhu et al., 2012).

The third category of IQ research defined by Ge and Helfert (2007) relates to the IQ impact stream; from this perspective, IQ as a research concept is mostly conceptualised, based on sets of dimensions that can be related to other research concepts. For example, many studies have investigated the impact of IQ concept on decision making in different contexts. Keller and Staelin (1987) proposed a model to show how IQ can influence the effectiveness of decisions in the context of marketing, while Belardo and Pazer (1995) developed a framework to analyse the relation between IQ and decision strategy and decision cost in the context of crisis management. Jung, Olfman, Ryan, and Park (2005) explored the impacts of contextual IQ on decision performance in the context of a laboratory experiment. In IS studies, IQ is defined as the main construct in the IS success mode (Delone and McLean 1992; 2003), and many IS studies have shown that the quality of information has an impact on individual performance and the quality of their decisions (Chengalur-Smith, Ballou, & Pazer, 1999). IQ impact in IS has also been studied in relation to the specific application area, such as enterprise resource management (ERP), customer relationship management (CRM), supply change management and so on.

Most of the works mentioned above, such as the work of Wang and Wand (1996) and Wang and Strong (1996), are focused on the quality of structured data[12] provided by enterprise systems within organisations. With growing amounts and applications of semi-structured[13] data such as websites (Caro, Calero, Caballero, & Piattini, 2008), unstructured[14] data such as web 2.0 applications (Agichtein, Castillo, Donato, Gionis, & Mishne, 2008) and new communication technologies (such as mobile phones, touch screens and so on), users' expectations and perceptions of IQ are also changing. IQ research in these new contexts has been mostly interested in developing algorithms and criteria for building automated tools and less concerned with understanding users' information needs (Agarwal & Yiliyasi, 2010; Chen & Tseng, 2011). A review of IQ studies on social media, conducted as part of this thesis, also revealed that while prior literature offers several promising avenues to study IQ, the scope, context and approach of these works is disparate, largely incomparable and lacking a well-defined theoretical and empirical basis (Appendix D). Therefore, IQ research needs to be developed in order to address these new challenges.

Table 2-1 summarises the discussion in this section with examples from IQ studies.

[12] When each "data element has an associated fixed structure. Rational tables are the most popular type of structured data" (Batini and Scannapieca, 2006, p. 6).
[13] "When data has a structure which has some degree of flexibility" (Batini and Scannapieca, 2006, p. 6).
[14] When "data are expressed in natural language and no specific structure or domain types are defined" (Batini and Scannapieca, 2006, p. 6).

Table 2-1 : Summary of IQ studies' main categories

IQ research categories	Study approaches	Examples
IQ definition and dimensions	Empirical approaches	(Wang & Strong, 1996)
	Theoretical approaches	(Price & Shanks, 2005; Wand & Wang, 1996)
	Intuitive approaches	(Batini & Scannapieca, 2006; Stvilia et al., 2007). Redman (1996, 2001), English (1999)
IQ assessment	Objective	(Figueiredo et al., 2013)
	Subjective	(Rieh & Belkin, 1998)
IQ management	Improving the design of the system	(Ballou et al., 1998)
	Improving IQ strategies and policies	(Kerr, 2006; Otto & Weber, 2011)
	Improving data retrieval	(Almeida, Goncalves, Figueiredo, Pinto, & Belem, 2010; Blair, 2003; Burel, He, & Alani, 2012)
IQ impact	Decision making	(Chengalur-Smith, Ballou, & Pazer, 1999)
	IS success	(Petter et al., 2013)
	IQ impact in the application area	(Mikkelsen & Aasly, 2005)

The above review shows that researchers are aware of the “purpose-dependence” of the concept of IQ, but are still struggling to agree on methods and theoretical approaches to better understand IQ within new emerging contexts and applications (Floridi & Illari, 2014).

2.3 OBSERVED CHALLENGES AROUND THE CONCEPT OF IQ

IQ researchers have already pointed out the challenges and difficulties in existing IQ studies. This section reviews the main challenges observed by researchers in this field of study. These challenges, consistent with Batini et al. (2006), are discussed below in two main categories: research-related and practice-related gaps. Research related and practice related gaps are not independent. By clearly identifying and addressing the current gaps in IQ studies, researcher are able to contribute better to practical challenges in IQ field. This is elaborated further in the discussions presented below.

2.3.1 Practice-related gaps

The consequences of poor IQ for practice have been studied extensively by IQ researchers, and awareness of the importance of improving IQ is increasing in many practical contexts.

However, advances in technology have created new challenges regarding the quality of information for organisations. Information systems in organisations have moved from a “hierarchical/monolithic” structure to a “network-based structure”, where information can be potentially used by a network of cooperating organisations (Batini et al., 2014, p. 43). The representation of information has also evolved from structured to semi-structured and unstructured formats. Information is now provided through different media and different channels (Batini et al., 2014). These changes necessitate integrating information across different applications and tailoring its quality to match the needs of each group of information users. Application providers and system integrators are using different approaches and technologies to address the IQ needs in organisations; however,

> … many data quality software tools are advertised and used in various data-driven applications, such as data warehousing, and to improve the quality of business processes. Frequently, their scope is limited and domain dependent, and it is not clear how to coordinate and finalise their use in data quality processes. (Batini & Scannapieca, 2006, p. ix)

These new challenges have made it difficult to apply IQ management frameworks and tools (produced by the IQ research community) to measure and improve IQ effectively in practice (Batini et al., 2014). Over the years, IQ dimensions have been used as the starting point for different IQ studies in different contexts and with the goal of developing IQ management software and automated tools (Agichtein et al., 2008). However, practitioners still prefer to develop their own dimensions and measures from scratch rather than using the standard IQ measures defined in IQ studies[15]. Embury and Missier (2014), having studied IQ measures in several fields, concluded that they found themselves building quality dimensions and metrics from scratch. This implies that defining and conceptualising IQ as sets of measures and dimensions resulted in ambiguous and conflicting interpretations and thus is not useful and applicable in practice (Batini & Scannapieca, 2006; Floridi, 2013).

The issues discussed above in the application of IQ studies in practice require the IQ research community to critically reconsider their current approaches and move towards more practical IQ research (Floridi & Illari, 2014).

2.3.2 Research related gaps

The above review of IQ studies shows that this field is still struggling to provide a definition of the concept of IQ itself, and to deal with the challenges linked to new advances in communication technologies. Despite the diversity of research in this area, there is still no approach able to integrate multiple views of IQ and be applicable in practice.

> On the research side, the gap (in IQ research) still present between the need for techniques, methodologies, and tools, and the limited maturity of the area, has led so far to the presence of fragmented and sparse results in the literature, and the absence of a systematic view of the area. (Batini & Scannapieca, 2006, p. ix)

This section will now explore the deficits in IQ studies by discussing the gaps in four main categories: definition of IQ, IQ dimensions and measures, diversity in research methods, and lack of theoretical basis.

<u>Definition of IQ</u>

Despite the acknowledged importance of high quality information as discussed in Section 2.1 and the history of IQ studies in Section 2.2, the concept of IQ is still variably or loosely defined or simply ignored (Fox, Levitin, & Redman, 1994; Wang & Strong, 1996). The most popular definition of IQ, "fitness for use", means that information should satisfy the

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[15] IQ is domain specific and thus is defined differently in different contexts, however, the goal of IQ models and studies should be to provide the basis that can be reused in different practical contexts (Sadiq et al., 2011; Wang & Strong, 1996)

expectations of information users. This definition implies "that there is no absolute definition of good IQ" ((Embury & Missier, 2014, p.27), and IQ can only be defined differently in relation to its context of use (Embury & Missier, 2014). However one of the disadvantages of the dominance of such a definition in IQ studies is that it does not provide researchers with much help in discovering customers' information needs, and thus researchers tend to define IQ only by referring to sets of attributes and dimensions, which is not helpful in practice (Embury & Missier, 2014; Floridi, 2013; Mai, 2013).

IQ measures and dimensions

Several studies have devised sets of IQ dimensions and measures (English, 1999; Eppler & Wittig, 2000; Loshin, 2011). These frameworks and IQ models have many common IQ dimensions, but there is still no agreement on a comprehensive set of measures and their categorisation in terms of IQ dimensions. IQ studies usually do not define IQ measures (such as accuracy, objectivity and so on) and what they mean to the information user; they primarily categorise them into different dimensions (Floridi & Illari, 2014; Mai, 2013). Even when it happens that these dimensions and attributes are defined, their definitions are vague and imprecise, with conflicting terminologies. For example, Batini et al. (2006) identified 220 different IQ dimensions used in IQ studies, of which only 70 were without repetition or did not include overlaps in definitions (Batini & Scannapieca, 2006). It is not useful for the IQ research community to engage in the process of agreeing to one set of measures and their hierarchical organisation unless a more precise meaning and explanation associated with these dimensions has been found (Embury & Missier, 2014). Even some base criteria which have been mentioned in almost all IQ frameworks (such as accuracy and completeness) can have different meanings in different contexts (Batini et al., 2014). Some other reviews (Eppler & Wittig, 2000) believe that the issue with IQ frameworks lies in their mostly ad hoc, incomplete nature, which does not allow them to produce a robust and systematic measurement model. Although some frameworks have been successful in capturing a particular organisation or group perception, they have failed to justify application of their findings to a broader context and therefore are not deemed re-usable. Thus IQ frameworks, do not seem sufficient in either their academic or pragmatic implications (Eppler & Wittig, 2000).

Lack of theoretical basis

Price & Shanks (2005) argue that the current confusion in IQ frameworks[16] mainly results from a lack of theoretical basis for deriving and defining quality dimensions and measures. They argue that arbitrary choice of research methods and relying on information users' feedback rather than systematic theories, has resulted in inconsistency, and redundancy and thus a low level of rigour. An exception to this lack of rigour is Wang and Wand's (1996) development of an ontological understanding of IQ relying on representation theory. However, this work mainly focuses on defining IQ objectively or based on the system designers' and developers' views. Such an approach fails to address the end user's requirements and provides an incomplete perspective of IQ.

Diversity in the research methods

One of the main sources of confusion for researchers studying IQ is the multi-disciplinary nature of this phenomenon, and thus the existence of different competing approaches and definitions of this phenomenon in the literature. For example, as was mentioned earlier, the relative merits of subjective and objective approaches to defining and studying IQ have been a source of debate for many scholars (Mai, 2013; Price & Shanks, 2005). From the point of view of the information science discipline, the current measurement methods and approaches towards developing measurement frameworks have been problematic. Mai (2013) points out the inconsistency between the definition of IQ as a subjective concept and research approaches toward measurement, pointing out that:

> While many writers in the area argue that IQ ultimately is a subjective construct, and that 'users of the information have to make judgments about its quality for themselves' (Knight & Burn, 2005, p.163), at the same time, the focus of much research is on quantifying (Knight & Burn, 2005), measurement (Arazy & Kopak, 2011), or the determination of a true quality control measure (Fink-Shamit & Bar-Ilan, 2008) for information quality. (Mai, 2013, p. 681)

Sadiq et al. (2011), in their cross-disciplinary comparison of issues related to the IQ concept (in information systems and computer science) found that there is a lack of synergy between data quality metrics. While CS researchers have a strong focus on technical solutions, they appear not to address business needs in their research. On the other hand, while IS researchers have a strong focus on various application areas and business needs, they care less

[16] "An Information quality framework consists of sets of quality criteria and their definitions grouped into general categories that have been separately defined" (Price and Shanks, 2005, p. 89).

about how research findings can be applied in practice and as technical solutions. Of course, this difference refers to the nature of these two disciplines and does not mean that IS researchers should move towards technical aspects while CS researchers should move to higher levels of abstraction. What is argued here is the need to find synergies between these two streams of research. The habit of developing technical solutions for information/data quality in isolation from practice and business needs is counter-productive to IQ research.

With the emergence of new technologies and the involvement of communication media in everyday life, more challenges have emerged in IQ research. A review of IQ studies for this thesis finds that many researchers suggest a unified framework of information quality as the solution to the current gaps in the different approaches and frameworks.

Sadiq et al. (2011) argue that for the IQ research community to adequately respond to the current changing landscape of IQ and exploit the synergies between different disciplines, a unified framework that can integrate different competing approaches across diverse research communities should be developed. Stvilia et al. (2007) also suggest that in order to solve the problem of ad hoc and incomplete IQ frameworks, a causal analysis of IQ problems and a systematic, reusable IQ framework is needed.

However, IQ is a contextual and situational concept and, hence, a certain degree of diversity in definitions and conceptualisation of this concept is unavoidable. In fact, most researchers debating the merit of diversity generally conclude that diversity in research is desirable and could be beneficial (Benbasat & Weber, 1996). In the following section, diversity in research and the conditions for having a beneficial or a “disciplined diversity” (Burton-Jones, 2005, p. 4) are explained. The conclusion is that the current diversity in IQ research is not disciplined.

2.4 DIVERSITY IN INFORMATION SYSTEMS (IS) RESEARCH

Diversity in IS research has been divided in three main categories (Benbasat & Weber, 1996, p. 389):

- Diversity in the problems addressed within the discipline;
- Diversity in the theoretical foundations and reference discipline;
- Diversity in the methods used to collect, analyse and interpret data;

There is a debate between researchers on the role of diversity in IS research (Benbasat & Weber, 1996; Robey, 1996). Generally, they agree that diversity in research is fruitful under certain conditions (Lyytinen & King, 2004). Robey (1996) associates diversity with intellectual freedom, and considers it as beneficial in fostering creativity and helping to build the foundations of knowledge. However, he also mentions that this freedom needs to be directed by rules if it is to deliver on its promises. From this viewpoint, researchers pursuing the goal of diversity should be disciplined in their choice of theories and research methods. Diversity can help in knowledge development within IS research, if it does not manipulate coherence in the theoretical and conceptual levels (Robey 1996).

Robey describes the rules of diversity based on the concept of disciplined methodological pluralism suggested by Landry and Banville (1992). Discipline is required to prevent diversity from leaning towards methodological anarchy. To be disciplined while having diversity in studying a research phenomenon, Laudan's (1986, p. 63) "triad of justification" has been suggested as a useful tool. Relying on this triad (Figure 2.1), Robey (1996, p. 406) argues that the "theoretical foundations for research and the specific research methods are justified by the research's aims and purposes". Robey argues that using this triad and maintaining a balance between its three angles (Figure 2.1) helps researchers to justify their choice of methods and theories, and achieve what is called disciplined diversity. This disciplined pluralism as defined by Lauden (1986) and Robey (1996) amounts to a pragmatic position in research philosophy. Robey also points out that the main assumption in the above argument is that theories and methodologies are intellectual artefacts aimed to help in achieving the main goal of IS studies — solving business problems. However, Landry and Banville do not agree with this undefined position in terms of research philosophy, and criticise Laudan's triad for being incomplete and not paying attention to research grounds (Toulmin, 2003) or philosophical assumptions. Landry and Banville suggest that the balance in Laudan's triad can be achieved by considering the role of philosophy of science as the foundation of theoretical frameworks and choice of methodologies. They argue that the underlying or philosophical assumptions should be explicitly clarified during the research process, and in relation to methodological and theoretical choices. Relying on Morgan (1990), they argue that understanding the underpinning philosophical assumptions of the paradigms on which the understanding of the phenomenon is built helps towards a comprehensive understanding of the phenomenon.

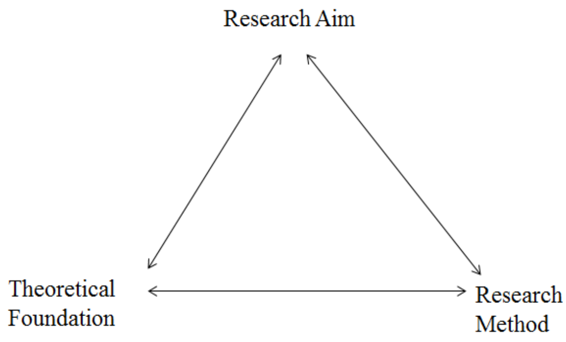

Figure 2-1: Triad for justification of research, adapted from Laudan, 1986 (p. 63). Cited in Landry and Banville (1992, pp. 88-92); cited again by Robey (1996)

In order to further explore the concept of disciplined diversity (Burton-Jones, 2005), this study draws on (Weber, 2003), who encourages IS researchers to be more reflexive during the research process and to justify their choices of methods and theories based on the phenomenon under study and their research questions. Weber (2003, p. vi) defines being reflexive as "trying to understand the assumptions, biases and perspectives that underlie each component of our research." Being reflexive in the research process is the key to achieving disciplined diversity (Burton-Jones, 2005). This study argues that Weber's so-called areas of reflexivity provide a more comprehensive and pragmatic frame for achieving disciplined diversity than Laudan's triad. Weber (2003), consistent with Landry and Banville (1992), positions and describes the role of philosophical assumptions or meta-theories as one of the principles guiding the research approach. The following section discusses Weber's principles of reflexivity in the research process.

2.4.1 Meta-theoretical reflexivity and challenges in IS studies

Philosophical assumptions or meta-theories form the basis of the most influential perspectives, assumptions and even biases in the research process. "Meta theories are broad, general ideas about the world" (Weber, 2003, p.vi) and any research practice is informed by researchers' meta-theoretical assumptions, whether it is acknowledged or not by the researcher (Weber, 2003).

Meta–theories deal with the foundational assumptions and preconditions for the existence of science. These presuppositions can be categorized in two main groups a: ontological assumptions which define the objects of knowledge, and epistemological assumptions which define the conditions for knowledge (Gable, 2014). "Implicitly or explicitly, meta-theories constrain the kind of knowledge we can or cannot acquire when studying a phenomenon (Bhaskar & Danermark, 2006, p. 295). Positivism, interpretivism, hermeneutics and critical realism are examples of meta-theories (Danermark et al., 2001).

Weber divides meta-theoretical assumptions according to two main beliefs regarding real world phenomena: nomothetic and idiographic.

> If we hold an extreme nomothetic view of the world, we will undertake our research in the belief that we can discover laws that govern the world — in other words, that we can build theories that provide powerful explanations of and predictions about phenomena in the world. If we hold an extreme idiographic view, we will eschew theory; we are always likely to employ qualitative research methods (e.g., case studies, ethnographies, phenomenology, ethnomethodologies, hermeneutics) to study phenomena. We will justify our actions by arguing we need the so-called rich, thick, situated descriptions of phenomena. (Weber, 2003, P. vi)

In this definition, nomothetic views are associated with a positivist philosophy in research, while idiographic views can be associated with interpretivist or constructivist philosophies. IS research is mainly developed around two dominant research paradigms: positivism and interpretivism. Although the boundaries defined between these two philosophies may be becoming dubious (Weber, 2003), they shape the current IS literature (Smith, 2006). Some of the main meta-theoretical assumptions of positivism and interpretivism are now discussed.

The main assumptions of positivist philosophy influencing IS research are: (1) a reliance on “hypothetico-deductive logics and analysis” (Orlikowski and Baroudi, p. 9) in scientific explanation; and (2) drawing on the Humean (Hume & Roberts, 1967) account of causality (Bhaskar, 2013, Smith, 2006). These two aspects are related. For Hume, “causality is a constant conjunction of events” (Smith, 2006, p.194) and perception of necessary connections in the nature (Searle, 2004). However, a constant conjunction of events can explain the series of events, not their causal relationships (Hempel, 1970). The clearest example of this assumption is found in statistical tests that posit some relationships between variables. Following a Humean conception of causation means that researchers seek to provide a proof of their hypothesis by means of multiple observations combined with statistical methods (Wynn & Williams, 2012).

Smith (2006) argues that positivism has resulted in some inconsistencies in IS research. The main problem lies in reducing causal laws to the explanation of constant conjunctions of events without realizing the underlying necessities. This means that IS research based on positivism is mainly interested in capturing “what” questions, and is unable to open the black box of “how” and “why”. Another inherent problem of positivism relies on how it proceeds from causal explanations to the generalisation of research findings, which is a form of induction that requires the assumption of a uniformity of nature, which can never be fully justified.

IQ research in IS and CS disciplines has mainly been associated with positivist philosophy. These studies, following a Humean notion of causation, associate high quality information with values assigned to some IQ measures and metrics and rely on convergent validity to show the correlations between measurers (Arazy & Kopak, 2011). Such a conceptualisation of IQ concept lacks the necessity that explains the connections between measures and quality of information for information users (Smith, 2006). For example, (Lee et al., 2002) designed a tool (questionnaire) to measure IQ, based on the dimensions defined by Wang and Strong (Wang & Strong, 1996). Studies in the CS discipline assume that the correlation between measures and IQ already exists, and develop automated tools to measure the quality of information or find technical solutions to improve systems (Karvounarakis, Ives, & Tannen, 2010). In addition to reliance on Humean causation in defining and measuring IQ, another problem related to these positivist approaches is the existence of inconsistency in the definitions of IQ in these studies (as a context-dependent phenomenon or “fitness for use”) and development of measures and dimensions that are supposed to be applicable in any context invariably. This approach ignores the subjective nature of IQ in practice by generalising research’s empirical findings (Arazy & Kopak, 2011). Section 2.3 discusses how this assumption has caused confusion and inconsistencies between research and practice.

In social science studies, the interpretivist approach was established as a reaction against positivism. In IS studies, the problems with positivism also made many IS researchers become more interested in applying an interpretivist view (Walsham, 1993). Interpretivists believe that reality is a social product and prioritise the role of meanings and human agency in the construction and re-construction of reality. Thus interpretivists seek to understand the phenomenon through the meanings which are assigned to it by participants in the context of study (Orlikowski & Baroudi, 1991).

From an interpretivist point of view, it makes no sense to theorise concepts related to information systems — except in the study context. The goal of interpretivist research is to provide narrative description by understanding the inter-subjective meaning embedded in social life (Gibbons, 2015), not to uncover universal laws; therefore interpretivist do not pursue the positivist goals of explanation and prediction (Nissen, 1995). The interpretivist position does not differentiate between the contingent and necessary effects of any phenomenon, thus, from this perspective one cannot theorise about information systems outside of the context of use (Smith, 2006).

However, while interpretivists do not explicitly believe in causation assumptions, their tendency to generalise their research findings often makes them rely implicitly on a constant conjunction of events, or the Humean notion of causality (Sayer, 2000). Interpretivists also use the logic of induction, which does not insure generalisation. By rejecting the real ontology beyond their subjects' understanding[17], they are caught between their desire to generalise and convey research results and their main ontological assumption (Lee & Baskerville, 2003; Smith, 2006). Thus, some inconsistencies between research practice and ontological assumptions exist in this interpretivist philosophy as well. In IQ studies, the interpretivist view is mostly evident in the information science discipline (Mai, 2013; Rieh, 2002). Mai (2013) proposed a conversational model for IQ based on Grice's (1991) maxims of conversation[18]. Based on this framework, "IQ is contextual and can only be assessed in the context of information's meaning and use and of the sender's intentions" (Mai 2013, p. 686). By this definition IQ evaluation is like a conversation (Blair 2003) and can be assessed according to its fulfilment of Grice's maxims. The main inconsistency in Mai's study is the generalisation approach. Despite its philosophical position and emphasis on a contextual definition of IQ, this study proposes principles which, if satisfied, can be considered a successful communication act or high quality information. If IQ is totally contextual there is no reason for Grice's maxim to always be considered as a true principle.

Rieh and Belkin (1998) and Rieh (2002; 2000) apply interpretivist approaches to understanding IQ and the judgment of IQ among different groups of users. The empirical results derived from these papers show the degree of variety in IQ judgment and different, important contextual factors. Researchers looking to answer questions such as "how are the criteria used for quality evaluation different in the World Wide Web from traditional information systems?" use a combination of data collection methods to collect relevant data from users. However, data in these studies is mainly collected from students or scholars, and again, generalisation of the research findings (inductive generalisation) and interpretivist assumptions generate sources of inconsistency, as discussed above.

[17] Interpretivist believe in existence of ontology or real world phenomenon in natural science. In social science they believe that reality is dependant to social actors (Section 3.1.1).
[18] Grice's maxim of conversation (successful communication) defines principles of a meaningful conversation in categories related to quantity, quality, relations and manner (Mai, 2013).

Considering the inconsistencies of positivist and interpretivist positions and their consequences in research practice, Weber's reflexive position in the choice of meta-theories seems more relevant. Weber (2003) argues that researchers should be aware of their philosophical assumptions and their implications in research. In IQ research, Batini et al., (2014) argue that the current dichotomies and challenges in IQ research can be tackled by applying appropriate philosophical frameworks to basic IQ issues.

According to Weber (2003), the choice of philosophical assumptions or meta-theories should be related to the phenomenon under study and the research questions. Weber suggests that researchers should not start with an extreme view (either positivist or interpretivist), but should consider how different meta-theoretical assumptions can provide richer insights for them.

2.4.2 Theoretical reflexivity and challenges in IS studies

Theories are both liberating and constraining for researchers. In order to apply theories in the research process, the researcher needs to be aware of both the restricting and the enabling nature of theories. Theories can help researchers retrieve otherwise invisible insights from data. Weber (2003) defines a theory as a particular representation of a phenomenon in the real world; it comprises constructs and the relations between those constructs.

In information systems research, Gregor (2006) developed a classification of theories in IS comprising five different categories of theories: (1) analysis, (2) explanation, (3) prediction, (4) explanation and prediction and (5) design and action. Grover and Lyytinen (2015), consistent with Weber (2012), argue that in IS most theories fall into category four, explanation and prediction. These theories can also be called domain specific, or mid-range theories, because they adopt and borrow grand or reference theories[19] from reference disciplines to describe a phenomenon in the IS domain (Grover & Lyytinen, 2015). The term mid-range theory here refers to Merton (1967), who defines mid-range theories as between high level grand theories and concrete descriptions (Smith, 2008). For Merton, middle range theorising works with testable hypotheses developed in a deductive logical system from grand theories. Mid-range theories in Merton's definition deal with a limited number of variables and testable hypotheses (Layder, 1998). In IS, mid-range theories consistent with Merton (1967) develop

[19] In this study the terms reference theory, general theory and grand theories have been used interchangeably. The definitions of these terms are more accurately described in the Glossary (Appendix E).

testable hypotheses based on theories from other disciplines and transfer to and test them in the IS domain (Grover & Lyytinen, 2015).

IS researchers have relied on general theories originating from reference disciplines such as economics, psychology and sociology (Grover & Lyytinen, 2015). Weber (2012) refers to general theories as “macro-level” theories, which provide a broad overall insight into a phenomenon. In this study, consistent with Danermark et al. (2001) and IS studies, the term general or reference theory refers to theories from reference disciplines that can be used to describe different aspects of information systems.

General theories have a very broad explanatory power to explain the whole of society, the process involved in development of the social structures, and the relationship between structure and agency. However, researchers conducting empirical studies are reluctant to use general theories as they consider them disconnected from real world data (Merton, 1967). Some IS researchers believe that theory should be developed in conjunction with data. These approaches are related to a grounded theory (Glaser & Strauss, 2009). The grounded theory (GT) approach is mostly related to interpretivist and humanist assumptions (Layder, 1998). For example, Rieh (2002) and Rieh and Belkin (1998; 2000) applied GT in analysing the empirical data in their studies. GT approaches have been criticised in IS research for focusing on micro phenomena and preventing researchers from taking historical and macro structures into account (Carlsson, 2003). Carlsson argues that macro phenomena such as culture influence the use and evaluation of IS, but they do not emerge from users’ perceptions, meanings and actions; thus, by using GT, researchers cannot have access to these structures.

The conventional IS research approach to applying theory starts with developing middle range theories; this means translating abstract concepts in the reference theories into testable hypotheses and constructs that can be associated with empirical data in the IS environment. For example, Davis (1989) and Davis, Bagozzi, and Warshaw (1989) relied on two influential socio-psychological theories: theory of planned behaviour (Ajzen, 1985) to define the concept of the individual’s intention in the use of IT; and theory of reasoned action in relation to the individual’s adoption of IT tools (Grover & Lyytinen, 2015).

This approach to using general theories in IS has been criticised by many; Weber (2012), for instance, outlines their limited explanatory power when applied to a more specific research domain. Grover and Lyytinen (2015) also argue that mid-range theories (MRT) which originate from reference or general theories create constraints in respect to building original IS theories, because researchers tend to accept what is assumed by theories without modifying their theoretical constructs according to the nature of the IS environment. Then the researchers' reasoning is driven by the aim of confirming a testable hypothesis rather than understanding the research phenomenon itself (Bhaskar, 2013). According to Grover and Lyytinen (2015), using reference theories creates a base of limited acceptable constructs, thus limits a researcher's ability to identify new sources of data, new patterns and novel IS theories. Although borrowing reference theories has helped achieving methodological rigour and theoretical logic within IS (Grover & Lyytinen, 2015; Weber, 2003), on the negative side this approach does not account for IT phenomena (IT artefact) and merely provides "ready-made problems and a fashionable style of thinking" (Shepherd & Sutcliffe, 2011, P. 363) without modifying the IS context. For example, Technology Acceptance Model (Davis et al., 1989) has been criticised as treating IT phenomena external to theorising, as a general target or antecedent of the intention (Grover & Lyytinen, 2015), and thus contributing little to design aspects of IT artefacts (Benbasat & Barki, 2007).

However, despite the above problems encountered when applying theories in the research process, general theories remain valuable for unfolding complex research contexts, generating ideas and formulating explanations (Danermark et al., 2001; Layder, 1998). For instance, if IS researchers never used agency theory, they would be unlikely to perceive kinds of interactions between individuals and their relations to agency at certain levels (Weber, 2003). "Theories are stronger than our intuition" (Weber, 2003, p. viii) and they provide impetus to the research process (Silverman, 2006). Thus, it is a waste of theoretical views and insights for researchers to discard general theories (Layder, 1998). Even Grover and Lyytinen (2015), after criticising the current use of reference theories in IS, argue that IS researchers should not discard general theories altogether. On the contrary, general theories could help them build new and innovative theories (Grover & Lyytinen, 2015), provided they are adopted more carefully and are relevant to the information system context and to the specific characteristics of an IT phenomenon. This requires "observation of deviating data, disciplined imagination (Weick, 1995), thought experiments and examining phenomena through diverse lenses" (Grover & Lyytinen, 2015, p. 286), also taking into account the nature of IT phenomenon itself.

Having discussed the main concerns surrounding the application of theories in the IS domain, this section now discusses the role of disciplined diversity in applying theoretical lenses and in addressing the challenges above. Disciplined theoretical diversity is defined by Robey (1996) based on Laudan's (1986) triad as the choice of theoretical lenses based on research goals and purposes and in balance with a methodological approach. Weber's (2003) principles in reflexive use of theories is a more comprehensive approach rather than Robey's (1996) regarding disciplined theoretical diversity. This thesis argues that Weber's approach also addresses the concerns of the IS community in using the theories highlighted above, first by warning against the dogmatic use of theories, and second by choosing theories in relation to the nature of a phenomenon (the nature of the IS environment itself).

Weber suggests that researchers "should understand that any one theory provides only a limited view of the world and avoid dogmatic application of theories. Theories never account for everything" (2003 , p. viii). In order to be disciplined, researchers need to apply theories in creative and adaptive ways and scrutinise the phenomenon of interest using theoretical lenses. Weber also refers to the necessity of examining the research phenomenon prior to selecting theoretical lenses. To be reflexive during the research process and achieve disciplined diversity, "researchers need to juxtapose the different perspectives of some phenomena provided by alternative, sometimes competing theories. They compare. They contrast. They assimilate. They are knowledgeable, facile, flexible users of theories" (Weber, 2003, p. viii).

2.4.3 Research method reflexivity and challenges in IS studies

Research methods help researchers frame problems and analyse the phenomenon of interest in a certain way. They provide ways of viewing the world and impact what we can see from the phenomenon. Weber (2003) argues that the choice of research methods should be based on the phenomenon of interest, and how the methods enable the researcher to study this phenomenon; it should not be a case of choosing a research topic which is amenable to the specific methods the researcher has most expertise in. Thus, researchers need to work with a portfolio of research methods instead of committing to one method from the beginning.

Different research methods provide perspectives about different aspects of the world. These perspectives then can be used to build theories about the world. Thus, it could be possible and desirable to combine different methods to achieve a comprehensive perspective of the world (Mingers, 2001a; Weber, 2003). In IS, mixed-method or multi-method approaches have been advocated by many scholars; for example, combining: positivist and interpretivist approaches (Lee, 1991); case studies and survey research methods (Gable, 1994); or qualitative and quantitative methods (Kaplan & Duchon, 1988). Landry and Banville (1992) have been among the strong advocates of multi-method research and coined the term disciplined methodological pluralisms, which is a "position that favours diversity of methods, theories and even philosophies in scientific inquiry" (Landry & Banville, 1992, p.78) and lies between extreme methodological monism and methodological anarchy (Robey, 1996).

However, despite the popularity of multi-method approaches among IS researchers, Mingers (2001a) demonstrated upon reviewing the main IS publications[20] that only 13% of empirical studies actually applied multi-method approaches. He argued that one of the main difficulties in applying multi-method approaches is the issue of incommensurability of the paradigms in their philosophical assumptions. Research methodologies carry different (sometimes conflicting) ontological assumptions derived from their original philosophical stand and paradigms. Most approaches, in Mingers' (2001a) review of methods, have not elaborated on how these inconsistencies could be solved. For example, potential sources of incommensurability are: the ontological and epistemological dichotomy between interpretivist and positivist assumptions; the nature of the structure and agency; or different definitions of causation. These dichotomies can cause confusion and inconsistencies in the research process and lead to methodological anarchy if not considered and discussed prior to applying different research methods.

Weber (2003), offering a solution to the above issue, suggests that researchers should conceptualise research problems in different ways based on the research method they're using. However, he doesn't give specific guidelines on how this can solve the problem of inconsistencies between philosophical assumptions. (Garcia & Quek, 1997) argue that the choice of research methods should not depend on being qualitative, quantitative or multi-method, but rather on the ability to find a philosophical assumption that leads to more coherent and consistent research. Thus researchers cannot address the potential inconsistencies between research assumptions and different methodologies, unless they can find sets of philosophical assumptions that bring together all these research methods in a comprehensive way.

In relation to this discussion, Mingers (2001a), in advocating strong methodological pluralism (where research phenomenon is inherently complex and multi-dimensional), argues that the problem of paradigm incommensurability can be solved by first disconnecting research methods from particular paradigms (for example, quantitative methods from positivism) and constructing a bridge across paradigm boundaries based on less extreme meta-theoretical assumptions (Layder, 1998).

[20] 6 journals (MIS Quarterly, Information System Research, Communication of ACM, Information System Journal of IS and Accounting, Management and IT) from the period of 1993 to 1998.

2.4.4 Interpretation reflexivity

Weber (2003, p. x) mentions another kind of reflexivity in the research process — interpretation reflexivity. He defines interpretation reflexivity in terms of the following considerations for the research process:

1) applying different strategies in interpretation and being aware of their strength and limitations;
2) questioning the data source and how it is related to the research questions, and considering the impact of the research process on collected data;
3) being careful about research biases in interpretation;
4) playing the devil's advocate with theories;
5) recognising the "tyranny of theories" and iterating between interpretation and meta-theory.

Considering the above issues, this study argues that interpretation reflexivity (as defined by Weber) is related to epistemological assumptions and will be discussed as part of a methodologically reflexive study. (Layder, 1998) defines analysis in the research process as theory generation[21] and describes it in relation to different modes of inference.[22] Thus, interpretational reflexivity should be discussed in relation to reflexivity in methodological choices, as well as reflexivity in choosing and applying theoretical lenses in the analysis process.

The following section describes how Weber's principles and the concept of disciplined diversity are related to the identified gaps in IQ research.

2.5 CONCEPTUALISATION AND DISCIPLINED DIVERSITY

This section will proceed by: (1) highlighting the importance of IQ conceptualisation in research; (2) explaining why it is currently considered as undisciplined; and finally (3) discussing how the principles of disciplined diversity can address this status quo.

2.5.1 Conceptualisation and its critical role in research

Conceptualisation is at the core of scientific research. All scientific attempts to study a phenomenon start with researcher's conceptual understanding of it (Danermark et al., 2001).

[21] Theory generation includes theory modification or theory extension.
[22] Logic of analysis as induction and deduction.

A good conceptual definition is an essential requirement for building theories and conducting empirical research (Barki, 2008; Wacker, 2004; Wacker, 2008). However, conceptualisation is not a well appreciated research step in most empirical research (Goertz, 2006). Even among books on methodology, the importance of concept and conceptualisation has been down-played (Danermark et al., 2001). Much of the existing literature on research methodology focuses more on how to test construct validity, and less on construct development and concept definition (Barki, 2008; Wacker, 2004).

A traditional empirical investigation includes several concepts, measurement instruments and statistically tested relationships. While there is no doubt that the traditional, measured and focused treatment of construct validity is important, the initial steps during which a researcher identifies and specifies a concept play a crucial part in any theoretical contribution (Barki, 2008). Construct conceptualisation should be considered as the prerequisite to developing a measurement model. If the concept is not formally defined, causal relationships and statistical measures cannot lead to a good measurement instrument (Grace & Bollen, 2005). Concepts are also defined as the main building blocks of constructing theories and propositions (Goertz, 2006; Wacker, 2004); Rivard (2014) argues that a clear construct conceptualisation can potentially make a theoretical contribution. Accordingly, a good conceptual definition is a prerequisite to develop good theories and a strong body of research. A good conceptual definition involves both theoretical and empirical analysis of the phenomenon and draws distinctions between the behaviour of the phenomenon and its attributes. These distinctions are important for explanation and causal analysis (Goertz & Mahoney, 2012).

In IS studies, conceptualization is not a well appreciated research step (MacKenzie, Podsakoff, & Podsakoff, 2011). Researchers mostly borrow constructs from other disciplines or rely on common sense and focus on how to test construct validity instead of clarifying concept definition (Barki, 2008; Wacker, 2004). In IQ studies, the focus on defining IQ by sets of dimensions and measures to develop measurement models, and related challenges in IQ conceptualisations, were discussed in Section 2.3.

Accordingly, this thesis argues that the first step toward addressing the challenges in IQ studies is to develop a rigorous conceptual definition of this phenomenon, one that also facilitates disciplined diversity both in definition and in studying different aspects of IQ.

2.5.2 Undisciplined diversity in conceptualisation of IQ

In the review of IQ studies in Section 2.3, existing challenges in the study of this phenomenon were discussed and broken down into two categories: research related and practice related. These challenges are summarised as follows:

- IQ is a multi-disciplinary research concept; there are inconsistencies between different approaches and assumptions in different disciplines.
- Although the definition "fitness for use" is the most popular one in IQ research, it is ambiguous and does not tell much about the end user's requirements. Thus researchers mostly define IQ in their research context with sets of dimensions and attributes.
- There is a variety of IQ dimensions and measures, with ambiguous and overlapping definitions.
- The derivation of IQ definition and selection of measures are rarely justified on a theoretical basis.
- Researchers have often applied different approaches for IQ measurement without justifying their methods. There is a need to develop a systematic approach that positions different methods according to this study's goals.
- IQ measures and dimensions defined in research practice can hardly be applied in the practical context to define and evaluate IQ, and the results of evaluation are difficult to interpret.

Burton-Jones (2005, p. 4), in re-conceptualising system usage, defines non-disciplined diversity in conceptualisation as associated with:

- lack of accepted definition of the concept within literature;
- arbitrary choice of measures and dimensions in evaluating system usage;
- arbitrary choice of research methods in studying system usage;
- disconnected definitions and conceptualisation across different levels of analysis.

Consistent with Burton-Jones (2005) and Weber's (2003) principles of diversity discussed earlier, this study argues that the gaps in IQ research are associated with a lack of disciplined diversity in how this phenomenon is defined and conceptualised.

2.5.3 Achieving disciplined diversity in conceptualisation

Section 2.4 of this chapter described how Weber's (2003) principles for conducting reflexive research can help to achieve disciplined diversity. It is argued here that gaps identified in IQ research can be effectively addressed following the general rules of reflexivity proposed by Weber. For example, meta-theoretical reflexivity forces researchers to clearly define and justify the foundational assumptions of their research based on the nature of IQ and their research goals, and it avoids adherence to the philosophical assumptions of a given research community without justification, thus can address the problems related to inconsistencies. Theoretical reflexivity forces IQ researchers to build their definitions and justify their choice of measures based on theoretical concepts. Applying theoretical frameworks can also help explain the variety of definitions that surround the concept of IQ. Methodological and interpretational reflexivity can help justify research methods and IQ measurement approaches according to the theoretical foundations and study's goals. This approach is also a solution to the inconsistencies between research assumptions and research approaches. Figure 2-2 shows these principles in relation to the gaps in IQ research.

Weber's Reflexive Principles	IQ research challenges
Meta-theoretical reflexivity	Inconsistencies between different disciplines, unclear definitions
Theoretical reflexivity	Unclear definitions, different sets of measures with ambiguous definitions
Methodological reflexivity	Inconsistency between research assumptions and research approach
Interpretation reflexivity	Inconsistency between research assumptions and research approach

Figure 2-2: Weber's disciplined diversity principles and IQ research problems

In short, the current problems in IQ research need to be addressed by moving towards disciplined diversity and relying on the above rules proposed by Weber (2003).

The rest of this thesis focuses on developing a conceptual framework[23] that facilitates achieving these principles in the IQ field, in order to address the research question "how can information quality be studied in a disciplined way?"

[23] The term conceptual framework is referring to Sayer's (1992) definition of *conceptualisation* as identifying fundamental qualities of the phenomenon by means of abstracting and isolating.

A good conceptual framework will solve the identified problems related to existing imprecise definitions and measures of IQ; provide a basis to develop methods and tools to study IQ by considering context and the information user; seek to transfer the benefits of this improved understanding to practice by providing more precise definitions of IQ measures and dimensions.

2.6 CONCLUSION

This chapter begins by discussing the importance of the concept of information quality, followed by a brief review of IQ research, based on which the main gaps in studying this phenomenon are identified.

IQ scholars are aware that their field's main issue lies in the existence of a variety of definitions, measures and research methods which are not consistent with each other. They have suggested that a unified framework which could integrate these varieties would be the solution to this problem.

It is also argued in this chapter that, since IQ is a context-dependent phenomenon, diversity in how this phenomenon is conceptualised is desirable, as long as it is disciplined and justified. Specific principles of disciplined-diversity, as proposed by Weber (2003), are presented as the basis for a conceptual framework that could help researchers to study IQ in a disciplined way.

In the next chapter, I will discuss how research philosophy can help overcome and unite the existing epistemological problems that are identified in this chapter and consequently help to develop a framework for achieving disciplined diversity in IQ research.

Chapter 3: **Research Design and Methodology**

In the previous chapter it was argued that the main problem in Information Quality (IQ) research is not the variety of definitions and conceptualisations of this phenomenon, but the lack of disciplined diversity in conceptualizations. Disciplined diversity is defined as the existence of balance and consistency between research phenomenon (research aim) and choice of philosophical assumptions, methodological and theoretical lenses. This coherence can be achieved by principles of reflexivity in the research process, as proposed by Weber (2003). These principles consist of: meta-theoretical reflexivity, theoretical reflexivity, methodological and interpretational reflexivity.

This chapter describes the approach of this study in developing a conceptual framework that answers the research question: "How can we study IQ in a disciplined way?"

The study design is based on the first principle of Weber's (2003) proposed research approach — meta-theoretical reflexivity. This study argues that Critical Realism (CR) as a philosophy for science can satisfy the criteria of meta-theoretical reflexivity and also provides the basis for satisfying the other three principles (Bhaskar, 2013). This chapter has two main parts. The first part (from section 3.1) justifies the choice of critical realism as the research philosophy, and introduces the main tenets of this philosophy and their relevance for studying IQ. The second part (from section 3.4) describes the research process based on the six-stage explanatory research guideline proposed by Danermark et al., (2001). The structure of the thesis based on this methodological approach is then outlined.

3.1 META THEORETICAL ASSUMPTIONS/PHILOSOPHY

In section 2.4.1, it was argued that to achieve a disciplined diversity in conceptualising the phenomenon, researchers should avoid extreme nomothetic or idiographic views of the world in their choice of meta-theoretical assumptions. Rather, the choice of meta-theories should be based on the nature of the phenomenon under study, and should be flexible enough to engage with different world views if necessary (Weber, 2003).

Research paradigms are informed by meta-theories in their philosophical stance. Researchers always bring their assumptions to the research process implicitly or explicitly, and they are mostly unaware of the meta-theories behind their research paradigm (Dobson, 2001).

Scientific meta-theories carry ontological, epistemological and methodological assumptions that inform research paradigms. Ontology refers to assumptions about the nature of reality; epistemology refers to the justification of knowledge claims; and methodology is the process and procedures that generates knowledge claims (Orlikowski & Baroudi, 1991). Accordingly, the choice of meta-theories and philosophical stance influences the appropriate choice of theoretical views and research methods (Garcia & Quek, 1997).

Thus, a researcher's reflexivity is bounded by their philosophical stance (Landry & Banville, 1992). This emphasis on the choice of meta-theories and research philosophy is the pivotal point in achieving disciplined diversity in research. In fact, there is no such thing as no philosophy in research; no philosophy means bad philosophy. Everyone has their own unconscious philosophy and applies it in their daily life or research practice (Collier, 1994). If researchers are not conscious in their choice of philosophical stance they will be guided passively by the social or academic group they belong to (Collier, 1994; Dobson, 2001); accordingly, inconsistencies between research problems, choice of methods and theories start to emerge. Coherent and consistent research is the result of recognising one's implied philosophical beliefs (Dobson, 2001).

Thus, to be reflexive in the choice of meta-theories Weber (2003), researchers should define their philosophical stance based on their sphere of activity and their research phenomenon and try to avoid any dogmatic view of the world. In the following section, in order to choose the appropriate philosophical stance: (1) IQ and information system (IS) studies are introduced as social science phenomena; (2) different philosophical positions within social science studies are presented briefly; and (3) CR is presented as the appropriate research philosophy to study IQ and to achieve this thesis's aim.

3.1.1 Choice of research philosophy

What is generally called information system and information system research cannot be restricted to computers and communication technologies, independent from the context of use (Avgerou, 2001). The field of IS and research phenomena such as information system use and information system evaluation are influenced by macro-level structures of social life such as cultures, norms and power structures (Avgerou, 2001; Schech, 2002). With advances in new technologies, information and communication technologies are more intertwined with different aspects of everyday personal and social life; thus it is becoming more complicated to define and evaluate IS research related concepts. Accordingly, as IS research is conducted within organizations with social characteristics, it should be studied as part of social science (Mingers, 2001a; Mingers, 2004).

IQ and IQ perception are defined by many researchers in IS and other disciplines as subjective and context-dependent phenomena (Eppler & Wittig, 2000; Floridi, 2006; Floridi & Illari, 2014; Mai, 2013). Even intrinsic measures of IQ such as accuracy are dependent on the human agent's understanding and perceptions and the intended use of information (Illari, 2014). Thus IQ is not inclusively observable or definable independent of human actions and social context, and should be studied through socio-technical lenses. Social science's philosophical stance and meta-theoretical assumptions are examined below to identify how they fit studying IQ, particularly within the IS discipline.

There are three main philosophical positions that debate current methodologies in social science studies (Gorski, 2013): positivism, interpretivism and constructivism.[24] The underpinning assumptions of these three schools of thought and the main critiques of them are reviewed as follows.

The naturalist view (positivism) believes there is a general approach to science both in the natural and social sciences, and anything "scientific" should follow a positivist (or more general empiricist) philosophy, in order to make general rules based on empirical observations. For many years IS studies have been seen as having their roots in natural sciences studies (Mingers, 2001a, 2003; Orlikowski & Baroudi, 1991) and thus the dominant research paradigm in IS has been positivism (Mingers, 2003). This philosophical stance is based on three main assumptions: "(1) observations and perceptions are unproblematic in providing access to the real world; (2) causation relies on the constant conjunction of events, as in the Humean (1967) notion; and (3) the principle of induction, that universal laws can be drawn from sets of observations accompanied by deduction of the predictions from the laws (laws can be confirmed or falsified by their instances" (Mingers, 2004, p. 89).

This view of science has been critiqued by many philosophers (Pepper, 1942; Wittgenstein, Anscombe, & Anscombe, 1958) and researchers in the social sciences (Cicourel, 1978). The problems of the extreme positivist view, which leads to inconsistency between research and practice in IS studies (Smith, 2006), were discussed in Section 2.4.1. The main objection to a positivist approach to social science research is to the assumption that

[24] There are a variety of schools of thoughts in social science, but "positivism is the dominant form of orthodoxy, and interpretivism is the dominant form of heterodoxy, and most social scientist position their methodological approaches implicitly or explicitly in relation to these two stances" (Gorski, 2013, p. 660).

observations provide a mirror on reality and universal laws can be drawn from sets of observations (Hesse, 1974; Kuhn, 2012). One reason the social scientist cannot discover universal laws is because of their inability to achieve experimental closure when studying social structures and human activities. The other problems associated with positivism are the belief that knowledge is given-in-experience, and the ambiguous and superficial notion of experience (Bhaskar, 1998).

Accordingly, a positivist assumption only suits the study of natural science phenomena in a closed system (Danermark et al., 2001). In social sciences and also in IS, research phenomena cannot be studied independently of their social context. Thus, philosophies appropriate for closed systems do not fit the nature of IS and IQ studies.

In the social sciences, the oldest rival of positivism is interpretivism. Interpretivists believe that social objects are ontologically different from natural objects, and epistemologically there is no observation or fact that is independent from social actors, and cultural and social activities (idiographic knowledge). The conclusion is that research methods for social science should rely on hermeneutic methods. Examples include different strands such as ethnography (Harvey & Myers, 1995), hermeneutics and phenomenology (Boland Jr, 1986; Coyne, 1995).

It was argued in Chapter 2 that interpretivists' assumption in rejecting a real ontology beyond human's understanding is inconsistent with their desire to generalise research results (Section 2.4.1). Smith (2006, p. 197) argues that interpretivists in IS research still apply Humean account of causality "as a constant conjunction of events" similar to positivists, and look for regularities in empirical data to come up with some universal laws. Within this view, the ontological reality of social structures and technologies are denied by ignoring objective and structural aspects of the world, thus producing scientific research that is "reportage and local narratives" (Carlsson, 2009, p. 811).

Another philosophy in social science studies is constructivism, which goes one step further than interpretivism and denies the possibility of scientific knowledge for both social and natural science (Gorski, 2013; Mingers, 2004). Social constructivism in the strong form affirms epistemic relativism and rejects any possibility for knowledge beyond sets of stories, discourse and collective performance (Gorski, 2013). Weak social constructivism believes that there is an objective reality but humans cannot have any knowledge of it (Edwards et al., 2014). Many social constructivists believe the goal of theories and science is "simply to destabilize or subvert the discourse or power and to create space for individual autonomy" (Gorski, 2013, p. 661). In social sciences, post-structuralists such as Foucault (1980) and post-modernists (Best & Kellner, 1991) follow research paradigms based on this view. In IS, this stream includes post-modernist studies such as the work of (Ciborra, 1998; Greenhill, 2001; Robinson, Hall, Hovenden, & Rachel, 1998), actor-network theory (Walsham, 1997) and critical theories (Cecez-kecmanovic, 2011).[25] The ontological position of social constructivists sees human agents as representations of discursive powers and language; this makes it difficult or impossible to explain the role of social scientists and how any knowledge of social science can be generated at all (Gorski, 2013). Rejection of the possibility of knowing non-subjective, non-discursive reality means that "all theories are all equal and 'reality' is what people say it is" (Edwards et al., 2014, p. 5). This position inhibits researchers from criticising social systems and relations. Moreover, constructivists (critical constructivists) in their effort to explore and reinterpret subjective meaning systems, ironically (with their ontological beliefs) and frequently generalise claims about the properties and relations of discourses (Edwards et al., 2014).

Another issue with all three above positions (positivisms, interpretivism and constructivism) is that few social researchers would defend them nowadays (Gorski, 2013). For example, many positivist researchers both in social science and IS research do not believe that they can attain universal laws by examining empirical observations and by quantitative data analysis (the near-perfect correlation between two variables would mostly be taken as a mistake). Interpretivists also do not believe what they do is exhaustively showing reality in practice. Constructivists recognise all these inconsistencies and complexities of the social world, but turn these complexities into a thin explanation that reality is made up of "self-interested narratives" or "theories of laypersons" (Edwards et al., 2014, p. 6).

An alternative approach which responds to the problems of positivism in social science and is an alternative to interpretivist and constructivist approaches is critical realism (CR), which enables IS research to take a realist stance while avoiding the major criticism of positivism. CR believes in the existence of an objective reality independent of the agent's meaning and perceptions of it. Thus CR can address aspects of IS studies both as natural (including systems and technologies) and social (organisational environment and human

[25] IS research is conventionally split into positivism, interpretivism and critical studies. However, critical theories ontologically follow a constructivist position, discussed above.

interpretation), and potentially suits studying IS as an applied discipline (Carlsson, 2009; Mingers, 2004).

In terms of facilitating reflexivity and avoiding extreme views, CR points out the limitations of other philosophical stances and their related paradigms, and recognises their contributions to the study of a complex phenomenon by acknowledging their methodological advantages. CR (Bhaskar, 2013) establishes a realist ontology consistent with natural science, and also accepts that epistemologically social science phenomena are relative and socially and historically formed (consistent with interpretivist views). Even critical theories, at least in their traditional Habermasian form, are recognised in CR philosophy (Mingers, 2004). Thus CR as a research philosophy fits for the study and conceptualisation of a complex and multi-aspect phenomenon such as IQ. It also allows the researcher to avoid any dogmatic, extreme idiographic or nomothetic views of the world (Weber, 2003, p. vi).

3.2 INTRODUCTION TO CRITICAL REALISM (CR)

CR as a philosophy for science[26] (Bhaskar, 2013; Gorski, 2013), provides answers to the questions about ontology, epistemology and methodology. This thesis is mainly based on the foundational concepts introduced by Bhaskar as part of his seminal works (1975-1988). Bhaskar's (2013) version of realism (critical realism) has two central assumptions: first, reality exists independent of human beings' perception; second, this reality has its own structures (Easton, 2010; Tsang, 2014; Fay, 1994). Bhaskar describes CR as "ontologically bold but epistemologically cautious" (Outhwaite, 1987, p.34). Thus CR-based research should focus on answering the question of what the reality of the phenomenon must be like before explaining what kind of knowledge research can acquire from the phenomenon (Bhaskar, 2013).

In order to develop reliable accounts of social phenomena and explain key social processes, critical realist researchers put ontological questions (what is information quality?) before epistemological ones (how can information quality be studied?) (Edwards et al., 2014). Ontology is concerned with the nature of the object of the study, the entities in the real world and their characteristics, and whether this reality exists objectively or subjectively relative to human understanding (Orlikowski & Baroudi, 1991).

The main difference between CR ontology and classical scientific ontology is that the latter would require describing things about reality which can be proved or disproved through

[26] "What (good) science is and does" (Gorski, 2013, p. 660)

the research process. CR ontology, on the other hand, asks what the world (reality) should look like for science to be possible (Bhaskar, 2013). This ontological view provides the basis for critical assessment of the knowledge and existing scientific ontologies in any domain. CR philosophical ontology helps with providing an overarching framework which includes a taxonomy of related concepts from which scientific ontologies can proceed (Gable, 2011).

Bhaskar's philosophical ontology defines the social world as an "emergent, concept and activity dependant, value-drenched and politically contested part of the natural world" (Edwards, et al., 2014, p. ix). Any social phenomenon is a manifestation of interactions (both cooperation and counteraction) between varieties of mechanisms resulted from observable or unobservable contextual structures. According to Bhaskar (1998), it is the very characteristics of social structures that determine the shape of social phenomena and therefore the nature of social inquiry and the extent to which social reality can be examined.

Accordingly, CR's main assumptions and ontological toolbox are detailed in order to understand the nature of IQ phenomenon and develop a conceptual definition of IQ.

3.2.1 Independent reality

Critical realism's main ontological assumption is that an objective world exists independent of our perception, language or imagination. It also admits that our experiences and perceptions of this world are limited to our subjective interpretation (Edwards et al., 2014; Sayer, 1992). CR distinguishes between objects of knowledge such as concepts, laws and theories which are dependent on humans and the structures or mechanisms of the real world to which the theories refer. This distinction implies that the "world should not be conflated with our experience of it" (Sayer, 2000, p.11). According to CR, the reality of the phenomenon which is independent of any knowledge that a human agent might hold about it is called the intransitive dimension of the phenomenon, whilst any knowledge, perception and understanding of the phenomenon resides in the transitive dimension which is open to challenge, dispute and revision (Wynn & Williams, 2012). Bhaskar describes the transitive dimension as "the raw material of science, the artificial objects fashioned into items of knowledge by the science of the day" (Bhaskar, 2013, p.11) and argues that any conceptualisation or knowledge about research phenomenon is socially constructed and therefore is fallible. Bhaskar argues that there is no science without the world of intransitive objects; this is the fundamental error in post-modernist approaches, that they collapse the transitive and intransitive dimensions to one dimension (Dobson, 2001).

CR also accepts that social phenomena are intrinsically meaningful and these meanings have to be understood, not measured or counted. However, CR, unlike constructionist approaches, believes in the possibility of knowing reality (Easton, 2010). CR helps in clarifying what can be known while recognising that the various understandings of people within a social setting are likely to produce multiple interpretations of one situation, each of which might be viable but of different social import (Olsen, 2010). For example when studying performance within different teams in an organization, there exist different interpretations of the same performance criteria and definitions across different teams or even between individuals in a team. CR believes that despite these variations in interpretations, we can still identify the mechanisms that can cause higher performance results for some teams comparing to the other ones. The importance of different interpretations and how they cause varieties in performance results also can be studied by CR researchers in combination with other mechanisms in the context of the study.

According to this principle, IQ as a social science phenomenon possesses both transitive and intransitive aspects. The existing knowledge about this phenomenon, its different conceptualisations and frameworks, form the transitive dimension of IQ which is diverse and open to debate; for example IQ measures and metrics are all knowledge, thus transitive. The intransitive dimension refers to the nature of IQ (for example the communicated message, the information user, the medium of communication, etc.) and needs to be differentiated from existing knowledge and definitions of IQ. This emphasises again the importance of having an ontological understanding of IQ (defining intransitive aspects) prior to studying and acquiring knowledge about it. Chapter 4 is focused on identifying the intransitive aspects of IQ and developing an ontological understanding of IQ.

3.2.2 Open system

Another difference between natural science and social science studies is the concept of open and closed systems. In natural science, researchers are able to design laboratory experiences as closed systems, in which a phenomenon is more exposed by controlling contextual elements. Most often within these closed systems, it is possible to isolate specific causes for a given outcome or an event (Bhaskar, 1998). However, in social science studies and consequently IS studies, it is impossible to design an experiment in a closed system.

Social systems and organisations, as socio-technical systems, are a combination of continuously changing contextual structures and mechanisms (Wynn & Williams, 2012). Open systems such as organisations contain complex feedback loops that make prediction and historical happening of events quite impossible (Edwards et al., 2014). In CR, the focus is thus on identifying mechanisms which can be enacted according to the context.

In relation to IQ studies, this assumption means that researchers cannot only rely on research methods such as experiments or interviews with specific groups of users, then generalise the results. It is true that these methods can give some insights about users' (specific groups of users) perceptions of IQ, but they cannot reveal the complexity of open systems and the different factors involved in real situations, unless researchers are able to provide explanation of the active mechanisms in the study context.

3.2.3 Stratified ontology

Critical realism argues for a stratified ontology or ontological depth (Bhaskar, 1998, p.12) rather than a flat ontology (Sayer, 2000). "The strata are defined as domains of the real, the actual and the empirical (Bhaskar, 1998; 2013). The empirical is where observations and experiences can be made by the observer. However, events occur independently of perceived experiences; the actual domain includes the events that occur but may or may not be observed (includes the empirical as well- the observed events) (Bhaskar, 2013). Finally, the real includes whatever exists, be it natural or social, its structure and power and its capacity to behave in certain ways. Bhaskar (2013) argues that structures in the domain of real exist independently from the pattern of events in the domain of actual. The real domain includes both actual and empirical domains (things that are active as well as things that aren't). We are not be able to observe the real or actual domains; we just see the tip of the iceberg, which can be observed in the empirical domain. Table 3.1 shows these three domains of reality in the "depth ontology" (Edwards et al., 2014, p. 9) of CR (domain-stratification) and the concepts associated with them in CR ontology.

Table 3-1: Stratified ontology (Bhaskar, 2013, p.13)

	Domain of real	Domain of actual	Domain of empirical
Mechanisms	×		
Events	×	×	
Experiences	×	×	×

In the transitive dimension of science, CR researchers try to discover the structures and mechanisms in the real domain (Sayer, 2000). This ontological assumption is one of the main differences between CR and other research philosophies such as positivism and interpretivism which adhere to a flat ontology (Wynn & Williams, 2012). Positivism reduces reality to a Humean notion of causality and conjunction of events in the domain of empirical and has little to do with mechanisms and structures in the real and actual domains (Joseph, 1998). Interpretivists typically hold the position that reality is constructed socially or individually and can be studied through understanding the agent's meaning and actions. Thus interpretivist research moves from empirical events to the actual domain and the actor's meaning system, but they do not go further to identify the structures and mechanisms in the real domain. Constructivist research on the other hand rejects the existence of the real domain altogether (Wynn & Williams, 2012).

CR understanding of a stratified reality is an indicator that scientific knowledge is a process of investigating what lies behind experienced events and realising that what has been observed does not exhaust what could happen or has happened (Sayer, 2000). Patterns of events evident in our day-to-day life are the end result of a series of activated powers and mechanisms. A scientific act, then, is about investigating what lies behind experienced events (Bhaskar, 1998). However, researchers' knowledge of reality is limited because of the difficulty of accessing reality through the levels of stratification (Mingers, 2004).

This assumption of stratified reality, which mostly is referred to as a depth ontology assumption, is the foundation upon which CR epistemology and methodologies are built (Edwards, et al., 2014). The main research question that can be asked more specifically by CR researchers is: "what could be the real world structures and mechanisms that make these events happen?" For example, Carlsson (2005) proposed that in IS evaluation studies (Bjørn-Andersen, 1988), it is not enough to understand that an information system works (which belongs to experiences in the domain of empirical); researchers need to ask questions about the mechanisms and structures (such as existing powers or social structures and norms) that make the system work and be accepted by users.

Another ontological assumption in CR, depicting the stratification of the world, refers to the existence of entities and structures of the real world (see Section 3.2.3.1) in a hierarchically organised way (Bhaskar, 1978, p.979). This assumption is reflected in the cumulative and diverse nature of scientific knowledge, seeking explanations for different levels of structures. For example, an entity like an organisation is composed of people, and people are made of organs and tissues. To understand a phenomenon it is important to consider different levels (physical, biological, psychosocial, social), and how they make the core phenomenon happen. This form of stratification has been referred to as a "laminated system" (Bhaskar & Danermark, 2006) or level stratification (Elder-Vass, 2007).[27]

For example, in a factory we empirically observe that one team is following all schedules, standards and procedures detailed within a code of practice, independent of supervision. To explain such a behaviour, a CR researchers looks beyond the events in the domain of empirical. In the domain of actual there might be events causing the empirical observation which are beyond the immediate context of empirical regularities. For example intra-team relationships, the activities included in conducting the code of conducts and supervision surveillance which respondents are not aware of. CR researchers need to identify also the real domain entities such as team dynamics, organization structure(s), the nature of the products and tasks, and government legislations etc., to identify how these entities interact with each other and what could be potential mechanisms that can cause the observed events. With this approach, multiple causes can be identified for any observed event in the domain of empirical (Edwards et al., 2014).

The assumptions of depth ontology and laminated systems will be used in Chapter 4 to develop a stratified conceptualisation of the IQ phenomenon.

3.2.3.1 Entities, objects and structures

"Objects, or more generally entities, are the basic theoretical building blocks of critical realism" (Easton, 2010, p.120) that possess causal powers and can make changes in their own right". Powers are inherent in the structure of entities and are considered as ordinary causes of changes that can be activated or not (Sayer, 1992). For example, while information users (as entities) have powers to use good quality information in their decision-making, they also have the liability to be deceived by low quality information.

"Entities can be molecules, things, organisations, people, resources, relationships, attitudes, management information systems, inventions, ideas and so on. They can be human, social or material, complex or simple, structured or unstructured" (Easton, 2010, p.120). Entities can be organised hierarchically and exist at different levels (the concept of a laminated

[27] Elder-Vass also refers to the differentiation between the three domains of real, actual and empirical as domain stratification.

system is described above). For example, an entity such as an organisation is made up of people, teams, different sections, infrastructures, norms, and so on.

Entities possess structures (Easton, 2010). Sayer (1992, p. 92) defines "sets of internally related objects (entities) or practices" as structures existing in the real domain. These structures may include lower level structures (entities or objects) or even be part of larger structures (for example individual, teams, organization and government in the factory example presented above in Section 3.2.3). In this definition, the term structure refers to internal relations which make the entity what it is and not something else (Danermark et al., 2001). Examples of structures in the IS context could be the structure of an organisation, gender and psychology structures for an individual, group structures or an organisation itself, rules or practices, and technology and management information systems (Easton, 2010). In this study the terms object and entity are used interchangeably, consistent with Easton's definition above, while use of the term structure is consistent with Sayer (Sayer, 2000) and Danermark et al. (2001) to mean the internal composition of the object.

The implication of this foundation for research is that it focuses the attention on three main questions: "what are the entities and structures that define the research field (IQ studies); what their relationships are; and what are their powers and liabilities?" (Easton, 2010, p. 120).

3.2.3.2 Mechanisms

Bhaskar (1998) defines mechanisms as the ways of acting of things. Mechanisms are inherent to structures, enabling or limiting what can happen within a certain context (Sayer, 2000). Any power to be activated necessitates the existence of at least one mechanism (Edwards et al., 2014). For example, heat can transform water to steam (power) through increasing the vibration of molecules of water (mechanism). "In the social world, powers depend on the existence of mechanisms that relate entities together" (Edwards et al., 2014, p. 8).

Unlike positivist definitions of the mechanisms by Merton (1967) and (Hedström & Swedberg, 1998), mechanisms in the CR definition are not necessarily "linear or additive as required by statistical models or logico-rational as in box and arrow diagrams, instead they can be linguistic in nature and metaphorical" (Easton, 2010, p.122). In CR, mechanisms are assumed to be contingent and context-dependant, thus their outcome depends on other mechanisms in the context (Bygstad & Munkvold, 2011). In other words, it is the combination of the mechanisms and particular context and setting that can lead to any specific outcome. So we are not able to predict phenomena using mechanisms — we can only explain them (Sayer, 1992; Smith, 2006).

For example, when studying individuals' actions and meanings (as in IQ studies), their beliefs and thoughts are considered as mechanisms which link the given actions to the consequences. An actor's beliefs or reasons that motivate intentional behaviour correspond to a tendency to behave in a certain way. As a result, CR considers an actor's reasoning as a generative mechanism (Bhaskar, 1998) causing the given action or observed event (Archer, 1995; Bhaskar, 1998). For example, in IQ studies, the information user's knowledge about the credibility of the information source is a mechanism that can change decisions about the quality of received information. The actions caused by generative mechanisms may trigger subsequent mechanisms enabled by other entities; for example, the power of authority (through institutionalised mechanisms) in an organisation may influence mechanisms on an individual level (reasoning) in using information. This shows that while beliefs and reasons may adequately explain an action, they do not necessarily determine its ultimate consequences. The factory example in Section 3.2.3 can clearly show the complexity of different mechanisms in different levels (individual, team, organization and government) influencing each other and causing the observed events.

3.2.3.3 Events and experience

Events are generated as a result of interactions between mechanisms and the effects of structures and may be observable or not. Events can cause new mechanisms to be activated and thus contribute to new events. Structures and mechanisms are in the domain of real and ontologically different from the events they generate (Edwards et al., 2014; Sayer, 1992).

Social events or the formation of any social phenomenon happens as the result of interactions between entities at different levels (in a laminated system) such as physical, biological, physiological, psychological, cultural and normative. This understanding of a social phenomenon or event implies that the mechanisms, context and characteristics of each level are all essential in understanding the event. This does not mean that each of these levels needs to be thoughtfully referred to when explaining a social phenomenon (Bhaskar & Danermark, 2006); "this is the matter of pragmatics of explanation" (Bhaskar & Danermark, 2006, p. 289). In Chapter 4, IQ as a social phenomenon/event is defined as the result of the involvement and interactions of physical, individual and social contexts in the real domain.

However, it is important to note that not all events can be perceived by observers because of the limitations and restrictions of human beings and their observation methods. Wynn and William (2012), consistent with Bhaskar (2013), call the events which can be observed experiences. Experiences belong to the empirical strata of CR and are subsets of actual events taking place (Table 3.1).

Both positivist and interpretivist paradigms are based on an empiricist philosophy, meaning that they rely on sets of empirical observations or data that are obtained by data collection. CR believes that these observable empirical data are only subsets of what happened in the actual world, and researchers should not under-specify the entirety of events which are actually happening and the mechanisms generating them (Bhaskar, 2013; Collier, 1994). With this definition, even the non-occurrence of an expected event may provide useful insights. For example, an information user might decide not to act upon received information, not because they perceive it as low quality but because of the pressure related to social norms in an organisation through hidden mechanisms.

3.2.3.4 Emergence

Critical realism argues that the world is emergent, which means that interaction of two or more entities can contribute to new phenomena or new attributes which are not reducible to their elements, even though the latter are necessary for existence of the former (Sayer, 2000). When entities are studied considering their structure and lower level entities, the whole system might have different causal powers which are greater than the sum of its lower levels entities and cannot be reduced to that. Thus, properties of any structure emerge from the interaction between the components and their powers (Archer, 1995). In the Factory example in Section 3.2.3, the operational team is working consistently with code of conducts and rules. This is a characteristic of this team which is not necessarily representing the characteristics of all team members. Teams can have qualities which are more than the sum of the qualities of team members.

The implication of this concept for research is that in analysis of the levels one should accept that access to other levels is not necessarily easy. For example, an information system has properties which are not derivable by studying different components of it in a summative approach. Therefore, IQ as an emergent phenomenon cannot be studied by considering only the objective qualities and rules defined by a specification of the system and data bases. It also cannot be defined based solely on an individual's reasoning and beliefs, but should instead be defined as a combination of both in relation to the social context.

3.2.4 Causation and explanation

Causation is another foundational tenet of CR that provides language to explain the world and research phenomena (Easton, 2010). It is also one of the key differences between CR and other research paradigms. CR's rejection of Humean causation[28] a main assumption in positivist and interpretivist research has been mentioned earlier. Bhaskar's notion of causation is aligned with concepts defined in previous sections, such as powers, mechanisms, tendencies and the idea that different causes combine and interact to generate specific events. This section elaborates on causation from a CR perspective.

Causation within CR is defined as explaining the process and mechanisms that produce observed events from existing structures (Bhaskar, 2013). CR based researchers firstly need to describe empirical events and then explain the causal mechanisms, if and under what conditions they have been activated, interrelationships between them and how they generate the observed (Sayer, 2000; Wynn & Williams, 2012). Thus CR researchers tend to move between the intransitive world of events (Section 3.2.1), mechanisms and structures to the transitive world of measures, descriptions and theories. The significance of this new understanding of causation "lies with the potential to provide new causal insights into complex phenomena by radically rethink[ing] what scientific causal analysis involves" (Kurki, 2008, p. 197).

According to CR, identifying the causal explanations that can always lead to certain outcomes is quite rare or impossible because in an open system, the interaction and enactment of mechanisms is dependent on the structural and contextual conditions. Scientific research is capable of finding the causes of events but not of providing precise predictions. Thus, the aim of theories developed on the principles of CR is to describe the causes and contextual structures that cause a phenomenon to happen (Wynn & Williams, 2012). In the factory example in Section 3.2.3, it was described how the observed behaviour of the operative team might be caused by some non-observable events such as team dynamics, or a combination of different mechanisms such as supervision qualities or government legislations. However, there is still the possibility that none of these explanations are actualized in this context and completely different form of explanation and causal factors exist.

[28] David Hume (Hume, 1748) defines causation as empirical regularities which are generalisable (universal-laws) using statistical methods.

However, this does not mean that similar mechanisms cannot be enacted in similar settings. There are of course similarities in different social and socio-technical settings that can lead to similar experiences at various levels of observations. This potential regularity is called demi-regularity (Lawson, 2006). Bhaskar admits Lawson's definition of demi-regularities as "a partial event regularity which prima facie indicates the occasional, but less than universal, actualisation of a mechanism or tendency, over a definite region of space-time" (Lawson, 1998, p. 149)

Sayer also points to demi-regularities as some "invariant in structures under certain transformation" (Sayer, 1992, p.94). One can find similarities (invariants) for example between different organisations, information systems and thus between different research phenomena, such as the use of IS and enterprise systems or perceptions of IQ in different contexts.

To study invariants in structures and provide explanations, researchers can look for a common phenomenon in similar contextual settings, not as a basis for prediction[29] but to explore the existence and activation of mechanisms within each setting (Wynn and William, 2012). For example, perceptions of IQ from a certain kind of system or media can be studied within different organisational contexts to derive related social mechanisms and invariants between different contexts, or different communication technologies can be studied within one social context to derive related technological mechanisms. In the factory example introduced in the Section 3.2.3, one can study other teams' behaviour in the factory to see if similar patterns exist. Or one operative team with the same responsibilities can be studied in another factory to identify what are the similarities that can enact the observed behaviour.

The essence of this discussion for this research project is that if defensible causal explanations are identified in IQ research, then constituents of that explanation can be used in other cases. A CR tool box helps in identifying similarities between contextual structures. The conceptual framework proposed in this thesis also helps to identify these invariants in different contexts by developing typologies of contextual concepts. In CR terms, theories that provide explanations regarding the invariants in structures and contexts are called conceptualisation frameworks (Sayer, 2000). Conceptualisation frameworks provide an abstract language that can help us to talk about invariants in the structures and mechanisms (Danermark et al., 2001; Easton, 2010). The framework proposed in this thesis can be considered a conceptualisation framework since it proposes high level concepts that help to identify invariants in IQ studies.

[29] Prediction here refers to Hume and his notion of causality.

3.2.5 Forms of logical reasoning (inference)

Science can never be limited to observation, reporting and registering. “Reasoning, our ability to analyse, abstract, relate, interpret and draw conclusions, is a fundamental precondition for knowledge and knowledge development” (Danermark et al., 2001, p. 79). Thus it is crucial to clarify the form of reasoning in the research process based on research assumptions, philosophical stance and research goals.

Inference is defined as different methods of reasoning and various procedures applied when particular evidence is related to general conclusions (Danermark et al., 2001; Habermas, 1984; Peirce et al., 1933). Four different modes of inference can be characterised in scientific studies; deduction, induction, abduction and retroduction.

Deduction is a logical form of reasoning that derives conclusions directly from a given premise or derives knowledge from an individual phenomenon or from universal laws. An example of research using deduction logic is hypothesis testing. Although deduction provides rules for logical derivation and logical validity in all arguments, it restricts researchers from going beyond what is known within existing premises and does not allow for new patterns to be discovered from data (Danermark et al., 2001).

Induction, in contrast to deduction, provides some guidance on generalisation from empirical data, but is never analytically or empirically certain and there is always the risk of drawing wrong conclusions. Induction also restricts access to knowledge about underlying structures which are beyond empirical observations (Danermark et al., 2001). Grounded theory is an example of a totally inductive approach to analysis.

Given the limitations of deduction and induction, CR suggests a different process of reasoning to complement these forms of logical reasoning. Whereas induction or deduction include moving from the particular to the general or the other way, CR moves from the conception of one phenomenon to another (Lawson, 2006). CR researchers thus apply two other modes of inferences — abduction and retroduction, which are not formal logical modes but represent a more comprehensive way of reasoning from the particular to the general (Danermark et al., 2001).

However, it should be noted that although in Danermark et al. (2001), abduction and retroduction are differentiated (as is positioned in the discussions below), some disagreements and confusion between scientists exists on this. Peirce (1931) himself use both terms as synonyms:

> There are in science three fundamentally different kinds of reasoning. Deduction (called by Aristotle synagögé anagögé), Induction (Aristotle's and Plato's {epagögé}) and Retroduction (Aristotle's {apagögé} but misunderstood because of the corrupt text) and as misunderstood usually translated abduction), besides these three, Analogy combines the characteristics of induction and retroduction (Peirce, 1931, p28)

According to Peirce (1931) the term abduction is originated from a mistranslation of retroduction (van Hoek, R., Aronsson, H., Kovács, G., & Spens, K. M., 2005). He himself uses the term abduction to refer to retroduction as well and through his series of works introduces different definitions of abduction. Retroduction in CR is considered as the mode of analysis that reveals the mechanisms and characteristics of the social structures (Bhaskar, 1986, Danermark et al., 2001). Bhaskar (1986) also used both terms synonymously. His proposed retroductive approach, RRRE[30], is heavily reliant on the process of abstraction and drawing on existing theories (Gable, 2011). However, his approach has been criticized for lack of attention to the process of abstraction (Collier, 1994). As a result, this thesis relies on Danermark et al.'s (2001) approach which clearly emphasizes on the centrality of abstraction prior to the retroduction process. Danermark et al. (2001) makes a clear distinction between abduction and retroduction in the research process and describes how both modes of inferences are essential in the methodology of social science. In the following sections, abduction and retroduction are introduced according to Danermark et al.'s (2001) definitions.

3.2.5.1 Abduction

The concept of abduction as a mode of inference goes back to the early twentieth century and to American pragmatic philosopher Charles Peirce (1931-1958). Peirce defined abduction as a mode of inference and also as a more fundamental aspect of all perceptions of reality by humans. The scientists inspired by Peirce have also referred to abduction as redescription or re-contextualisation (Jensen, 1995). Different definitions of abduction are complementary and represent different aspects of scientific inference.

Abduction as a mode of inference is different from induction by drawing on general patterns and universal rules (theories in research). It is also different from deduction in the sense that does not assume that conclusion is logically given in those general rules (Collier, 1989). Abduction draws conclusions that are not induced by empirical observable data and not given by existing premises. Thus, abduction is a process of discovering the structures and

[30] RRRE stands for "Resolution, Re-description, Retroduction, and Elimination" (Resolution of a complex in to its components, Redescription of the components, Retroduction to possible causes of components, Elimination of alternative possible causes).

underlying layers of the phenomenon. Neither deduction nor induction can inform such discoveries (Danermark et al., 2001).

Abduction can also be defined as redescription or re-contextualisation. The advantage of re-contextualisation is that it gives new meaning to already known phenomena. This definition of abduction is based on the assumption that it is possible to acquire better knowledge about the research phenomenon by redescribing it from a set of new ideas or theories. In CR, it is important to apply an abductive method for re-contextualisation or re-description of a phenomenon in order to describe it as part of a general structure. Theories and models expressing more general contexts are vital tools in this process. In CR, abduction provides ways of classifying observations according to the theoretical concepts in order to identify general structures (Danermark et al., 2001; Peirce, 1932).

To simplify the discussion, abduction is about re-interpreting the existing phenomenon using different theoretical lenses. The starting point is the abstract level and general rules. The importance of abduction is that it broadens our knowledge and stimulates new ideas and research directions (Habermas, 1984).

This study applies abductive logic to re-describe the concept of IQ in a more general context than current definitions in IQ studies. Using existing theories as analytical tools helps to identify structures that are involved in IQ perceptions. This effort has also contributed to identifying new research directions in IQ research. Chapter 5 elaborates on the details of this process.

3.2.5.2 Retroduction

By means of abduction, phenomena can be defined by identifying its underlying structures. Retroduction is a mode of inference by which we explore the characteristics of these structures and their relations. Using retroduction, events are explained by identifying their generative mechanisms (Sayer, 1992).

Retroduction relies on CR meta-theory and the assumptions of a stratified reality and emergence. Retroduction is about proceeding from an empirical observation of events to conceptualise transfactual conditions.[31]. By means of retroduction, one seeks to identify

[31] "Transfactual conditions are conditions for something (a social structure) to be what it is and not something different" (Danermark et al., 2001, p.78)

structures and conditions underlying social phenomena and people's actions (Danermark et al., 2001).

The fundamental questions that can be asked in retroduction mode of inference, are "how is any phenomenon, like an action or social organisation, possible?" or "what properties should exist for the phenomenon to be what it is?" To answer these questions is to explore structures and relations in the real world. These questions can be asked at different levels of abstraction, so retroduction is an inference mode that can be used at both abstract and concrete (empirical) levels. At an abstract level, retroduction answers the above questions by referring to abstract theories to find universal conditions for human activities (Danermark et al., 2001). In empirical research, retroduction links structures and their inherent powers to specific events by hypothesising the generative mechanisms (Wynn & Williams, 2012). Retroductive analysis of empirical research enables researchers to explain the collected data through closely examined sets of theoretical ideas (Roberts, 2001)[32].

Chapter 6 will describe how the analytical framework proposed in this study can assist researchers to apply retroductive thinking and identify generative mechanisms and structures in the context of empirical study.

3.3 HOW DOES CR FACILITATE DISCIPLINED DIVERISTY IN IQ RESEARCH?

Having introduced the ontological and epistemological assumptions of CR, this section describes how CR tenets can also support theoretical, methodological and interpretative reflexivity[33] as principles of disciplined diversity in IQ research (Section 2.4).

Earlier (see Section 3.1.1) it was argued that a critical realist philosophy addresses the criteria of meta-theoretical reflexivity (Weber, 2003) in its ability to furnish the insights of other meta-theoretical positions while avoiding their disadvantages (Bhaskar & Danermark, 2006).

CR advocates a particular model of reflexivity in the research process (Delanty & Strydom, 2003). It Proposes that philosophy and science can not be seprated, instead, philosophy is viewed as a "reflective discourse on the practice of science" (Delanty and Strydom, 2003, p. 3).

[32] More details on the differences between mode of inferences and abduction and retroduction can found in Danermark et al. (2001), Chapter 4.

[33] Interpretative reflexivity as defined by Weber is part of the epistemology and methodology of the research project.

CR as a philosophy does not provide a scientific epistemology and specific suggestions for research methodologies. CR as established by Bhaskar is a philosophy of science and argues that the main role of philosophy is to provide insights for scientific practice. Bhaskar (2013) argues that the main goal of scientific activity should be to answer the question of 'what must be true in the real world for the phenomenon of research to be possible?' And consequently he suggests that different scientific methodologies can be applied if they provide the answer to this question. With this definition CR provides ontological principles that work as under labourer in guiding the research process.

Although CR assumes that an explicit and systematic research methodology is crucial, its concern is mostly with the conceptualisation and theorisation of research phenomena (Sayer, 1992). The basic methodological argument of CR is that the nature of the research phenomena determines what kind of knowledge (epistemological assumptions) it is possible to have about the phenomena (Wynn & Williams, 2012).

In other words, CR is tolerant of different research methods and epistemological assumptions, but it also believes "that particular choices should be made based on the nature of the object of the study and what one wants to learn about it" (Sayer, 2000, p.19). According to CR, the dichotomy between objective research associated with quantitative methods and a positivist paradigm and subjective research associated with qualitative methods and an interpretivist paradigm creates illusions about the world. CR embraces different paradigmatic assumptions by associating them with different levels of a laminated system (Section 3.2.3). Bhaskar and Danermark (2006) show how different research paradigms can be positioned in the study of disability as a laminated system. This understanding focuses on establishing an ontological understanding of the research phenomenon within a stratified notion of reality (depth ontology) and a necessarily laminated system (Bhaskar & Danermark, 2006), prior to identifying the kind of knowledge (epistemology) and methods that can be used to study the phenomenon.

Accordingly, CR ontology as a laminated system, works as an under labourer[34] to guide the research (Archer, Sharp, Stones, & Woodiwiss, 1999) and serves as a reflexive device that avoids selecting restrictive and unexamined methodologies to study research phenomena (Collier, 1994; Gable, 2014). Thus, CR provides an ontological and epistemological basis for

[34] An under-labourer framework/ontology can provide precepts to guide the research process without restricting research to reflect pre-defined facts (Cruickshank, 2003)

multi-method approaches (see Section 2.4.3) to disciplined diversity in IQ research (Carlsson, 2003; Mingers, 2001a).

CR ontology proposes that competing theories and schools of thoughts refer to different epistemological positions; they provide complementary explanations of different levels of reality that form the phenomenon. Thus, regarding theoretical reflexivity, "CR philosophy works as an under labourer to science" (Gable, 2011, p.13) to guide theoretical critique and to identify appropriate theories to frame the research. The value of CR lies in harmonising various knowledge and theories about the phenomenon by prioritising ontology over epistemology (Danermark et al., 2001). Sayer (2000) argues that one of the objectives of CR research is to develop a framework within which to position, evaluate and utilise theories or existing knowledge about the phenomenon. For example, Cruickshank (2003) used CR ontology as an under-labourer to criticise current theories in the unemployment field. Gable (2014) applied CR to critically reflect on current theories in disability education and the application of these theories to practice. By defining a laminated system of the disability phenomenon, Gable (2014) proposed a reflexive tool to consider the value of theories for practice.

3.3.1 Developing research questions based on CR principles

In summary, CR's meta-theoretical assumptions provide the philosophical tools to reflect on the application of different theories in the research process. This study relies on Cruickshank's (2003) theoretical approach and uses CR as an under-labourer to critique theoretical approaches to IQ and to achieve the goals of reflexive theorising as defined by Weber (2003). This approach will be elaborated on in the following section (3.4.2).

In order to achieve disciplined diversity and to produce relevant and consistent knowledge and conceptualisations of a phenomenon, researchers need to know what might be the real world structure that makes the phenomenon of research possible (ontology), what concepts are required to achieve knowledge about the phenomenon (epistemology), and what methods are appropriate to studying different aspects of social phenomena (methodology) (Edwards et al., 2014).

Thus, the overarching research question in chapter 2 "How can information quality be studied in a disciplined way?" can be answered by applying CR principles and through addressing the following questions:

- RQ1.1: What is information quality? (establishing ontological understanding)

- RQ1.2: How can we study information quality as a research concept based on CR epistemological and methodological assumptions? (It was argued in previous section that how CR facilitates all required aspects of disciplined diversity).
    - What kind of knowledge can we acquire about the IQ phenomenon? (epistemology)
    - What are the appropriate research methods to study IQ?

The following sections describe how using CR tenets will address these research questions.

3.4 Overview of research design

Above, it is argued that CR ontology facilitates disciplined diversity in research. This study follows the explanatory conceptualisation guidelines proposed by Danermark et al. (2001) as the overall methodology for studying and conceptualising IQ according to CR principles. The importance of Danermark et al.'s methodology for this study lies in its strong emphasis on an ontological and conceptual definition of the phenomenon prior to empirical study and data collection. Danermark et al. (2001) argue that precise conceptual abstraction plays an important role in minimising the risk of applying flawed ideas and implicit assumptions in research process.

Danermark et al. (2001), amongst the most influential writers in CR studies (Crinson, 2007), propose a comprehensive explanatory research methodology for social science. They propose a conceptualisation approach based on both abstraction and empirical study of research phenomena. In this approach, conceptual experimentation provides guidelines for empirical study.

Danermark et al.'s approach is a variant of the complementary model of explanation, RRRE[35], suggested by Bhaskar (Gable, 2011). RRRE is a four-stage model: (1) Resolution of the complex phenomenon (event) into its components (structural analysis); (2) Re-description of components' causes; (3) Retroduction to possible causes of components; and (4) Elimination of alternative possible causes of components (Bhaskar, 1998, p.129). Despite the critical role of abstraction in studying social science phenomena (Collier, 1994) and the centrality of abstraction as a methodological process (Lawson, 2006), Bhaskar's RRRE methodology has been criticised for not developing the connection between abstraction and explanation (Collier,

[35] Resolution, Re-description, Retroduction, Elimination

1994; Lawson, 2003). Collier (1994) also argues that the RRRE model is not able to adequately define the structure of the research phenomena to be able to derive causal mechanisms and explanations involved in its formation. Danermark et al.'s (2001) proposed guidelines provide a more structured approach for retroductive research and describe how this happens in the movement between abstraction and empirical phenomenon.

Danermark et al. (2001) argue that their framework is capable of bringing together essential aspects of Bhaskar's reasoning like abduction and retroduction. This methodology provides a comprehensive approach to conceptualising a social science phenomenon through abstraction and empirical data. Within this methodology, the researcher relies on existing knowledge or theories to develop a better understanding of the phenomenon.

The significance of this methodology for conceptualising IQ is the emphasis on abstraction, conceptualisation and theoretical reflexivity as the basis for empirical studies of the IQ phenomenon. This methodology enables this study to achieve Weber's principle (2003) of disciplined diversity through a rigorous abstraction process and theoretical reflexivity. According to this methodology, it is only after the abstract definition (ontological and epistemological basis of the study) that data collection and empirical study can be designed reflexively.

Danermark et al.'s (2001) guidelines have two main components: *conceptual abstraction methods* and *use of theory in the research process*, as explained in the following sections. Then the six-stage explanatory research methodology is introduced as the framework that gathers these two components in a staged approach to guide the empirical phase of the research. The conceptual abstraction method (Danermark et al., 2001), is associated with stage 2 and 3 in the methodology as the means of abstracting and applying a meta-theory to the research process. The role of theory in research process is discussed in the abstraction process (stage 3) and empirical study (stages 4, 5 and 6). Figure 3.1 represents the above stages in the overall research design and in relation to the research questions.

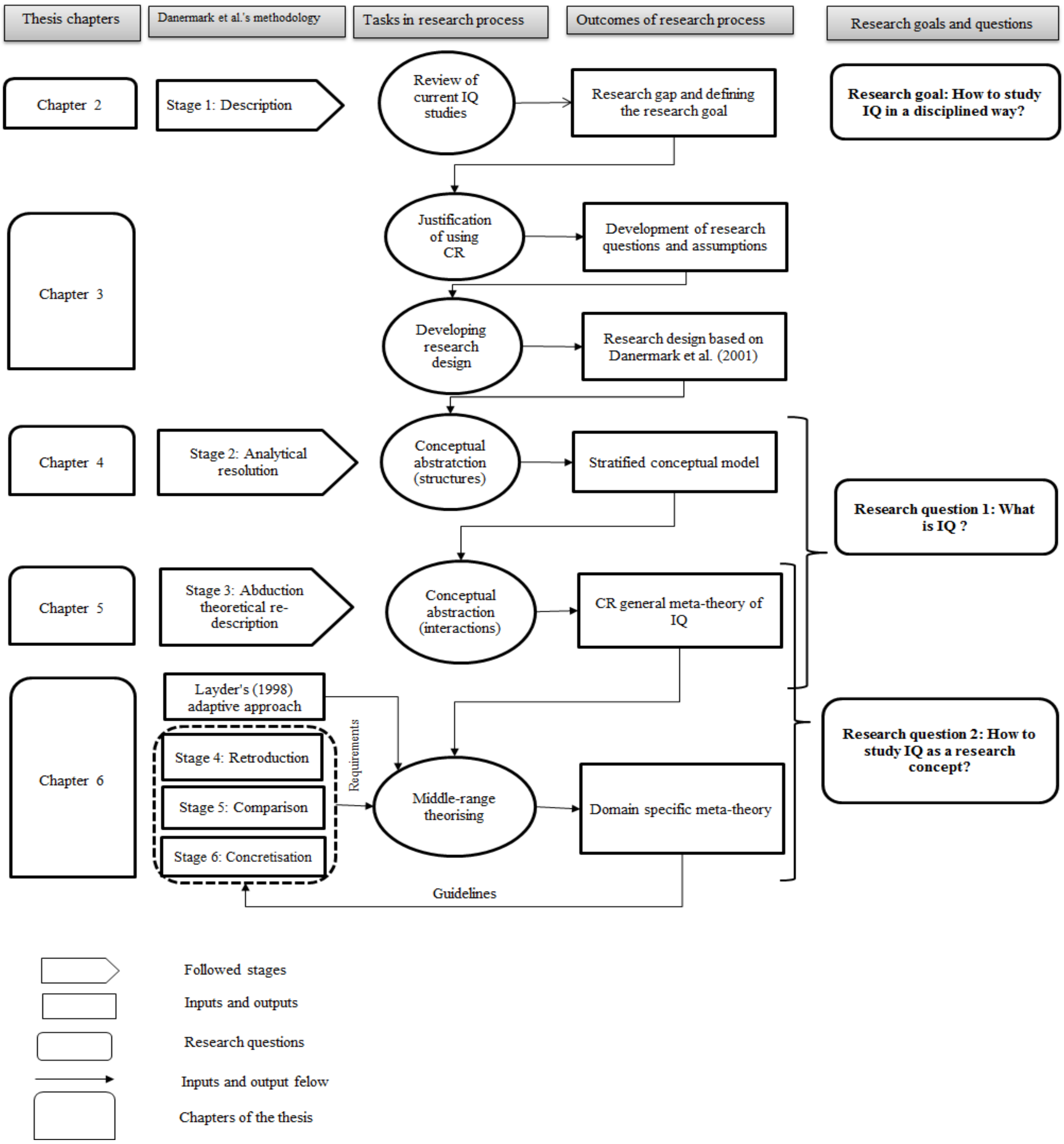

Figure 3-1: Overall research design based on Danermark et al.'s six-stage methodology

3.4.1 Conceptual abstraction method

Critical realist studies of social phenomena are deeply conceptual (Edwards et al., 2014). The objects of social science include people who make their own definitions and their own concepts. People have a great capacity to change these concepts in connection with new experiences and new generated knowledge. Danermark et al. (2001) define conceptualisation in social science as based on abstraction (conceptual abstraction) and empirical analysis. Abstraction is aimed at isolating different aspects of the phenomenon (Bhaskar, 2013).

Abstraction as part of conceptualisation provides necessary guidelines for data collection and analysis (Danermark et al., 2001).

Abstraction consists in individuating objects, their characteristics, attributes and relationships for a specific purpose. Its goal is to differentiate between the necessary (for the existence of the phenomenon) and contingent properties of the research phenomenon and to identify causal linkages (Sayer, 1992). Abstraction makes the conceptual distinction between what is observed as a phenomenon and the nature of the phenomenon itself (Danermark et al., 2001). Sayer (1992) describes abstraction as a process that links theory to empirical data.

Following Sayer, Danermark et al. (2001) introduced structural analysis as an efficient social tool for conceptualising an abstract definition of the phenomenon. Structural analysis includes breaking down the elements of the phenomenon to causal components with the aim of identifying different aspects of the phenomenon and how they exist in different domains and levels of stratified reality (Elder-Vass, 2007).Structural analysis begins with asking questions such as: “what does the existence of this phenomenon presuppose; can it exist on its own; what cannot be removed without making an object cease to exist as it is?” (Sayer, 1992, p. 91).

In a structural analysis, it is important to know that social science phenomena are relational and can only be defined by virtue of the relationships within their structures. The relationships that structural analysis focuses on are internal and external relations (Danermark et al., 2001). Internal relations are necessary for the research phenomenon to exist. External relations are contingent. For example, the social phenomenon “house market” can be defined only under the assumption of the existence of a relation between landlord and tenant. Examples of external and contingent relations in this case are landlords’ mismanagement of a property or conversely their generosity (Danermark et al., 2001, p. 46). In this study, IQ can only be defined under the assumption of the existence of information and an information evaluator. There is no such thing as information quality if there is no information user or if there is no information or message[36] presented to them. Examples of external and contingent relations in this case are characteristics of the information evaluator or of the medium of communication.

To summarise, structural analysis is about identifying structures, their qualities and powers and differentiating between their internal and contingent relationships. Given the CR assumption that reality is stratified, structural analysis includes (1) identifying objects and

[36] Information and message and their distinctions will be defined in Chapter 4.

structures in the real world;[37] (2) defining substantial internal relationships between structures; (3) positioning a phenomenon according to the three domains of reality (identifying experiments, actual events and possible mechanisms and structures in the real domain); and (4) identifying contingent and external relations. The resulting conceptual abstraction provides the basis for identifying the relation between causal powers and mechanisms when studying an empirical phenomenon.

In this thesis, chapter 4 or stage 2 of Danermark et al.'s (2001) methodology is associated with identifying structures and internal relations and develops a stratified conceptual definition of IQ. The first part of Chapter 5 provides more details on the structures and the internal relations relying on Mingers and Willcocks' (2014) framework and develops a CR ontological framework for IQ phenomenon. To be able to describe the causal mechanisms in an empirical situation, the contingent and external relations should be defined as well. This is done in the second part of Chapter 5 by relying on the relevant theoretical frameworks and in chapter 6 through relying on existing empirical studies.

3.4.2 Role of theories in the research process

Theory has been defined differently in various disciplines and research traditions. Theories differ according to their scope, "from very general abstract ones to concrete theoretical hypotheses" (Danermark, et al., 2001, p.118). In this study, the term theory refers to descriptive theories as defined by Morrow and Brown (Morrow & Brown, 1994) in social science studies. Descriptive theories describe the structures, properties, relationships and mechanisms related to social phenomena. Danermark et al. (2001) distinguish between two kinds of theories in the descriptive category: first, those that are specific to objects of research (domain theories) and second, general theories representing broader aspects of social activities and social interactions.

In IS research, the term general theory[38] or reference theory is used to refer to theories with a broad range of description (Weber, 2012), borrowed from other disciplines (Grover & Lyytinen, 2015). Since IS has a multi-disciplinary nature, these theories have been valuable sources of ideas for IS researchers; without them, many theories and concepts in IS research could not be achieved (Section 2.4.2). Examples of such theories used in IS include Habermas's

[37] This study is consistent with (Fleetwood, 2001) and (Edwards, et al., 2014) definition of actual domain; it assumes that actual domain includes only events, whereas structures, entities and powers belong to the domain of the real.
[38] Weber (2012) defines general theories as theories with a broad range of phenomena or macro-level theories. In this thesis general theory refers to theories at the macro-level borrowed from other disciplines.

(1984) theory of universal rules (Lyytinen & Hirschheim, 1988); Foucault's discourse power (Doolin, 2004); and Gidden's (1984) theory of structuration (Jones, Orlikowski, & Munir, 2004). These general theories are very abstract and link social actions to social structures or explain general structures of social life,

General theories play a valuable role in formulating new theories and explanations (Danermark et al., 2001; Layder, 1998). However, there is a debate both in social science studies (Danermark et al., 2001; Layder, 1998; Merton, 1967) and in IS studies [39](Grover & Lyytinen, 2015; Weber, 2012) about the application of general or reference theories in the research process (more detailed discussion in Section 2.4.2). The absence of general theories in the research process is a waste of good theoretical ideas (Layder, 1998) and it would be profitable for researchers to overcome the division between theorists and empiricist-oriented researchers to apply general theories in the research process.

Although there is no specific way to apply theories in the research process, it is important to bear in mind that it should be in a flexible and undogmatic way, consistent with Weber's (2003) principles of reflexivity. Danermark et al. (2001) following CR principles, propose an approach for applying theories in the research process which is also consistent with theoretical reflexivity criteria proposed by Weber (2003). Danermark et al.'s (2001) approach to using general theories in the research process and how this study draws on that is now explained in more detail.

The different reasoning and inference modes that were introduced earlier (Section 3.2.5) are all about approaches to application of theories in research. In social science studies and in IS, two main approaches to using theory in the research process can be differentiated: grounded theory (GT) or the inductive approach (Glaser & Strauss, 2009); and middle range theory (MRT) or the deductive approach (Merton, 1967).

According to CR and Danermark et al.'s guidelines, both MRT and GT approaches underestimate the value of general theories in the research process (Layder, 1998)[40]. MRT, through its process of deduction and its demand for testability, excludes many (general) theories, whilst GT avoids applying any theoretical concepts (induction). Considering the epistemological and ontological problems of both approaches in the research process,

[39] For example many IS topics involve human behavior and cognition, human behavior and cognition towards IS are correctly a subset of "general theories" of human behavior (Tate, Evermann, & Gable, 2015)

[40] See section 2.4.2 for more detailed discussion

Danermark et al. (2001) suggest abduction and retroduction as the most appropriate approaches to applying theory. Their approach to applying theory in the research process consists of two stages: (1) using theories in formulating the research problem (abduction); (2) applying theories as tools to interpret empirical data (retroduction).

Formulating the research problem and developing productive research questions are fundamental steps in the research process. Although it is beneficial to define the research problem based on the stakeholders' point of view but a scientific problem also needs to be "analytically resolved and theoretically explained" (Danermark et al., 2001, p.144). Application of theory in defining research problems helps to: (a) break down and formulate problems in a more conscious and well-thought out way; (b) relate the specific study to the whole body of knowledge to better describe the scientific contribution; and (c) relate problems to more comprehensive social aspects. Without theoretical lenses, there is the possibility that some questions are taken for granted. General or reference theories applied in this way can help to identify events, structures and their connections in the social context from empirical data (Kellner, 1995).

For application of Danermark et al.'s (2001) proposed approach in practice, this study draws on Cruickshank's (2003) levels of theories (Figure 3.2) in realist research. Cruickshank's hierarchy shows how researchers can move from meta-theories (1) and general theories (2) to the level of empirical research (4).

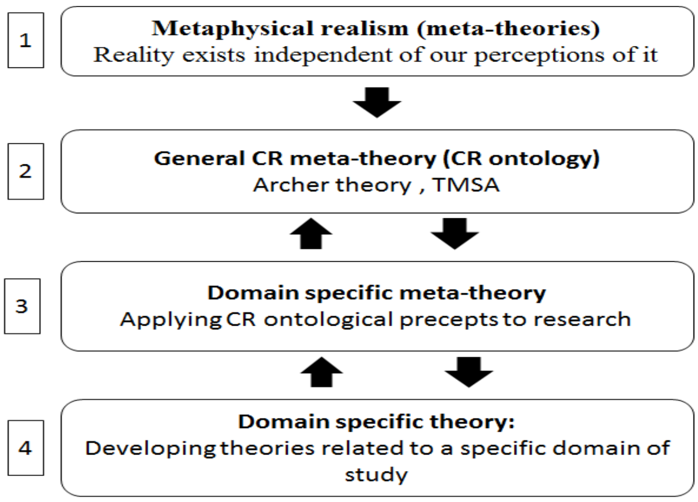

Figure 3-2: Levels of realist theorising adapted from Cruickshank (2003, p. 114)

According to Figure 3.2, meta-theoretical assumptions (such as the distinctions between transitive and intransitive dimensions in CR) should inform the lower levels of theorisation. On the next lower level, we have CR ontological definition or general CR meta-theory.

Examples of such theories could be Archer's morphogenetic approach (Archer, 1995) applied by Cruickshank (2003), and Bhaskar's theory of TMSA[41] (Bhaskar, 1998) applied by Gable (2011). Cruickshank (2003) developed a domain-specific meta-theory in the field of unemployment based on meta-theoretical assumptions from Archers' morphogenetic approach. In this thesis, developing a general CR meta-theory or CR ontology (2nd level in Figure 3.2) of the phenomenon is associated with stages 2 and stage 3 of Danermark et al.'s (2001) methodology in relation to defining the research problem and articulating research questions (Figure 3.1).

The third level of theorising in Cruickshank's (2003) hierarchy is called domain specific meta-theory. Cruickshank argues that in order to avoid the existing critiques (Gunn, 1989) in application of meta- and general theories in the research process, it is necessary to move from meta-theoretical assumptions to domain-specific meta-theory. This domain specific meta-theory will then be used to inform empirical research and data analysis and contribute to building domain specific theories (4th level in Figure 3.2). A domain specific meta-theory should be developed by drawing on general CR meta-theory (ontology) and by generating new terms from precepts already used in empirical research in the field (Cruickshank, 2003).

The domain-specific meta-theory developed in this way works as an 'under labourer' in empirical studies and facilitates achieving disciplined diversity; it also avoids forcing empirical data to conform to rules derived from theoretical frameworks and achieve tautological research outcomes (Cruickshank, 2003).

To develop a domain specific meta-theory, Chapter 4 constructs a stratified conceptual definition of IQ based on CR meta-theoretical assumptions. Chapter 5 develops a general CR meta-theory of IQ applying Mingers and Willcocks' (2014) semiotic framework. Then in Chapter 6, the domain specific meta-theory is developed based on requirements of stages 4, 5 and 6 of Danermark et al.'s methodology and by drawing on Layder's (1998) adaptive theory. This approach will be discussed in more detail in Section 3.4.3.4. The resulting domain specific meta-theory can be used as an analytical framework to assist the researcher in conducting IQ empirical studies and developing related domain-specific theories.

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[41] Meta-theoretical Transformational Model of Social Activity (TMSA) is considered by many as CR's principles of social theories which focuses on separation of human's actions from agency.

Given the two main components of Danermark et al.'s methodology; conceptual abstraction and using theories in the research process, in the following sections the six-stage methodology is described and this study's design is outlined.

3.4.3 Six-staged explanatory research methodology

In this study, the six-stage explanatory research methodology (Danermark et al., 2001) (Figure 3.3) is applied as a general framework to guide the research process based on CR principles. This methodology brings more rigour to the process of abstraction in combination with an abductive and retroductive methodology as the main modes of inference in CR-based research (Gable, 2011). The methodology provides general guidelines for empirical study and more importantly relates the empirical research to the abstract and conceptual definition of the phenomenon in a comprehensive way (Danermark et al., 2001). This methodological guideline is also flexible enough to adapt different strategies and different research methods related to the empirical phase of the research.

Stage	Description
Stage 1	An explanatory social science analysis usually starts from the concrete level. The complex and composite event or situation it is intended to study is described. In order to do this, researchers make use of everyday concepts. An important part of this description is the interpretation of the persons involved and their way of describing the current situation. Most events should be described by qualitative as well as by quantitative methods.
Stage 2	In this phase the complex phenomenon should be decomposed and separated to its parts; this stage is related to the structural analysis method as part of the conceptual abstraction of the phenomenon.
Stage 3	Abduction is about reinterpreting different aspects of the phenomenon identified in the previous stage by drawing on theories and frameworks about structures and relations. The goal is to explain the phenomenon by integrating and comparing existing theoretical frameworks to develop the original idea of the object of the study.
Stage 4	Retroduction: the goal is to try to answer the questions: what kind of structures and relations in the real world should exist for phenomenon X to happen? Here the researcher can draw on theoretical description in the previous stages. Stage 2 and 3 are closely related to stage 4. This stage can be associated with either abstract or empirical study.
Stage 5	In this stage the researcher estimates the explanatory power of different theoretical frameworks and descriptions found in stage 4 and stage 3. Theories can be used in a complementary way or one theory can be justified to provide better explanations.
Stage 6	This stage is about examining the theoretical description identified in previous stages in the concrete situation. In this stage attention is to specific contextual conditions that might enact some mechanisms and not others.

Figure 3-3: Six-stage explanatory methodology adapted from Danermark et al. (2001, p. 110)

Danermark et al. (2001) argue that this approach mostly provides the guidelines and is not suggested as a template to be followed; thus researchers don't necessarily need to follow different stages in a chronological order and can combine or intertwine them. This methodology has been applied by (Crinson, 2007) for interpreting and explaining data and also for developing Gable's (2011) conceptual model of the phenomenon. Gable (2011) has applied this methodology in different phases of her study. Stages 1, 2 and 3 have been applied to developing research questions and during the initial conceptualisation of the research phenomenon, and stages 4, 5 and 6 have been associated with data collection and data analysis (hence also in this thesis).

The freedom this methodology allows and the focus on defining the nature of the phenomenon make it appropriate to address the research questions for this study. By utilising this explanatory strategy based on a critical realism toolbox, this thesis focuses on conceptualisation and developing an abstract definition of the IQ phenomenon through stages 2 and 3 of Danermark et al.'s methodology, then defines the links (domain-specific meta-theory) between the abstract definitions and empirical study based on the requirements of stage 4, 5 and 6 (Figure 3.1).

3.4.3.1 Stage 1: Problematisation

The objective of this stage is to identify items contributing to the phenomenon, using different interpretations and understandings of people involved (Danermark et al., 2001). In this stage the boundaries of current research and the possible contradictions in conceptualisation of IQ are identified as existing research gaps. One approach to conducting this step is to understand phenomena in terms of current studies. Conducting a literature review of existing studies has also been referred to Gable (2011) as a systematic description of concrete phenomena. In this study, literature on IQ was reviewed to identify how IQ studies have evolved and how they have contributed to practice. The results of this review showed inconsistencies in IQ research and a lack of disciplined diversity in these studies. These problems also contribute to difficulties in the application of IQ theories in practice. Thus the main focus of the following chapters is to address this gap by following Danermark et al.'s proposed guidelines.

3.4.3.2 Stage 2: Analytical resolution

Chapter 4 of this thesis develops stage 2 or analytical resolution in Danermark et al.'s methodology (Figure 3.1). The goal is to develop a conceptual definition of IQ based on CR meta-theoretical assumptions. In order to achieve this goal, conceptual abstraction methods (Section 3.4.1) suggested by Danermark et al. (2001) have been applied.

In this stage, the IQ phenomenon is analytically broken down into a number of plausible causal elements (Danermark et al., 2001). The main goal of this stage, consistent with the foregrounding of ontology in CR, is to establish the nature of the phenomenon to guide the explanatory research agenda and to identify entities that should be included in the analysis of the phenomenon (Danermark et al., 2001). This stage is associated with the research question "what is information quality?" and sets the basis for answering the second research question, "how to study information quality (IQ) as the research concept?"

Accordingly, Chapter 4 describes how IQ is defined by breaking it down to its elements, information and quality. After a review of different perspectives on the concept of information, a definition consistent with CR assumptions is selected. Then quality or quality perception is defined based on the selected definition. With this understanding, real world entities important in IQ formation were identified as: information user, social context, communicated message, and medium of communication. Considering the stratified nature of CR ontology, IQ definition and related entities were positioned according to three domains of reality (real, actual and empirical). The result of this stage is deep ontological understanding of IQ (stratified conceptualisation of IQ) and entities that are involved in forming this phenomenon.

3.4.3.3 Stage 3: Abduction/theoretical re-description

The goal of stage 3 is to develop a CR general meta-theory of IQ (Figure 3.2) by identifying the interactions between entities in the stratified conceptual model developed in the previous stage.

Danermark et al. (2001) describe this stage as reinterpreting and redescribing different components and aspects of the phenomenon through criticism of current theories and frameworks. This section corresponds to abduction and redescription. "The original ideas of objects of the study are produced when we place them in the new contexts of ideas" (Danermark et al., 2001, p. 110). Danermark et al. (2001) emphasise integrating and comparing theoretical arguments by clearly demonstrating how these theories can help in the formulation of specific research questions.

Chapter 5 is associated with stage 3 (Figure 3.1). As the first step in applying theory in IQ studies, this study relies on Mingers and Willcocks' (2014) semiotic framework. The framework is adapted to define and position entities in the stratified model of IQ (Chapter 4) and to develop general CR meta-theory of IQ. Based on the discussion in Section 3.4.2, new research questions to study IQ are formulated from the developed model in this stage.

Then the developed general CR meta-theory is used as a taxonomic framework to identify and position different theoretical frames in relation to IQ phenomena. Different theoretical interpretations and explanations are compared and integrated to identify possible mechanisms that might work in a research context for studying IQ. Theories are positioned according to their explanatory power in relation to different aspects of the general CR meta-theory of IQ. The integration of theories across different disciplines is made possible by considering them in the middle range and as explanation of causal mechanisms (George & Bennett, 2005).

These theories are derived from Mingers' and Willcocks' (2015) semiotic guidelines, in addition to the theories that have already been used in IQ studies reviewed in this thesis. However, the sets of theories reviewed in this thesis are not comprehensive and can be extended, and new theories can be positioned according to the proposed taxonomic model. The reviewed sets of theories in Chapter 5, provides a theoretical starting point to define and hypothesise causal relationships and mechanisms in the empirical IQ studies (Appendix A, shows how reviewed theories in chapter 5 can be applied in a hypothetical empirical study of IQ).

3.4.3.4 Developing guidelines for IQ empirical studies (Stages 4, 5 and 6)

While abstraction is a crucial stage in social research and good abstraction can make satisfactory explanations, without empirical study an abstract explanation cannot truly represent models of causal processes and internal relations (Danermark et al., 2001). The first three stages of Danermark et al.'s methodology introduced above were all about abstraction and conceptual definition of the phenomenon; however, researchers need to move to concrete study to provide better explanations of the phenomenon and even revise the abstract definitions. This section describes how this thesis will develop guidelines for researchers to be able to go through stages 4, 5 and 6 of Danermark et al.'s proposed methodology.

A primary objective of scientific research conducted on CR principles is to explain real domain structures and mechanisms and how they can generate observable events in the empirical domain (see Section 3.2.3). Since we are dealing with an open system, there could be different combinations of mechanisms working (Danermark et al., 2001). The importance of methodological choices is that they are able to make unobservable mechanisms and structures in the empirical context apparent to the researcher (Wynn & Williams, 2012).

Danermark et al. (2001) propose retroduction (stage 4 of their methodology) as the main logic in analysis of empirical data and as a mean to discover generative mechanisms. This thesis proposes guidelines for conducting IQ empirical studies based on general CR meta-theory of IQ, using retroduction as the main logic of analysis (Figure 3.1). These guidelines provide both methodological and epistemological direction in data collection and data analysis.

The guidelines can also be regarded as domain specific meta-theory defined in Cruickshank's hierarchy of theories. According to Figure 3.4, this level of theorising is influenced by CR ontology or CR general meta-theory of IQ developed in the previous stage (Chapter 5). But how can someone move from the abstract ontological level to a mid-range level[42] to conduct an empirical study? How can general theories be applied in research practice and in developing a domain specific meta-theory? What elements should be included in a domain specific meta-theory?

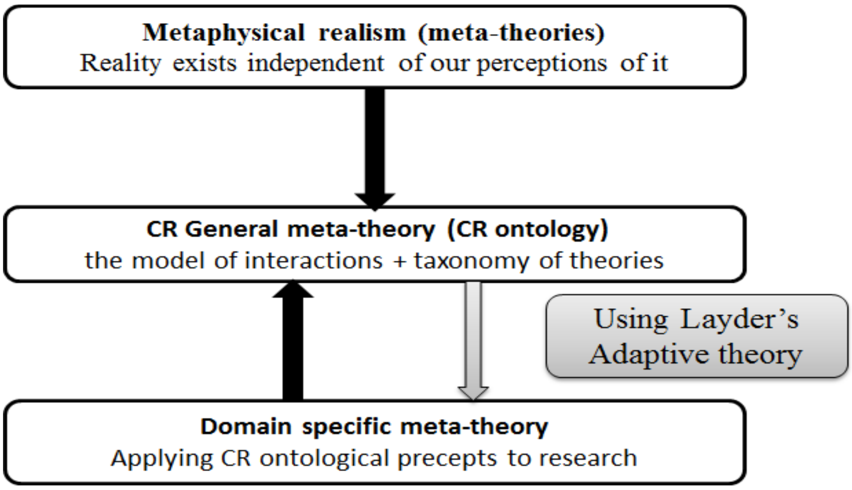

Figure 3-4: Levels of theorising and this study's approaches (adapted from Cruickshank (2003, p. 114)

Cruickshank (2003) suggests that a domain specific meta-theory should be constructed via a dialogue with existing theories and findings of empirical studies. He suggests that a domain specific meta-theory should be developed using the canons already existing in the research area but constructing new terms of reference to overcome their shortcomings. Although this is a useful approach in developing domain specific meta-theory, Cruickshank

[42] The term mid-range level here refers to Layder's (1998, p. 133) definition of it as "between abstract and empirical study" and is not equivalent to Merton's (1967) mid-range theory approach. This will be elaborated more in Chapter 6.

does not specify the elements of a domain specific meta-theory and how it can support an empirical study.

Accordingly, there is a need for a theoretical approach that is able to link abstract concepts to middle-range concepts, avoiding the critiques of middle-range theories (Sections 3.4.2 and 2.4.2). Derek Layder (1998) proposed adaptive theory as a middle range theory which links the ontological and theoretical assumptions to empirical studies in sociology but is also able to conquer the critiques of positivist middle range theorising approaches (such as Merton, 1967). Adaptive theory aims to make a stronger link between abstract and theoretical concepts and methodological considerations of empirical research. This is consistent with the goal of this thesis to link a general meta-theory of IQ to the methodological approaches in empirical study by developing a domain specific meta-theory.

Thus, the approach to translating CR ontology to domain specific meta-theory in this thesis is informed by Cruickshank (2003) and Layder's approach in adaptive theory (1998). Adaptive theory proposed by Layder works as a domain specific meta-theory (Cruickshank, 2003) and proposes an analytical guideline for data analysis. The analytical approach suggested by Layder (1998) relies on both induction (grounded theory) and deduction (middle-range theory) approaches in theory development, thus is consistent with the logic of retroduction in Danermark et al.'s (2001) methodology. The analytical approach suggested by Layder (1998) can be more specifically understood through the coding approach that he suggests as provisional open-ended coding. *"*Coding in this sense helps to develop a more specific focus on the emerging data and gives direction to the analysis by highlighting the relevant questions that one might want to ask about data. Overall coding in this sense helps to answer questions such as what themes and patterns gives shape to this data*"* (Layder, 1998, p.56). Retroduction as defined by Danermark et al. (2001, p.96) is to *"*go beyond what is empirically observable by asking questions about and developing concepts of the more fundamental, transfactual conditions for the events and the phenomena under study*"*. Accordingly, in the coding method that is suggested by Layder (1998), the data is coded in a way that helps researchers to get deeper and ask more questions about it. Using provisional coding also helps in developing concepts related to fundamental and transfactual conditions. The method of coding proposed by Layder (1998) is going beyond data and asking questions about the hidden patterns and themes. Thus, this approach is similar to the analytical approach of retroduction.

Accordingly, this study develops a domain specific meta-theory for IQ studies in two main stages. First, drawing on adaptive theory (Layder, 1998), the CR general meta-theory of

IQ is mapped to a hierarchy (clustering) of research concepts as part of a domain specific meta-theory. This study extends Layder's conceptual cluster to include IT artefacts or materials of communication in relation to studying IQ. Then in the second stage, Layder's definitions of "concept-indicator-links"[43] (Layder, 1998, p. 79) and "typification" (Layder 1998, p. 80) are applied to define the links between defined theoretical concepts and the empirical domain of IQ studies.

In addition to general guidelines provided by Layder, to define concept-indicators links in the IQ domain, some knowledge of the actual context of the research is required (Cruickshank, 2003; Smith, 2008). Accordingly, this study also reviews existing studies to link the theoretical concepts to the IQ domain. This effort provides the links between theoretical concepts and empirical data and also provides a better understanding of IQ phenomenon through reviewing existing studies (Cruickshank, 2003).

The goal of this review is to find out how the theoretical concepts defined earlier (based on CR general meta-theory of IQ) have been studied in IQ or other relevant fields of research and thus to provide the links between theoretical concepts and the empirical context of IQ studies. To select IQ studies relevant for this goal, a systematic literature review approach is not useful. Systematic reviews only suit closed research questions and do not encourage diversions to different areas of literature (Boell & Cecez-Kecmanovic, 2010;2011; MacLure, 2005).

In order to cover a variety of research views in IQ studies, the search process started with review papers. Review papers are the most important document type when searching the literature. Review articles provide access to concept areas and classifications of the different domains within a specific topic (Boell & Cezec-Kecmanovic, 2011; Greenhalgh & Peacock, 2005). Review studies help to find the most important papers in the field and their relationships (Blair, 2003).

In this thesis, review papers were selected from Information Systems (IS) and Computer Science (CS) disciplines (Ge & Helfert, 2007; Madnick et al., 2009; Sadiq et al., 2011; Zhu et al., 2012) and also information science studies (Floridi & Illari, 2014; Mai, 2013). For example, Madnick et al. (2009) have conducted a review on IQ studies, categorising them to IS and CS disciplines, and have identified the most influential papers in the evolution of IQ studies.

[43] Concept-indicator links refer to presentation of structural concepts in empirical data; typification refers to presentation of bridging concepts in empirical data. Detailed definition is provided in Chapter 6.

Recently, in a follow-up review, Zhu et al. (2012) extended Madnick et al. (2009) by looking at new papers in the area. Another review paper which has been used is (Ge & Helfert, 2007). This study presents different classifications of IQ measures, different IQ assessment methods, and the most cited 13 papers in the history of IQ research and discussions around them. Other review papers used in this study were from information science studies: Mai (2013), with the main focus on information science and subjective views of IQ, and Floridi & Illari (2014) which reviews and criticises IQ studies in CS and IS disciplines.

Through backward citation and a snowballing approach (Boell & Cecez-Kecmanovic, 2010), these studies provide access to exemplars of different kinds of IQ studies in literature which have been more influential. For the goal of this section, the focus is mainly on studies that have defined and conceptualised (or evaluated) IQ. Overall, 50 papers were selected to be reviewed.

The analysis process for each selected paper included: 1) finding the main assumptions in each study; 2) examining the consistency of the selected approach to explicit assumptions and claims, drawing on the CR ontology; 3) examining context, collected data and findings related to the theoretical concepts in the CR-ontological model of IQ. The ultimate goal is to find concrete examples of theoretical concepts in studying IQ, and if possible to develop a systematic typology of the structural concepts in relation to IQ concepts (Layder, 1998).

After analysing these papers, many were discarded because of significant inconsistencies between research assumptions and research practice, or the limited perspective they could provide in relation to the CR general meta-theory of IQ proposed in this thesis. Many IQ studies fail to provide insights into the ontological model, since they are mainly focused on assigning measures to IQ attributes. The analysis of these studies mainly showed that vague definitions of IQ concepts and context limit their applicability in other contexts and in practice; the results of this critique have been used as examples across the thesis. Overall, in terms of the goal of Chapter 6 to define the link between theoretical concepts and the concrete domain, most IQ studies were not very informative.

The review also revealed that studies in the IS and CS disciplines can mainly provide some insights on media of communication, and studies in the information science discipline provide more insights on subjective and social aspects of IQ. However, the paper set could not provide enough explanations of all concepts in relation to a CR general meta-theory of IQ. Thus, in addition to IQ studies, other related fields such as information processing, information systems and organisational studies were also investigated. The search process again was mainly based on a snowballing approach and forward-backward citations, with the aim of providing justifiable links between concepts and concrete situations. In this thesis, the saturation point for the search process in finding related papers was achieved when some justifiable definitions for concept indicator links had been found.

3.5 CONCLUSION

This chapter provides the overall design of the whole thesis. First, the choice of critical realism (CR) as the research paradigm, based on identifying the existing research gaps, was justified, then the methodology of the study was built following the principles of CR. The main methodological guideline applied in this study is Danermark et al.'s (2001) explanatory methodology for conceptualising research phenomena.

The main goal of this study is to provide a domain specific meta-theory (Cruickshank, 2003) to facilitate disciplined diversity in studying IQ in different contexts. Accordingly, the next chapter, through the analytic resolution stage (Danermark et al., 2001), provides a stratified conceptual definition of IQ based on the assumption of depth ontology in CR. Chapter 5 draws on existing general theories to elaborate the conceptual definition of IQ and to develop a CR general meta-theory. Then in Chapter 6, from existing literature and defined ontological references, an analytical guideline is developed as a domain specific meta-theory that can guide empirical research in IQ studies.

Chapter 4: **IQ as a Stratified Phenomenon**

As explained in Section 3.2.4, in order to develop a basis for disciplined conceptualisation in Information Quality (IQ) research, an ontological understanding of IQ should be first obtained. The ontological understanding of IQ that this chapter presents, helps to determine the research methods used to explore the phenomenon, and lays the foundation for a disciplined conceptualisation of the phenomenon.

In order to develop an ontological understanding of information quality based on Critical Realism (CR) assumptions, this chapter relies on stage 2, or the analytical resolution stage of the explanatory research methodology suggested by Danermark et al. (2001) (see Section 3.4.3.2, and Figure 3.3). This stage consists in separating and dissolving the composite phenomenon by distinguishing its various components. To achieve this goal, the conceptual abstraction method proposed by Danermark et al. (2001) is adapted to develop an understanding of Information Quality (IQ) with an "ontological depth" (Bhaskar, 1998, p.12)[44]. Figure 4-1 shows the position of this chapter in the overall thesis design.

According to Danermark et al. (2001), social phenomena (such as information quality)[45] are concept-dependent[46] but it does not mean that they only exist as mental constructions of people's mind. To understand and interpret social phenomena, one needs to explain how these phenomena have been originated through the interactions of entities, mechanism and events in three domains of reality (section 3.2.3.2). Therefore, to understand the concept of IQ, firstly the objects (entities)[47] in the formation of IQ should be identified. This chapter starts by defining the two main elements, information and quality. Then, based on these definitions, the chapter proceeds to identify the entities involved in the formation of IQ (as a laminated

[44] See section 3.2.3, which defines the concept of depth ontology.
[45] See Section 3.1.1, which argues that IQ should be studied as a social phenomenon.
[46] This means that everyone (and not only scientists) has their own capacity to have their understanding and conceptualisation of a social phenomenon (Danermark et al., 2001).
[47] See section 3.2.31 which defines entities and objects in CR explanation.

system)[48]. Those identified entities are then positioned on different strata of reality[49] to develop a stratified conceptualisation of the phenomenon. However, in social science, objects of a study involve social interactions and systems of relations (Bhaskar, 1998). The stratified model derived in this chapter will be further elaborated in the next chapter by identifying the interactions between entities in the formation of the IQ phenomenon.

In the following sections, firstly the importance and implications of the ontological depth (or depth ontology) understanding of IQ are described. Then, a conceptual abstraction method (Danermark et al., 2001) is introduced to develop a stratified conceptual definition[50]. The rest of this chapter describes how the definitions of 'information' and 'quality' lead to a stratified understanding of 'information quality' IQ.

[48] See Section 3.2.3 for further details of what a laminated system is. In a nutshell, it is to understand the phenomenon in the form of a hierarchy of the entities involved in its formation and interactions between these entities. It is different from domain stratification which refers to three domains of reality.

[49] Referring to the notion of stratified reality and three domains of; 'empirical', 'actual' and 'real' introduced by Bhaskar (2013), see Section 3.2.3 for further details.

[50] Stratified conceptualisation here refers to both domain stratification (depth ontology) and level stratification (laminated system) introduced in Section 3.2.3 based on (Elder-Vass, 2007).

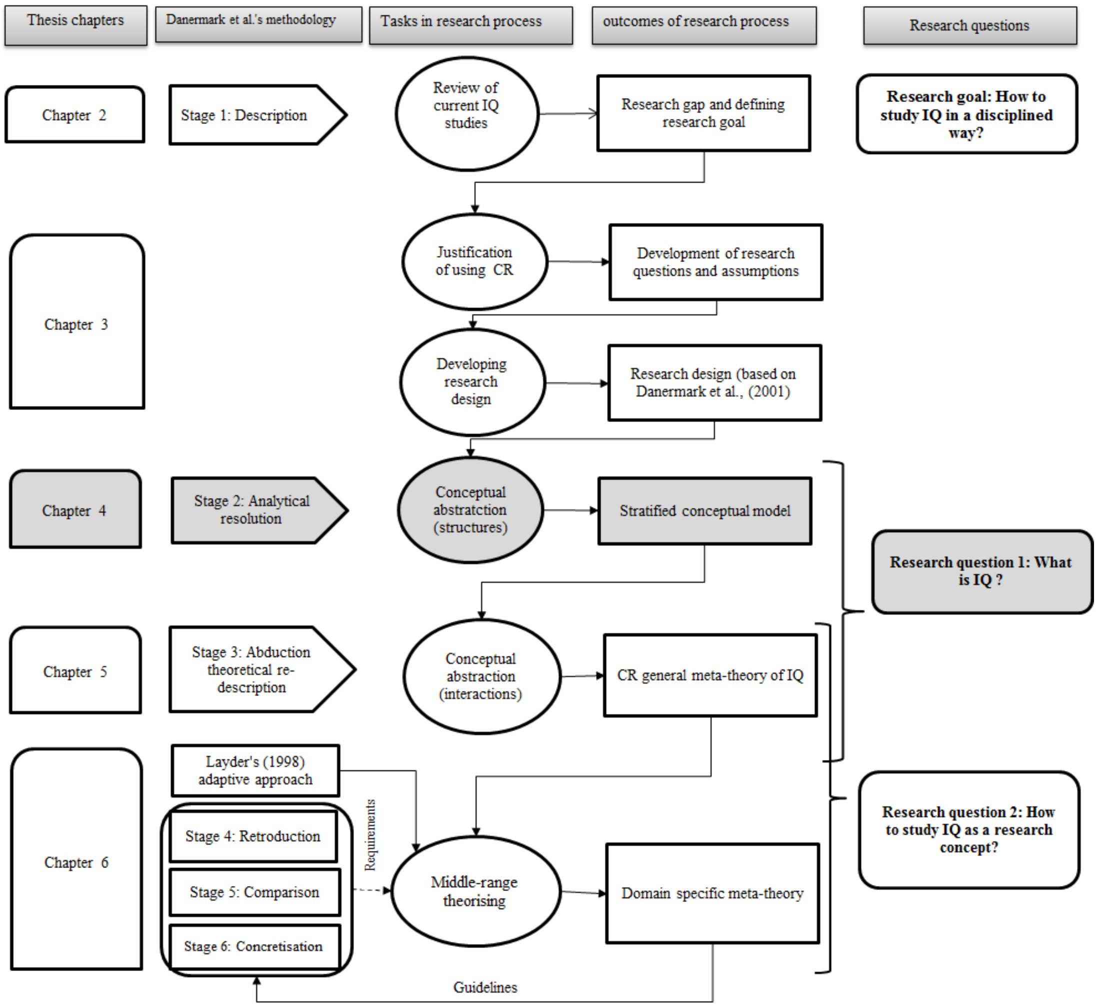

Figure 4-1: Research Design

4.1 ESTABLISHING A NEED FOR A STRATIFIED VIEW OF IQ

According to CR, reality is a stratified open system of entities with emergent properties and structures (Bhaskar, 1998). Thus, CR-based researchers adhere to a stratified ontology rather than a flat one. This perspective enables a better understanding of how entities at different levels (of a laminated system) work and relate to each other. The essence of a stratified ontology lies in the understanding that reality is more complex than what may be observed at an empirical level, and the actual causes and powers of events may not be observable via empirical observations (Edwards et al., 2014).

The crucial step toward conceptualisation in CR is to define the phenomenon in relation to a stratified reality which comprises three domains: empirical, actual and real (See Section 3.2.3). Figure 4-2 shows this stratification. The domain of 'real' (stratum) includes entities/objects, their structures, their inter-relations and the mechanisms inherent in these structures. The 'actual' domain is a subset of the real and includes events that occur when the causal powers of structures and entities are enacted; these events might not be necessarily observable. Finally, the domain of 'empirical' is a subset of the actual and real domain and includes events that we are able to experience via perception or measurement. It should be noted that there is a debate between CR scholars about positioning entities and structures in the real domain. Bhaskar himself did not make it clear (Elder-Vass, 2007; Nellhaus, 1998). This thesis, consistent with Fleetwood, Ackroyd (2004) and (Nellhaus, 1998)[51], follows the positioning shown in Figure 4-2 to provide an ontological understanding of IQ (see section 3.2.3 and the example that clarifies this stratification).

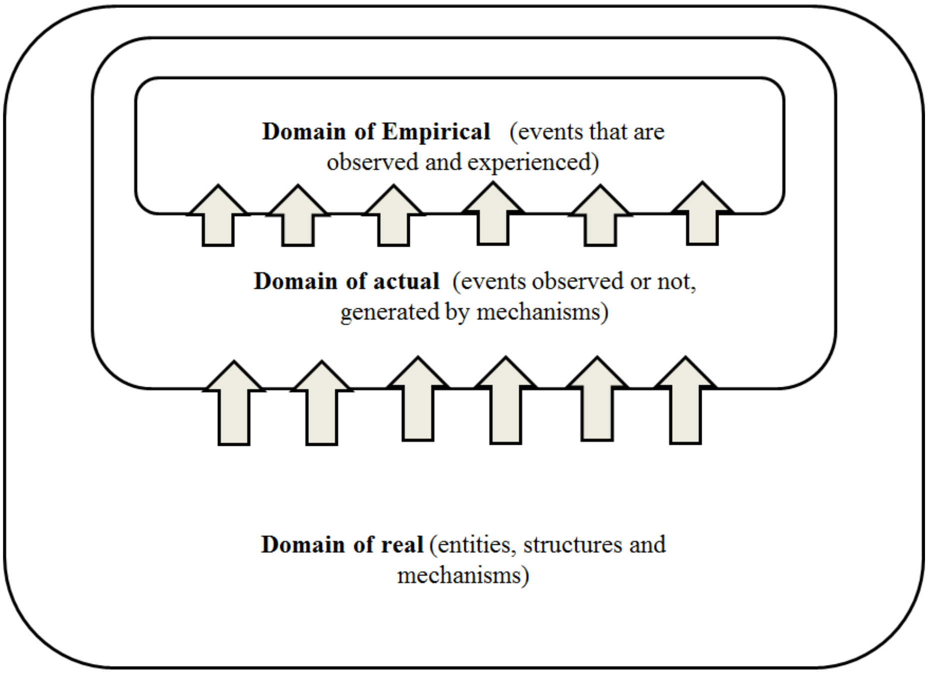

Figure 4-2: Depth ontology or domain stratification in CR adapted from Mingers (2004, p. 94)

Adhering to a stratified reality in IQ research can explain why information might be perceived as being of high quality only in some contexts and not in others; or why different criteria are applied to evaluate the quality of information by different users. To be able to describe any event in the domain of empirical, we need to identify the possible structures and entities that could be involved in forming the phenomenon at deeper levels of reality.

In contrast to CR, positivists and interpretivists believe in a flat ontology (Wynn & Williams, 2012); positivists equate ontology with recordable events observed in the empirical

[51] It should be noted that this thesis only follows Nellhaus' (1998) definitions of the domains of real and actual (which are better defined than Bhaskar's definition, defining structures and possibilities in the domain of real). However, Nellhaus (1998, p.98) criticizes the third domain (domain of empirical) in Bhaskar's stratification as being 'anthropocentric' and re-defines the domain of empirical as a "semiosis" domain consisting of "meaning embodied in signs". However, this thesis is built based on Bhaskar's definitions and only relies on Nellhaus and other scholars as long as they are in line with Bhaskar and provide clarification to his concepts.

domain. Interpretivists believe in the conceptual nature of objects of social science and are able to reconstruct the actual experience of them. However, interpretivists do not further investigate the domain of real and underlying entities, and thus collapse ontology into discourse on the actual domain (Edwards et al., 2014).

Positivist studies have commonly reduced the notion of IQ to sets of dimensions and measures derived from the use of survey methods (Wang and Strong, 1996). Using such quantitative methods and relying on statistical analysis means that a majority of these studies only ask the question of '*what*' from a given context, but do not open the black box of underlying layers, and therefore fail to understand '*how'* and '*why'* an observed event has actually happened at the deeper levels of reality (Smith, 2006). The positivist notion of constructs, and related measurement models and tools to collect data from participants (Lee et al., 2002), assume the existence of a causal relationship between empirical evidence and the defined constructs and measures. This approach, based on the Humean (Hume, 1748) notion of causality, is not able to capture the underlying, unobservable entities. Although theoretically valuable, this approach only provides access to empirical data, which is not necessarily reflective of the purpose it has been collected for. For example, Price and Shanks (2005) used a focus group consisting of different groups of individuals to derive some quality criteria related to a pragmatic category of IQ. Their idea was that the results from a focus group, itself consisting of different groups of information users (IT practitioners, academic, end users), could represent the valid expectations of pragmatic criteria. However, the validity of this assumption is questionable, since many underlying mechanisms (such as the power-relation between respondents) within a group discussion influence the results. It is not appropriate to integrate different views on IQ when these views actually stem from differences occurring at deeper levels of reality and mechanisms that alter people's perceptions and expectations of quality.

From an interpretivist view, empirical data is a crucial regulator of research results. Interpretivists reject the importance of real-world ontology for social science studies, and believe that truth is a relative concept[52]. From their perspective, the impact of technology is highly tied to the context of implementation, and truths are only accessible through an agent's meanings and perceptions.

[52] Interpretivists believe that social objects are ontologically different from natural objects, while they believe that social science phenomena are dependant to social actors interpretations and activities, they don't reject a real world ontology for objects of natural science (Gorski, 2013)

Thus, in order to address the current epistemological and ontological inconsistencies in IQ studies, the main goal of this chapter is to develop an 'ontological depth' understanding of IQ. This can be done by identifying the entities and structures that could be involved in forming the concept of IQ as a laminated system. This understanding builds a basis for choosing appropriate methodological approaches. To achieve this goal, Danermark et al.'s (2001) notion of conceptual abstraction and structural analysis methods is applied, and is described in more detail below.

4.2 TOWARDS AN ABSTRACT CONCEPTUAL MODEL OF IQ

According to Danermark et al. (2001), abstraction can help identify what the nature of a certain phenomenon is. Objects of science, either natural or social, have certain properties and powers that condition their existence. "Critical realist analysis is built around this understanding of natural necessity" (Danermark et al., 2001, p.44), and any abstraction should be aimed at identifying the necessary and constitutive properties of objects. This method also assumes the existence of a stratified reality, and the abstraction of the phenomenon needs to reflect this underlying philosophical assumption.

Having described the conceptual abstraction of a phenomenon (Section 3.4.1), to develop a conceptual abstraction of IQ as a social science phenomenon and to define determinative properties of related objects, the following steps should be taken:

1. Researchers should ask the key question "what structures (entities and their relations) in the real world make the existence of this phenomenon possible?" Answering this question in relation to IQ requires an analysis of the formation of the IQ concept and identification of the entities involved. In order to analyse the formation of IQ, this study starts by defining information based on a sound philosophical position that is consistent with this study's assumptions. Then, quality and the entities involved in the perception of quality are identified.

2. Define and position the phenomenon according to a stratified notion of reality (Figure 4-2): entities involved in IQ formation are first defined, then analysed and positioned in accordance with the CR definition of a stratified domain of reality (see Section 3.2.3). This is related to identifying substantial internal relations, as explained in Section 3.4.1.

3. Define interactions between entities: this is a crucial part of conceptual abstraction. Interactions are defined as occurring between entities and structures in the real

domain and between different levels of strata (Figure 4-2). This step will be discussed in more detail in the next chapter. This step is mostly related to identifying contingent relations (substantial external relations), as discussed in Section 3.4.1.

In the following section, as the first step, the notion of information will be discussed in relation to this study's goals and assumptions.

4.3 WHAT IS INFORMATION?

It is natural to assume that definition of information quality draws on the definition of information (Stvilia et al., 2007). Mai (2013) suggests that to avoid a limited perception of IQ among specific groups of researchers (Bawden, 2001), this notion should be addressed in a broader way and built on a solid philosophy of information. Information is one of the most fundamental notions in information systems (IS), as well as in many other areas of research. Yet there are few explicit conceptualisations of information, especially in IS research (McKinney Jr, Yoos, & Charles, 2010). Other disciplines such as communication (Rice, McCreadie, & Chang, 2001), philosophy (Floridi, 2009) information science (Capurro & Hjørland, 2003) and even physics (Stonier, 1990) have engaged in theorising information. Seeking a coherent and comprehensive definition of information, most scholars in philosophy and science have come to the conclusion that information cannot be detached from its context and problem area, and that there is therefore no single best definition for it (Shannon, 1993; Thagard, 1990). Different conceptualisations of information can be adopted in different disciplines, research contexts, systems or problems (Newman, 2001). Accordingly, this study reviews information definitions in IS, information science and communication disciplines, seeking to adopt/adapt a view consistent with this study's goals and assumptions as outlined so far.

In the next section, firstly, different views on information and different classifications of information views are introduced. Subsequently, a holistic classification of these various views is synthesised from past studies. This holistic view helps to critically assess different definitions and choose an appropriate one for the purpose of this study.

4.3.1 Different views of information

In this section, different views and classifications of information will be reviewed, integrated and combined to provide the basis for choosing an appropriate definition of information that suits this thesis's objectives and assumptions. Figure 4-3 shows the overall classification of these views, which will be discussed in more detail following.

Mai (2013) reviews the concept of information across information science studies, and, consistent with Capurro & Hjørland (2003), distinguishes two primary views: (i) the process school of thought, and (ii) the semiotic school of thought. The former is based on a quantitative view of information. It concerns transmission of the message and the act of communication. Information in this view is a physical substance which is transported between a sender and a receiver. This view of information is less concerned with its meaning than with the vehicle that carries it. In this view, information and meaning are transferred between sender and receiver and the primary concern is how to make the communication process more effective (Mai, 2013).

The semiotic school of thought focuses on how meaning is produced and exchanged via signs and is then interpreted by human being (Boell & Cecez-Kecmanovic, 2011; Mai, 2013). "In this view, communication is underpinned by a system of meaning and signification" (Mingers & Willcocks, 2014, p. 51). Based on the semiotic view of information, signs are the core element of communication and associate issues of human intentions, that is, the structure of language, forms of communication transmission, data storage and collaborative action (Beynon-Davies, 2009).

Another classification of information was suggested by McKinney Jr et al. (2010). They identified four categories of information views in the information systems (IS) research area: token, syntax, representation and adoption, and discussed their relative strengths and weaknesses and applications in IS research. This study argues that the token and syntax views are related to the process school of thought, while the representation and adaptation views are related to the semiotic school of thought introduced by Mai (Figure 4-3).

The token view assumes information and data are both tokens, manipulated by processes in mind, machine and organisations. Information is indistinguishable from data; we see the lack of distinction between data and information as a limitation of this token view. An illustrative theory found in IS based on the token view is the information processing theory (IPT) developed by Miller (1956) to explain human cognitive processing.

In the syntax view, "information is the measurable relationship between tokens". The lack or absence of these relationships is measured by so called entropy (uncertainty): the greater the entropy, the lesser tokens are related. Example measures of information in this view include the relationship between two passwords or the measure of association between two samples. The dominant definition of information in the syntax view is Shannon's definition of information as the measurable reduction in uncertainty (Floridi, 2009; McKinney Jr et al., 2010). Shannon and Weaver's (1949) theory of information draws on this definition to mathematically measure the amount of transferred information through a particular medium (Boell & Cecez-Kecmanovic, 2011). However, this view of information and information theory has been criticised for not being a general theory of information; rather, it should be considered a theory for signal transmission (Boell & Cecez-Kecmanovic, 2011). Information in Shannon and Weaver's mathematical theory is defined as "the difference between uncertainties in two situations" (McKinney Jr et al., 2010, p. 333). In IS, the syntax view is used when studying relationships across data attributes and designing data bases. Information in both the token view and syntax view is considered as physical, objective and independent from the observer and situation. As a result, these two views can be categorised as sub-classes of the process school of thought (Mai, 2013) (see Figure 4-3).

The representation view of McKinney Jr et al. (2010), which is built on the semiotic view of information, assumes an objective reality in which a sign represents the object to the observer. Representation could be external (objective) or internal (subjective) to the observer; external representations are assumed to be common or similar between observers; internal representations are assumed to vary between observers. The representation view is based on specifying the observer and the object (McKinney Jr et al., 2010). In terms of extant theories, two main streams can be recognised in literature. The first refers to MacKay (1956, 1961, 1969), who defines information as a change in the receiver of information. Mackay is mainly focused on international communication through language, and defines the sender as the one who wants to transmit a meaning, the message as the carrier of meaning, and the receiver, who is in "particular state of readiness" (Mingers, 1996, p. 199). Mackay defines three kind of meaning in a communication process, and defines information as the change in the recipient's mind caused by the meaning. Another important information theory in the representation view is (Dretske, 1981), who built his definition of information based on Bateson (1972, p. 826), stating that information is "a difference that makes a difference." These differences can be seen as events that generate signs and symbols. Dretske (1983) elaborated on this by stating that these events (generated signs and symbols) are not information themselves, but rather carry information about the cause of that event. In this definition, information is defined as being objective and as the semantic content of the sign (system), independent of any observer and interpreter. Dretske has an opposite approach to MacKay, and believes that information is objective and generates meaning. Dretske defines information as the propositional content of signs reflecting the state of affairs required in the real world for those signs to exist. Dretske (1983) then describes how meaning is generated through the process of digitalisation. Dretske (1981) argues that while our experiences (such as lights from a scene triggering our retina) are analogue, meaning (what we can see in a particular scene) is progressive digitalization of this experience. All signs carry both digital and analogue information. According to this view, digitalizing analogue information causes loss of some aspects of information. Thus, through digitalisation, objective information is converted to subjective meaning (Mingers, 1995).

The representational view is widely used in business, computer science, psychology and IS (McKinney Jr et al., 2010). In IS research, the representational view is the main view for developing information quality (IQ) frameworks (Mason, 1978; Price & Shanks, 2005; Wang & Strong, 1996). It simplifies objective reality by representing it. According to this view, high quality information is the most accurate and specific representation of the object (McKinney Jr et al., 2010).

The adaptation view, on the other hand, requires a paradigm shift and adheres to the anti-positivist belief that there is no objective reality independent of human perception. In this view, McKinney Jr et al. define information as any perceived "difference that makes a difference to a subject" (2010, p. 336). Subjects could be individuals, systems machines or firms. An example within a business context might be that of a firm that perceives declining sales; this perception is considered as information if it makes a difference to the firm. This definition implies that perception of information is formed through the interaction between the individual and the context as a system (Checkland & Holwell, 1997). "In [the] adaptation view, the observer-object dualism is eschewed" (McKinney Jr et al., 2010, p. 338). McKinney Jr et al. (2010) describe system theories based on the adaptation view. Among them is the cyber-semiotic theory (Brier, 2005), which relies on the adaptation view to address communication. Another theory is the autopoiesis theory of Maturana and Verela (1980), which describes how systems recreate and adapt themselves (autopoiesis) based on the differences they perceive.

A further classification of information views has been suggested by Boell & Cecez-Kecmanovic (2011). It is derived from an extensive literature review (100 papers and books on information) spanning different disciplines, making it more general and not specific to the IS domain. In this classification, Boell and Cecez-Kecmanovic (2011) differentiate between two main views of information: physical and semiotic. Within the physical view, they define two sub-views: the material view of information and the engineering view. The material view defines information as the physical world structure, "the pattern of organization of matter and energy" (Parker, 1973, p.10). This view of information has received limited attention in the realm of IS research. The engineering view of information is also related to the physical world, but is concerned with communication of signals between sender and receiver. From an engineering perspective, information is measurable in terms of physical quantities, is context free and linear. Boell and Cecez-Kecmanovic (2011) classified Shannon and Weaver's information theory (1949) in this category. The engineering view of information can be considered similar to the process school of thought. Both the token view and syntax view defined by McKinney Jr et al. (2010) can be considered as an engineering view of information (Figure 4-3).

Within the semiotic view, three different sub-views are defined: objectivist, subjectivist and inter-subjectivist. The objectivist view defines signs in communications as representations of objective reality. Information from this view is independent of humans and has to be always true (Mingers, 1995). In this view, similar to the representation view defined by McKinney Jr et al (2010), there is an objective reality which is embedded in signs, which are in turn represented to and interpreted by individuals (Figure 4-3).

From a subjective view, information is defined as "in-ward forming; it is the change in the recipient's cognition following an encounter with data" (Boland Jr, 1986, p. 363). The subjective view of information does not acknowledge context. This view highlights the perspective that interaction with the communication system is personal experience and varies between individuals. The subjective view explains how something that is already known by a recipient is not considered as information by them anymore because it cannot alter their cognitive structure (Boell & Cecez-Kecmanovic, 2011). An example of a definition of information from the subjective view is that of Kettinger and Li (2010, p. 415), who differentiate information, data and knowledge, and have defined information as "the meaning produced from data based on a knowledge framework that is associated with the selection of the state of conditional readiness for goal-directed activities."

Finally, Boell and Cecez-Kecmanovic (2011) define the inter-subjective view of information, which takes into account the context and social practices. It defines information as a part of a dynamic process which creates, adjusts and maintains relationships among participants in a social context (Falkenberg et al., 1998). The definitions of subjective and inter-subjective views of information conform to the definition of information in the adaptation view (as defined by McKinney Jr et al., 2010) as a distinction that can make a difference in the recipient system (which includes the individual and their interaction with the context). Other examples of conceptualisation of information in IS using the inter-subjective view include Stamper (1991), who extended the semiotic theories of Peirce (1933) and Morris (1938) to IS research, and tried to achieve a comprehensive view of information (Boell & Cecez-Kecmanovic, 2011). Stamper introduced three other semiotic levels in addition to those of Morris's semiotic framework (which are syntactic, semantic, and pragmatic). These three additional levels are social (shared social context), empiric (statistical properties of the sign representation) and physical (material properties of the media). Stamper's argument is mainly focused on the existence of information on all semiotic levels, assuming a mutual interaction between those levels. Although Stamper's adaption of Peircian semiotics has been criticised for being inconsistent in its philosophical assumptions with Peirce's pragmatic position, a considerable body of work has developed around Stamper's semiotic framework (Beynon-Davies, 2009) in the IS and IT disciplines.

4.3.2 A holistic synthesis of the different views and classifications of information

Figure 4-3 interrelates the above views on information. By definition, the physical view of information as defined by Boell and Cecez-Kecmanovic (2011) is not covered either by the process school of thought or the semiotic school of thought, so this view is added as a high level view to the framework. Seeking harmonisation, the terms 'process view' and 'semiotic view' are used instead of process school of thought and semiotic school of thought, employing the same terminology used by Mai (2013).

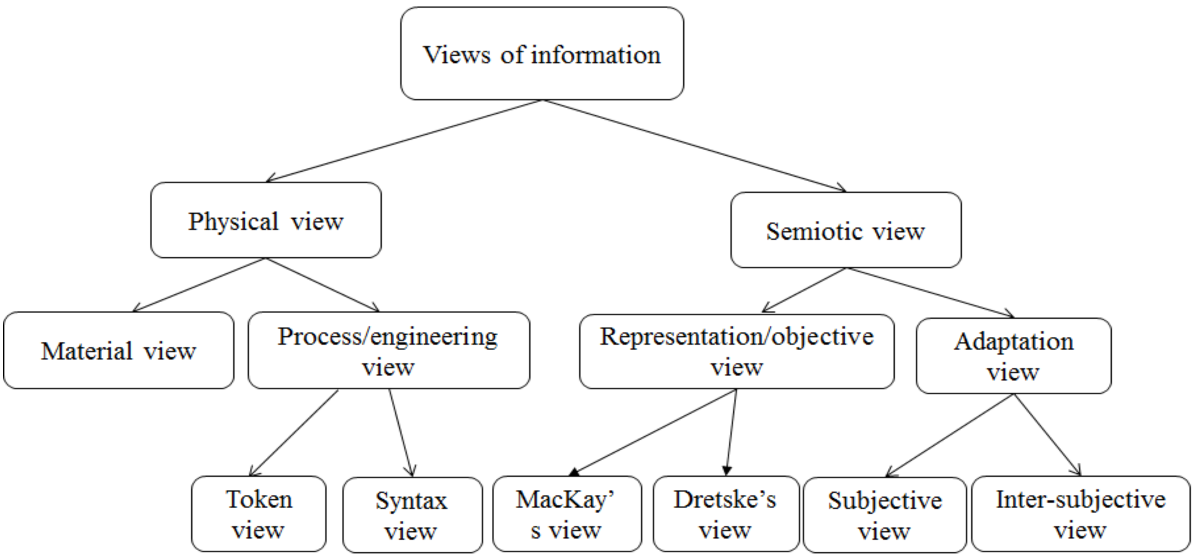

Figure 4-3: Hierarchical classification of different views of information

The physical view (engineering view) of information is the most dominant view in information systems and computer science. It adheres to positivist philosophical assumptions and consists in material and engineering views of information (Mingers, 2013). The material view mainly relates to the communication medium and how it transmits information.

Engineering views of information, consisting of token and syntax views, are also built on positivist assumptions. The token view is focused on processed data as input and output in mind, machine or organisation. It does not differentiate between data and information and defines information as processed data. The token view has been successful in understanding data processing in computer and organisations.

The syntax view defines information as measurable relations between tokens and associates information with entropy. In IS, this view can be used when studying relationships across data attributes and designing data bases. Syntax may be applied across a wide variety of topics to measure relationships between tokens. This measurement, although useful, does not contain any meaning about the tokens.

The semiotic view of information consists of the representation and adaptation views. Although both are categorised as branches of semiotics by definition, they represent a paradigm shift in the definition of information. The former believes in the existence of objective reality, adhering to the Peircian semiotic, while the latter adheres to a Saussurian semiotic and believes that reality is subject to perception.

The representation view of information is based on the belief that objective reality exists and "a representation includes a sign, an object and an observer" (McKinney Jr et al., 2010, p. 334). From the representation viewpoint, the interpretation of the sign varies among observers. The representation view of information is based on post-positivist assumptions and consistent with ontological assumptions of CR.

Representation views have been criticised for not being able to explain the differences in an individual's interpretations (McKinney Jr et al., 2010). Healy (2005) critiqued it for ignoring the process and practices that enable, generate and reproduce cognitive representations. More specifically, within the representation view, MacKay's definition of information has been criticised for being complex and for not clearly defining the role of inter-social context and giving limited attention to the physical and syntactic levels. Dretske's (1981, 1983) definition of information, on the other hand, provides a clear distinction between signs, information and meaning and describes the relation between sign and information clearly. Dretske, however, provides less precision when it comes to the socially related nature of information.

Mingers (1995) approaches information theory from a representation viewpoint; he built his definition of information based on Dretske but also developed Dretske's framework by clarifying the cognitive and social aspects of meaning generation.

The adaptation view of information is based interpretivist-constructionist philosophical ontologies that rejects the existence of reality independent of our perceptions. Two main categories within the adaptation view were introduced as subjective (related to interpretivist) and inter-subjective (related to constructivist) approaches. The main issue with adaptation views is that they do not consider the importance of physical and material aspects in defining information and within information systems.

4.3.3 Information theories and CR ontology

In this section, information will be defined in accordance with CR principles and this study's goal of understanding IQ as a socially formed phenomenon.

The definition of information that suits this study's goals should satisfy the following criteria:

(1) the definition should suit studying information quality as a socially formed phenomenon, meaning that it should not ignore the subjective social aspects of information;

(2) it should also consider the physical aspects of information and communication technologies to be able to contribute to information system improvements;

(3) it should be able to clarify the distinction between terms such as meaning, data and information (Mingers, 1996). In IQ research, this lack of clarity has been a source of confusion; the terms data quality and information quality have been used interchangeably to refer to the quality of data token stored in systems (Neely, 2011).

Finally,

(4), the selected definition should be consistent with the main assumptions of this study based on CR, meaning that it should take into account external objective reality as well as the subject-dependent nature of information (Mingers, 2013; Mingers, 1996).

Each view and definitions of information has its own strength and weaknesses (McKinney Jr, et al., 2010). According to CR, each of the above views and meta-theoretical understandings of information shapes the manner in which the phenomenon is understood. They each reject certain types of knowledge and research methods, and thus prohibit achieving a multi-disciplinary understanding of the phenomenon (Bhaskar & Danermark, 2006).

Accordingly, in order to define IQ, a multi-layered definition of the concept of information is required to bring all the different views together (physical, subjective and intersubjective) in a comprehensive way[53]. CR provides principles that can be used for 'under labouring'[54] existing information theories, and facilitates the development of an interdisciplinary definition of the concept of information (Gable, 2014).

CR suggests the concept of a 'laminated system' (Section 3.2.3) is an ontological tool to interpret the complex and multi-layered nature of social phenomena. CR meta-theoretical assumptions also help to apply current theories more productively in the research process (Gable, 2014). The concept of a necessary laminated system was used by Bhaskar and Danermark (2006) to describe the complexity of social phenomena and the existence of different structures and mechanisms in the formation of a phenomenon. "More specifically, a laminated system refers to the body of research about the phenomenon which are connected to different levels of reality" (Gable, 2014, p. 93). This can be achieved by considering philosophical ontology independent from scientific knowledge and answering the question: "what should the world be like for this science to be possible?" In other words, CR meta-theoretical assumptions enable a critical assessment of the ontological assumptions of different conceptualisations of information. Accordingly, competing information theories can be harmonised and positioned to provide an integrated explanation of information.

Bhaskar and Danermark (2006) define a laminated system as having multiple levels: chemical, biological, psychological, psycho-social, economical, political and cultural. However, Bhaskar later noted that this conjunctive multiplicity is in principle open and is related to the nature of the phenomenon and the existing body of knowledge (Bhaskar, 2010).

Accordingly, the body of knowledge on information, also can be linked to different levels (level stratification in section 3.2.3) of reality. Based on the information theories introduced

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[53] There are multi-layered information theories such as Stamper (1991) and Boell and Cecez-Kecmanovic (2011). However, these theories are not consistent with CR in their ontological assumptions, hence cannot be used as definition of information for this study's purpose.
[54] See section 3.3 which describes role of CR ontology as an under labourer.

above, this study recognises a laminated system for information (Figure 4.4)including the medium of communication (drawing on the material view of information Figure 4-3, tokens/signs and data, syntactic relations' between tokens (drawing on the process engineering view in Figure 4-3), real world objects,[55] observer (drawing on the representation view), and social-cultural context (based on the adaptation view).

Figure 4-4 shows how different information theories discussed above and their meta-theoretical underpinnings can be associated to different levels of the laminated system of information based on their relative strength in explaining each level. It was argued earlier that to study IQ, the definition of information should be able to cover material, subjective and social aspects. Figure 4-4 shows how Mingers' (1996) conceptualisation of information, by relying on theoretical lenses from the adaptation view and social theories, has extended Dretske's (1981) definition of information to include all levels required for this study's goal.

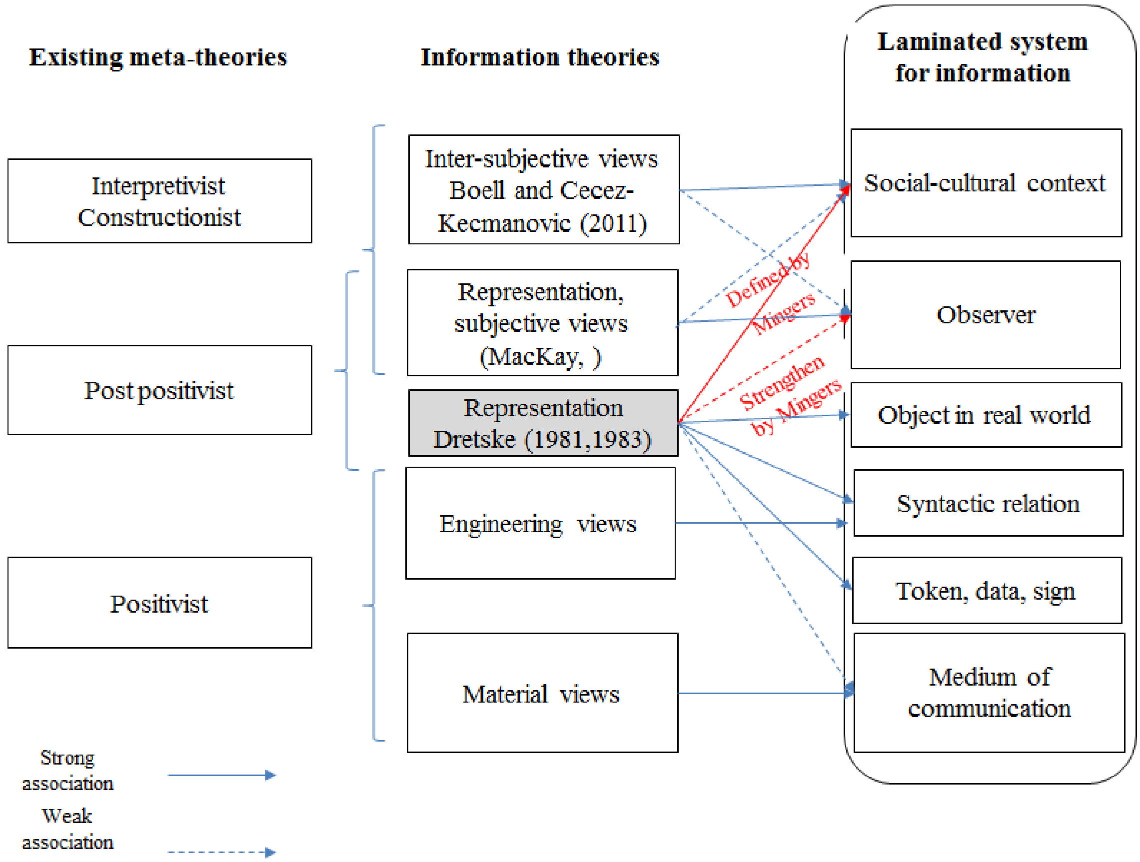

Figure 4-4: Mapping information theories to CR's laminated system

Mingers' (1995) framework of information draws on critical realist principles consistent with Bhaskar (1998, 2013), and assumes the existence of a physical world consisting of

[55] Signs' reference in the real world which could be concepts and thoughts.

structures, entities and events that are related in causal ways. Mingers (1995) draws on Bateson (1972) and Dretske (1983) to build his conceptual model of information. He defines information as the objective propositional content of sign systems, and clearly differentiates between the terms data, information and meaning. The main addition of Mingers' framework to Dretske that makes his definition more comprehensive is the description of the meaning generation process (semantic meaning) in the users' mind, relying on autopoiesis theory (Maturana, 1987; Maturana and Verela, 1980). It provides a biological explanation for the cognition process and also describes the social aspect of meaning generation and language, relying on the work of Habermas (1979, 1984).

Below, the terms data, sign, information and meaning, consistent with Mingers (1995) and also as defined and used in this thesis are introduced:

- Data is "a collection of signs, usually brought together for some purpose, to store or transmit information" (Mingers, 2013, p. 391); it can also be called a sign system. Peirce (1931, 1933) defines sign as "a representamen, is something that stands for somebody or something in some respect or capacity"[56] (Pierce, 1955, p. 99). Peirce's typology of relation between signs and their objects, consists in icon, index and symbols. *Iconic* is when the relation between sign and the object is their similarity, *indexical* when sign can be related to the object as an occurrence or result (fire and smoke) and *symbolic* refers to the category of arbitrary and conventional signs like language. The content of information systems is an example of symbolic sign. In information systems, data is usually a combination of symbolic signs produced in the system for a particular purpose [57](Mingers, 1995).
- "Semantic information is the propositional content of data and signs" (Mingers and Willcocks 2014, p. 58), is objective and is always 'true' because it is representative of some actual events in the real world that are independent of the observer (Mingers 2013; Mingers and Willcocks 2014). For example, the ringing of a doorbell carries the information that someone is at the door pressing it, or the information that there is a fault in its electrical system.
- Meaning is defined as a subjective and inter-subjective concept (Mingers, 1995); thus meaning in Mingers's definition is consistent with the definition of information

[56] Peirce used the notion of sign for both the entire semiotic unit and also for one of its parts or representamen. This study uses the notion of sign consistent with the latter.
[57] Mingers (1995) refers to this combination as utterance.

from an adaptation viewpoint. Humans can never experience information in an unmediated way; it is literally untouchable; humans are always in the world of interpreted digitalised meaning. Meaning is dependent on an individual's (receiver's) interpretation, their prior state, the connotation system, and intention. Mingers (1995, p. 299) defines two kinds of meaning generation in the semiotic process, consistent with Peirce, as described below.

- ✓ The first kind of meaning is understanding the primary meaning (semantic content of the message) which is manifested by signs triggering the nervous system of humans as observers. For example; the level of understanding that can be expected from all competent speakers of a language with common connotations. Each individual brings their knowledge and experience related to their social position to understanding of the semantic content of the received message.
- ✓ Individuals gain the second form of meaning from utterance (import). This form is focused on intentions and the implications of meaning in action. Individual's own personal experience, feelings and motivations, at particular time will be brought and result in particular behaviour (Mingers 2013, Mingers and Willcocks (2014).

Considering the ontological depth assumptions of CR, and consistent with Bhaskar (1993), information or semantic content and differences (transmitted by signs and data as communicated message) exist in the domain of the actual and when observed and perceived as meaning belong to the domain of the empirical (Mingers & Willcocks, 2014). As discussed earlier (Section 4.1), structures and mechanisms belong to the domain of the real. In defining information, these structures consist in the domain of possibilities or conditions of possibilities from which various events (or even other structures) arise. Accordingly, when considering the laminated system of information and the identified entities in Figure 4.4, it can be roughly argued[58] that real domain entities, in forming the concept of information and meaning, consist in the medium of communication, tokens and signs, pre-defined syntactic relations, the real world object, the observer (their experience and knowledge) and the social-cultural context.

[58] 'Roughly' because the goal of this thesis is not to enter the philosophical discussion around three domains of reality, and positioning entities in the domain of real is open to critique.

This positioning can be illustrated in the example of a blue smear on a map caused by a fault in the printer; the connotation system related to the map, the map itself, the reader of the map and the faulty printer all exist in the domain of real. The blue smear caused by the faulty printer is an event in the domain of actual. Drawing on Bhaskar (2013) the semantic content of this blue sign showing (there exist a fault in the printer system) is available independent of any observer and might never be observed/experienced; thus, semantic information belongs to the actual domain and is inaccessible by users. The meaning that information recipient might receive from this blue smear (e.g. blue smear is representing a lake on the map) belongs to the domain of empirical.

This positioning can also be illustrated with a more familiar example to the IS context. For example, on a social networking website, users' ratings of the content is a sign which carries information and possibly meaning for the recipient of the content. In this example, the social networking website itself, its affordances (such as what kind of rating system it provides, and how users have access to that etc.), social norms and connotations, content provider and users, all belong to the domain of the real. The sign that shows high rating (number of likes) for a specific content (created by other users) belongs to the domain of the actual. However, the semantic content of this sign could be that the author of the content is a popular person or the content itself is valid and reliable (domain of actual). The information recipients in this case depending to other factors, such as content itself, or social structures and relations will perceive the rated content as valid or not (meaning).

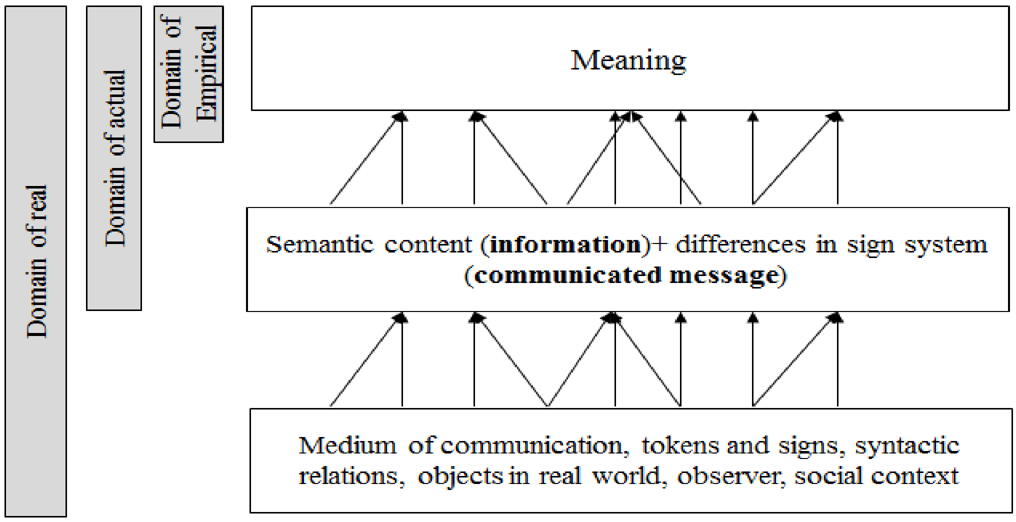

Figure 4-5: Depth-ontology view to the concept of information

This stratified understanding of information both in terms of levels in a laminated system (Figure 4-4) and in terms of domains of reality (Figure 4-5) provides the basis for a definition of quality and information quality as a research concept in the following sections.

4.4 WHAT DOES 'QUALITY' IN THE DEFINITION OF IQ REFER TO?

The notion of quality has been investigated throughout history and has been defined in various ways. There is no global definition of quality that can be applied in all situations. Each definition of quality has its own strengths and weaknesses. Definitions can be categorised from objective views, such as conformance to design specifications, to subjective views, such as value for the users or user-based quality (Garvin, 1984).

Although this study agrees with Reeves & Bednar (1994), who argued that the quality of any product or output should be defined by considering the nature of that product, it also notes that quality cannot be defined independent of a quality evaluator (Carr, Gibson, & Robinson, 2001).

In relation to defining IQ and the depth ontology view of the concept of information, this study argues that quality is a concept related to the empirical domain of reality; thus, any quality evaluation perception is associated with a kind of meaning perceived by users (users or information evaluators only have access to the meaning, thus evaluation can only happen in relation to the received meaning). This definition is consistent with Mingers' (1996) notion of semantic information, in which information is always considered as 'true' no matter what the user's perceptions are. The sign contains information of a real world event, irrespective of whether or not the receiver is able to derive the truth of the information. While we are able to talk about the amount of information available to the receiver according to their prior state, this is not an assessment of the quality of the information itself (Mingers, 2013). Talking about quality or judging the quality of the semantic content can only happen once it has been transformed by the users into a form of meaning (see Figure 4-5). Thus, the judgment of information quality is associated with the meaning of the information for information user. Consistently, the focus of this study is mainly to explain and understand the quality of meaning generated by receipt of a message for users (Figure 4-5)

Mingers (2013, p. 395) argues that "it is not appropriate" to talk about measuring the quality of the meaning generated by receipt of semantic content, as we can only understand

and compare meaning. This understanding means that quality judgment in the user's mind happens through comparison between perceived meanings with other references (Lillrank, 2003). The understanding of IQ as a result of this comparison process is consistent with other definitions of quality such as "meeting or exceeding customers' expectations" or "satisfying the needs and preferences of the users" (Stvilia et al., 2007, p. 1721) In this definition, expectations of the customers or their needs or preferences are explicitly mentioned as the reference of comparison in IQ evaluation by the information user. The most common definition for quality in information quality studies has been "fitness for use" (Evans & Lindsay, 2002; Juran, 1992). This definition also implicitly refers to quality evaluation in a user's mind, in terms of the comparison between their information needs in practice and the meaning they receive from information. These two definitions are, in fact, two sides of the same coin. Accordingly, in this study judgment of information quality from a user's point of view is happens as part of a meaning generation process or a cognitive process (Mingers, 2001b) and is defined as a "comparison between perceived meaning and a user's expectation of the meaning."[59] This comparison process forms the perception of quality in the user's mind. It should be noted that comparison in this definition is not a simple linear process but a more complex, cognitive one. Thus, to position an IQ phenomenon as a research concept, the process of IQ evaluation in the information user's mind should be elaborated on. All definitions of quality "assume that there exist some shared norms of quality or quality expectations" (Stvilia et al., 2007, p. 1722) (e.g. users' needs, or designers' and system developers' expectations of satisfying users' needs), and evaluation means to determine to what extent these expectations are satisfied (Garvin, 1984). In fact, the concept of quality is always an issue when there is a level of expectation that should be satisfied. This study assumes a communicated message is of high quality if it can change observed users' behaviour or is considered by users as applicable in their decision making process. As a result, expectations of the users are defined according to any conscious or unconscious criteria that make them consider a piece of information useful and of high quality in the context they are in. "Users' expectations are largely formed through their needs and the activities they need to perform" (Stvilia et al., 2007, p. 1721).

[59] This definition is also consistent with basics of expectation-disconfirmation theory (Oliver, 1977, 1980) which have been used in service quality studies.

To be consistent, in the rest of this thesis when referring to the quality of meaning, the term ‘perceived information’ is used as an equivalent of meaning[60], and the term quality of perceived information (QPI) refers to the difference between meaning generated from the communicated message and expected meaning for the information user. The concept of “expectation of meaning” or “expected quality of perceived information” (EQPI) refers to users’ expectations of the communicated message. To summarise, EQPI is the reference of quality assessment (based on expectations) while QPI is the final perception of quality.

So far, judgment of quality in the user’s mind has been defined as a meaning generation process[61] and also, to some extent, as a comparison process. Signs are defined as triggers in the meaning generation process (Mingers, 1996). Thus, a communicated message and its characteristics constitute the main triggers in the quality evaluation process as well. Stvilia et al. (2007, p.1722) define information quality measurement as “the process of mapping the attribute-level distributions of real-world entities to numbers or symbols in an objective and systematic way”. Thus, to evaluate the quality of the received message (user as the evaluator), the comparison between expected and received meaning is grounded by the information user’s cognitive thinking, in the attributes of the received message (syntactic and semantic rules, of the message and sign system)[62].

For example, to be able to understand the semantic content of an unstructured text message (comprehensibility) the connotations system (signs and syntactic rules) should be cohesive (Batini et al., 2014) and known by the information user. Comprehensibility in structured presentation of information, for example, databases might be evaluated based on compactness and normalization of data (Batini et al., 2014). Or for an image expected to be used in a newspaper (readability or comprehensibility), it should have certain size (measured by pixels) and visual-quality (dots per inch). Expectation of the meaning (quality) or information user's expectation of the communication is in form of analogue information based on Dretske’s (1981) definition. The expected criteria of qualities such as timeliness and accuracy are some forms of digitalization of these expectations. To be able to assess these

[60] Information is converted to meaning through a process of digitalization (Mingers, 1995). Here in this thesis I use the term ‘perceived information’ to refer to meaning as digitalized information (digitalization in meaning generation process was defined in section 4.3.1 and based on Dretske information theory) for information user.
[61] According to the definition of two kinds of meaning that was introduced earlier, the criteria of quality such as comprehensibility and correctness are related to the first form of the meaning (Mingers, 1995) and other quality criteria can be associated to import or second kind of meaning defined by Mingers (2013).
[62] Batini et al., (2014) also mapped IQ dimension (meaning in this thesis) to different kind of information representations (attributes of the received message).

qualities, these qualities should be translated to some real world attributes (as intransitive objects or in the domain[63]) of the received message. Mingers (1995) describes this process as observe digitalization or moving from digital meaning to analogue sign. Comparison, then, means mapping the expected attributes of the sign system to the attributes of the received message (Stvilia et al., 2007).

This definition introduces the expected real world attributes of a received message (syntactic (including meta-data) or semantic rules of a language and sign system) as an important concept in relation to quality perception. For convenience in this thesis, the term 'expected data quality' (EDQ) is used to refer to expected real world attributes of the sign system. Note that although EDQ is defined in relation to real world attributes such as syntactic rules and measurable criteria, it is still judged by human observer and has some subjective aspects (please see the example in Appendix B). For example, in the statement 'the number of students doing post-graduate degree in Australia is increasing during the last five years', if truthfulness is considered as the expected quality of perceived information (EQPI), then the expected data quality (EDQ) criteria in relation to truthfulness can be defined as the compatibility between semantic content of this message with other available resources (Batini et al., 2014). Semantic comparison with a reference source (or comparison with real world reference) are considered as EDQ in this study. Batini et al. (2014) also describes quality predication of a message either as semantic comparison with a reference version of information or as evaluation of perceptual and technological characteristics of the information in relation to its presentation.

Understanding the concept of EDQ is easier in relation to structured data such as data bases. For example 'completeness' as an expected quality attribute pertaining to EQPI, in structured data can be assessed by applying EDQ metric as 'number of not null value/total number of values'. In other kinds of representations of information, such as un-structured data like images and even maps, identifying EDQ might not be that straightforward and also different based on the context and information user.

[63] Real world attributes refer to objects and attributes of them which exist independent of being observed by human. In CR terms they are called intransitive objects of science. Intransitive objects exist in the world independent of our knowledge of them. Theories or knowledge which study these objects are intransitive and belong to the domain of empirical (see section 3.2.1 and also section 7.5.3 related to future research).

The following three examples can clarify the above concepts, associated in images and un- structured data; the first is an example adapted from Batini et al. (2014) in a comparison between two pictures from Mars (Figure 4-6).

Figure 4-6: Quality concepts in two pictures from Mars (Batini et al., 2014, p. 49)

In this example of quality perception, what makes the picture of Mars of acceptable quality is how accurate it can represent the real world phenomenon (EQPI). However, we do not have any reference for this phenomenon in our mind. In this example, visual attributes that could otherwise be used as criteria (such as colour contrast, sharpness, etc.) are not helpful in regard to the EQPI. Instead, what helps to examine how these photos represent the real world phenomenon is the source mentioned underneath (considered as meta-data associated with the message in this example). The first photo is from a blog and the second one is from the NASA website; thus, the credibility of sources (website links) is considered the measurable criterion (EDQ) in quality assessment of these two pictures. The final perception (QPI) in this example is the perception of higher quality for the picture from the NASA website. Note that in some other examples (for example a photo of a flower to be used in a journal) resolution can be used as EDQ, since it matches the EQPI (better representation of a flower in the real world) in the user's mind better.

Another example of these concepts, this time in a textual format, is the quality of information available on the TripAdvisor website. A user planning his/her next travel destination is looking for valid, accurate and current information about hotels (EQPI). Figure 4-7 shows two reviews on the same hotel. Each review, rather than just text, includes meta-data that provides information about the reviewer and the time that review have been submitted. The information user first looks for the reviews that have been submitted currently and probably would not consider older reviews (Submission time as EDQ). To examine the accuracy (EQPI) of the reviews, information users can consider syntactic criteria of the review's text (EDQ_1) itself, semantic similarity between this review and other reviews (which also can be done through structural similarity in organization between texts (Batini et al., 2014) and also the credibility of the reviewer through relevant meta-data (EDQ_2). In this example, the user might put a higher degree of trust in the review that was written by the reviewer with a higher level of contribution to TripAdvisor (EDQ here is the number of reviews by each reviewer showed in their profile). This is just an example to show how EQPI, EDQ and QPI are defined in this study. Users with different experience might give different weights to these criteria in combination with the review's text when evaluating the information.

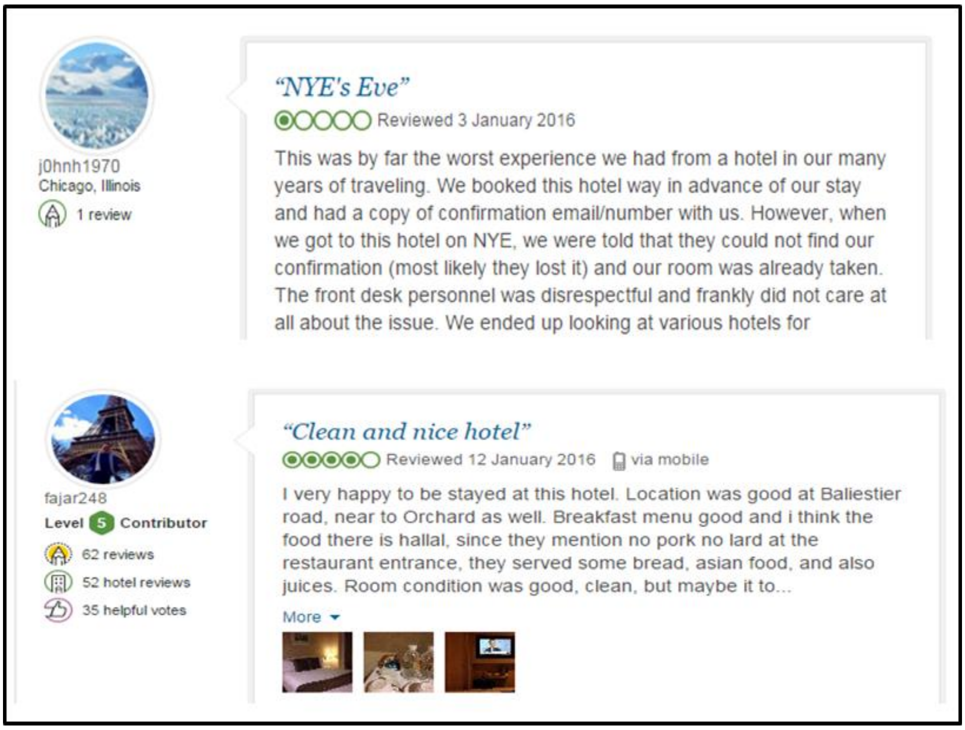

Figure 4-7 : Quality concepts in TripAdvisor[64]

Another example (related to Appendix A) is about the use of wikis in education. In this example, from students' points of view, the most important expected criteria of the received messages (EQPI) through the wiki are accuracy and currency of the content. These expectations are formed according to use of wikis as a source of information related to university courses. To estimate the currency, the submitted time of the message (EDQ related to the meta-data) might be considered. Students might ignore contents related to previous semesters by applying this criteria. To evaluate the accuracy of the content, students might apply multiple EDQ

[64] Figure 4-7 is a snapshot from the TripAdvisor website and is meant to represent an example of the content found on that website.

measures. For example they might check who the author of the content is and consider their credibility (or popularity) as a criteria for preciseness of the content. They also might compare the compatibility of the semantic content with more formal sources (such as their course materials), or even consider syntactic rules of language in the related wiki content to evaluate accuracy. By applying multiple EDQ criteria to the available content on wikis, users decide on the final quality of information.

Appendix B, part II, provides another example to represent the concepts of EQPI, EDQ and QPI. Appendix B, part B, provides a table that summarizes these three concepts in the examples above. Any pattern between sets of EQPI and EDQ criteria related the form of presentation or the media in use can be subject of future research.

Figure 4-8 represents the process of quality perception in the user's mind consistent with

The discussion above.

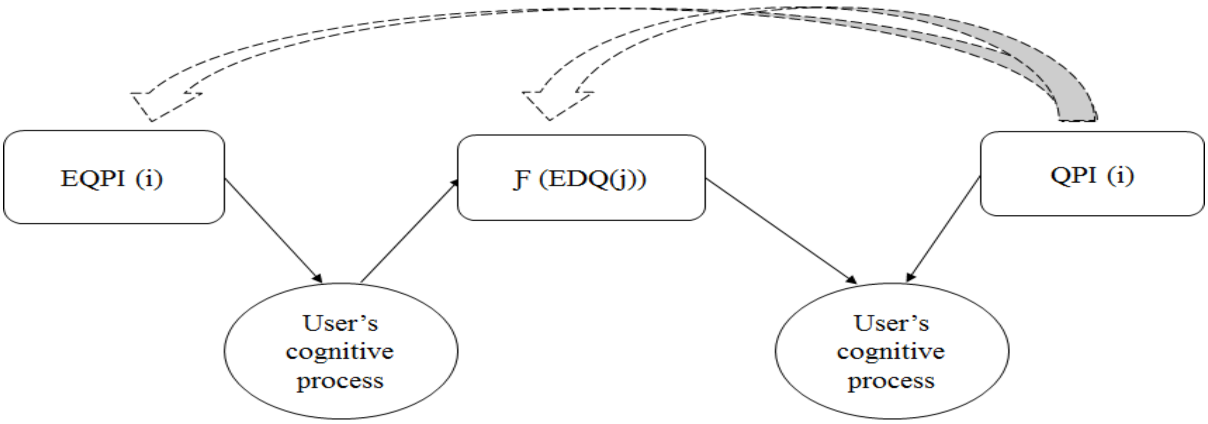

Figure 4-8: Proposed model for quality evaluation in user's mind

When considering the potential quality of any received message, users already have some expectations about the qualities of the meaning carried by that message (EQPI). These expectations are made based on the context of information use. Assuming any of the quality criteria such as validity, precision or timeliness (as in the above examples) representing these expectations of the meaning (EQPI (i)), users will need to determine some characteristics of the sign system (or combination of them) to be able to estimate the required EQPI (i). This is shown in Figure 4-8, by f (EDQ (j)). Users then compare the received message against these f (EDQ (j)) and translate that to the perceived quality of the received message (QPI (i)).

Figure 4-8 is only showing the sequence of thoughts in the quality evaluation process in the information user's mind through a staged approach. It is by no means a linear process, but a complex iterative process whereby the users may go through these stages in multiple cycles before deriving at final quality and acceptance of information.

The concepts and definitions depicted above are consistent with Hogarth's (1987), definition of any 'choice making situation' as involving 'predictive judgement' and 'evaluative judgement'[65]. Predictive judgment could be associated with expectations of the meaning (EQPI) and expectations of the attributes of a message (EDQ), while evaluative judgment refers to their final judgment (QPI) of their expected criteria (Rieh, 2002).

Based on the above discussion, this study argues that the formation of IQ perception in the information user's mind is associated with three phenomena: the user's expectation of the meaning (EQPI), the user's expectation of real world attributes of the received message (sign system) (EDQ), and final perception of quality (QPI), as presented above. This process based understanding of IQ (based on EQPI, EDQ and QPI) which will be more elaborated on in the next chapter is designed to support better design of IQ research, and more effective application of the research results in practice. Traditional/prior approaches used in IQ studies in defining IQ dimensions and measures (metrics), are different from the above approach (Figure 4.8), in differentiating between EQPI and EDQ. IQ studies especially in the IS and CS discipline, had less focus on the information user, their thinking process and how they evaluate information quality. To derive IQ dimensions and measures, these studies tend to focus either on technical aspects of the system (researcher or designer's views) or apply methods which are inconsistent with their definitions of IQ (Batini et al., 2014). As was discussed in Chapter 2, the resulted IQ dimensions and measures are arbitrary, overlapping in definitions and are not justified properly. Defining IQ as a thinking process (as per Figure 4.8) instead of using sets of dimensions and measures introduces new concepts which are linked to the context of use and also design aspects of the information system. According to this new approach for defining IQ, while IQ (and related concepts) is still defined as a subjective concept, it is possible to explain and justify this phenomenon according to the context of information use and related structures. The advantages of this process-based definition will be discussed in more detail in Chapter 7 (See section 7.2.1.3).

Henceforth, in this thesis the term IQ will be used to refer to the IQ concept as generally known in past IS studies, also as a general term that consists in studying QPI, EQPI and EDQ

[65] Predictive judgement refer to expectation of the user before making a decision or before looking to information. Evaluative judgment refers to values which people assign to their judgment of their preferences. People might go through an iterative process between these two judgments to make their final choices (Rieh and Belkin, 2000).

as the new research concepts this thesis seeks to define. The following section describes these concepts and their formation according to a stratified understanding of reality in CR philosophy.

4.5 STRATIFIED CONCEPTUAL MODEL OF IQ

After defining the IQ phenomenon and related concepts (EQPI, EDQ, QPI) in the information user's mind, consistent with conceptual abstraction methods (Section 4.2), this section develops a stratified conceptual definition of IQ as a research concept based on depth ontological assumptions of CR (Figure 4-9).

IQ perception and the related process in the information user's (evaluator's) mind happen independently from IQ researchers and are not observable or directly accessible to them. Thus, according to CR definitions of stratified reality and its three domains of real, actual and empirical, IQ perception and the related defined phenomena (EQPI, EDQ and QPI) in the information user's mind belong to the actual domain in relation to the researcher.

By applying different research approaches and data collection methods (such as survey, interview, observations), researchers gain indirect access to these phenomena (EQPI, EDQ, QPI) in the empirical domain of reality (Easton, 2010). The representation of these phenomena in the empirical domain varies depending on the data collection methods used (as part of mechanisms in real domain), which may lead to discrepancies with the actual and real domains.

The real domain in CR stratified reality consists in entities and structures (Section 3.2.3.1) which are involved in forming perceptions of IQ. According to the discussion in the previous section and the stratified model of information outlined in Section 4.3.3, this study argues that entities identified in the generation of meaning are also involved in forming IQ and IQ concepts. These entities include the information quality evaluator (observer or information user), social context and medium of communication. Although in Figure 4-5, communicated message has been defined in the actual domain of reality in relation to the concept of information, from the researcher's point of view the communicated message is also one of the structures (entities) in the domain of real that can alter the perception of IQ in the information users' mind. These entities are now discussed with more detail in relation to IQ perception (Figure 4-9).

The role and importance of the information user has been emphasised in IQ studies by defining IQ as a subjective concept (Price & Shanks, 2005), or as fitness for use (Wang &

Strong, 1996) and this definition has also been adapted widely in the literature (Ge & Helfert, 2007).

In relation to the communicated message, IQ studies have focused on semantic criteria (Price & Shanks, 2005) or representation dimensions of IQ (Wang & Strong, 1996). The importance of the communicated message in IQ perception has received more attention in the web context and with new forms of social technologies (Figueiredo et al., 2013; Rieh, 2002).

The meaning generation process or IQ perception process do not happen in a close system, and cannot be studied without considering the interactions of social and material structures in the context of a study (Boell & Cecez-Kecmanovic, 2011). By defining IQ as a socially formed phenomenon, while being grounded in the agent's (information user) interpretations, social world structures should be considered as entities in the real domain influencing the formation of IQ concepts (Layder, 1998). Figure 4-4 and in Section 4.3.3 also showed how the role of the social/cultural context has been noticed by researchers in the definition of information and as an entity in perceiving information.

The social context of information use has been considered by prior IQ research as well; in IQ studies, applying the definition 'fitness for use' (Wang & Strong, 1996), implies the importance of the context of use in quality perception (Neely & Cook, 2011). In these studies, social context is seen as determining the tasks related to information use. It is observed that the nature of the tasks people are engaged in will often determine their expectations and the criteria used in their decision making when evaluating information quality (Rieh & Belkin, 1998). In another relevant study, Strong, Lee, & Wang (1997) studied IQ in three different organisational contexts to identify how different aspects of the context such as task, organisational hierarchy, information systems design, and system deployment in organisations, can influence IQ perception. (Floridi & Illari, 2014) have shown that even the definitions and perception of what are known as intrinsic IQ dimensions such as accuracy are context-dependent. Therefore, social structures can determine which mechanisms are to be activated in the quality perception process (Lee et al., 2002).

IQ studies has also mentioned the role of communication medium in IQ perception. For example, (Strong et al., 1997) define accessibility as one of the IQ dimensions in relation to communication media transmission and also representation capabilities. Thus, the media of communication (or in the context of communication technology, the IT artefact) as part of the socio-technical context is one of the entities in the real domain interacting with other entities in forming the perception of quality for the information user.

The above entities and structures are mainly related to the perception of information, whereas in studying IQ as a research concept, other involved entities include the researcher and mechanisms related to the research methods (data collection and research design) that influence how IQ concept is perceived in the empirical domain by researchers. In this thesis, chapter 5 focuses mainly on the formation of IQ concepts and relate mechanisms in the domain of actual and chapter 6 provides some guidelines to choose appropriate research methods in order to study these concepts. However, further investigation of mechanism related to the researcher and research context is not in the scope of current study. Figure 4-9 shows the stratified conceptualisation of IQ based on the above discussion and CR principles.

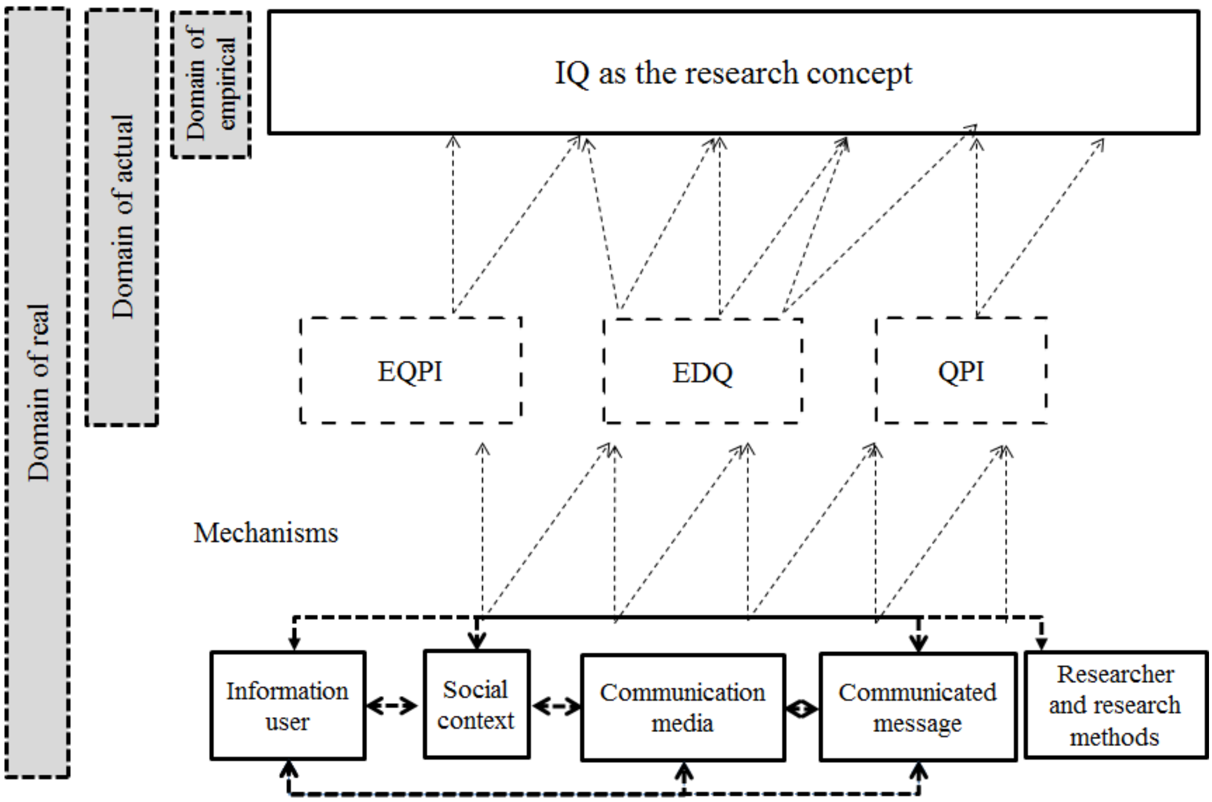

Figure 4-9: Stratified conceptual model of IQ

Accordingly, any observations and measures related to IQ in concrete situations are reflections of entities interacting with each other in the domain of real (thicker arrows in Figure 4-9 show possible interactions between entities). The entities in domain of real—

information user, social context, medium of communication and communicated message — all have powers or tendencies by virtue of their structures (See section 3.2.3.1; powers and tendencies will be elaborated in the next chapter). These powers and tendencies can enable mechanisms (thinner arrows in (Figure 4-9) resulting in events in the actual domain, which might be observable or not. For example, organisational hierarchy is one of the structures of the social context that can influence perception of quality for information users within organisations. In this study, expectation of the meaning (EQPI), expectation of data and sign system attributes (EDQ), and final perception of quality (QPI) are defined as events in the domain of actual and as the results of different mechanisms and structures working in the domain of real.

The above understanding of the IQ concept requires researchers to explain the observable events in the domain of empirical by considering entities and structures existing in the domain of real. The complexity of this causal structure is because mechanisms belong to different levels of reality (information user, social context, media of communication and so on). IQ-related concepts (EQPI, EDQ and QPI) and their empirical representations are emergent phenomena (Section 3.2.3.4). This means that researchers studying IQ should seek to carefully identify different interactions between entities in the domain of real and how they can cause specific research results.

According to this understanding (Figure 4-9), current approaches in IQ research that merely assign measures and dimensions to evaluate the concept of IQ in the empirical domain (by respondents rating these attributes) are not sufficient anymore. This understanding of IQ will open up new research directions to study the social phenomenon of IQ. The traditional approaches in IQ measurement assumes a causal relationship (Humean causation) between the IQ perception in the user's mind and the measures assigned to the IQ as a research construct. However, Figure 4.9 highlights the need to propose a case to reject the idea of Humean causation[66] in favour of causal explanation via mechanisms (Section 3.2.4). The conceptualisation of the phenomenon based on CR principles leads researchers to answer the question of "why what happens actually does happen" (Sayer, 1992, p. 104) or — why do sets of measures represent high quality information in a certain context? This non-Humean understanding of IQ will help to develop more useful knowledge and therefore will contribute to better applications of IQ research in practice. Thus, the concept of causation and the research

[66] Humean causation is introduced in Chapter 2 and discussed in more detail in Chapter 3.

practices associated with that, need to be revised considering the stratified conceptualisation of IQ.

In relation to IQ stratified conceptualisation and in seeking more explanations of how entities and objects work to form IQ phenomenon, the first research question in chapter 3 "what is information quality?" Now can be asked more specifically in relation to the framework proposed in this chapter (Figure 4-9) as[67]:

RQ1.1: How are the entities in the domain of real (Figure 4-9) in the interaction with each other, and what mechanisms emerge from these interactions forming concepts related to information quality (EQPI, EDQ and QPI)?

Also based on defining IQ concepts (EQPI, EDQ and QPI) in the domain of actual and IQ research in the domain of empirical (Figure 4-9), the second research question in chapter 3, as "How can we study information quality as a research concept based on CR epistemological and methodological assumptions? Can be slightly modified to:

- RQ 1.2: How can we, as researchers, study IQ concepts as an emergent phenomena in the domain of empirical? (based on CR epistemological and methodological assumptions)

The next two chapters in this thesis will address the above questions.

4.6 CONCLUSION

This chapter is positioned as stage 2 of Danermark et al.'s (2001) methodological guidelines, and develops a CR based ontological understanding of IQ as the entry point to the research process. In order to achieve this goal, firstly, information was conceptualised through reviewing different perspectives on information and considering CR assumptions (Figure 4-5). Then, a quality definition was developed based on the stratified understanding of information. Subsequently, a stratified conceptualisation of IQ was developed by positioning IQ concepts (EQPI, EDQ and QPI) in relation to ontological depth assumptions of CR and identifying real world structures and mechanism in the IQ perception process.

The model presented in this chapter (Figure 4-9), represents a stratified conceptualisation of IQ as a socially formed phenomenon and how it is formed through interactions between different entities in the domain of real. The conceptual model depicts the quality perception

[67] Also see Table 1.1 in Section 1.3

process as a cognitive process (or meaning generation process) at the individual level that is influenced by the individual's interaction with the context of the social and technological structures. This helps researchers to study the IQ phenomenon through context, structural constraints and the action of agents.

Accordingly, this chapter ends by suggesting possible questions as the entry point to the research process in the study of IQ: (1) how can entities in the domain of real, in interaction with each other through activated mechanisms, change IQ related concepts? And (2) how can information quality as defined by this model be studied as a concrete phenomenon?

A goal of upcoming chapters is to provide more detail in answer to the first question on the structures and their relations, based on existing theories. A further goal of the following chapters, in answer to the second question, is to provide methodological guidelines for researchers on how to study these structures in the domain of empirical.

Chapter 5: Theoretical Redescription: CR General Meta-Theory of IQ

The importance of this chapter has it basis in the CR principle that social science phenomena are concept dependant and we can never understand, analyse or categorize reality without using a theoretical language of concepts. It is fairly common to think that our knowledge of the world increases through data collection. But, as Bhaskar (2013) argues, such a notion limits knowledge only to empirically observable events. The emphasis of this study's approach is on the important role of theories and abduction in the research process.

In the previous chapter, information quality (IQ) and related concepts (Expected Quality of Perceived Information (EQPI), Expected Data Quality (EDQ) and Quality of Perceived Information (QPI)) were defined; several entities involved in IQ evaluation in the user's mind were identified; and a stratified conceptual definition based on the CR principle of stratified reality (Ontological depth assumptions of CR (Bhaskar, 1998) was developed. This chapter, using existing theoretical lenses, will elaborate the model (Figure 4.9) and focus on clarifying IQ as a laminated system by:

- Identifying the interaction between entities (information user, social context, communication media, communicated message), depicted with thick blue arrows in Figure 5-1, and how these entities are positioned according to each other.
- Describing the role of identified entities in IQ perception in the user's mind; or in other words, possible mechanisms driven by these entities changing information quality perception (thin black arrows in Figure 5-1).[68]

[68] Figure 5.1 shows the real and actual domains, cut from Figure 4.9, since the goal of this chapter is not to focus on mechanisms related to research practice that influence empirical observations and experiences; it mainly focuses on explaining the formation of concepts in the actual domain from mechanisms in the real domain. Chapter 6 will focus more on the domain of empirical.

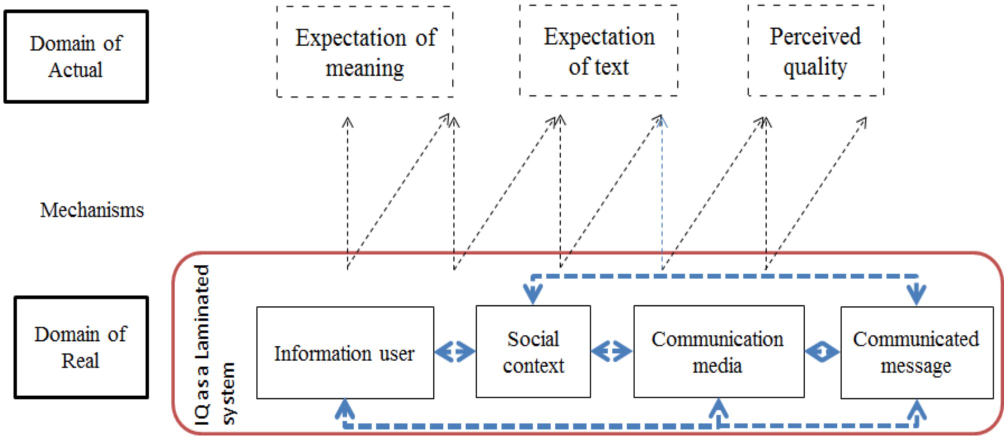

Figure 5-1: Stratified conceptual definition of IQ

Thus, the goal of this stage is to describe different components and aspects of the defined IQ conceptual model, using existing theoretical lenses. Several theoretical explanations and interpretations will be introduced, compared and possibly integrated here to describe the IQ phenomenon. This step is also fundamental in developing more precise research questions.

In Section 3.4.2, Danermark et al.'s (2001) approach to using theories was described in the two main stages of the research process: 1) defining the research problem (phenomenon); and 2) applying theories in the data analysis process (retroduction). Based on Cruickshank's (2003) hierarchy in realist theorising (Section 3.4.2), Chapters 4 and 5 of this thesis develop a CR general meta-theory that helps with the definition of the research phenomenon. In this chapter, a CR general meta-theory of IQ (the second level of theorising in Cruickshank's hierarchy) is developed by adapting Mingers and Willcocks's (2014) semiotic framework to the stratified conceptual definition of IQ (developed in Chapter 4).

Figure 5.2 positions this chapter in relation to the overall research design.

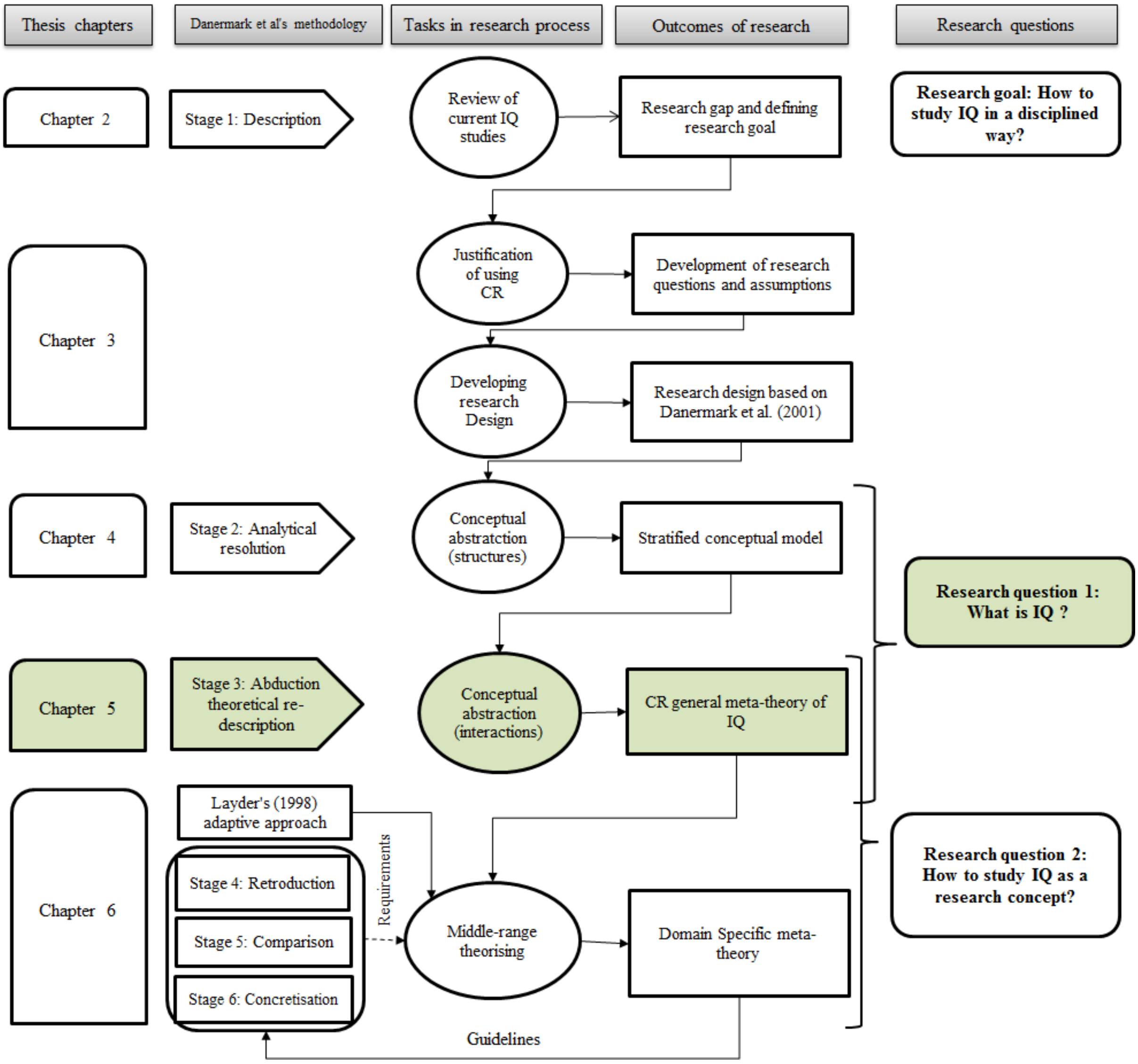

Figure 5-2: Position of this chapter in overall research design

After developing a CR general meta-theory, a research agenda for IQ studies is proposed based on this understanding of IQ. In Section 5.3, the proposed general meta-theory of IQ (CR ontology of IQ) is elaborated and explained relying on a variety of theoretical lenses across different disciplines. The theoretical description results in a taxonomy of theories that will be used in Chapter 6 to develop domain specific meta-theory and in analysing empirical data in future IQ studies.

5.1 POSITIONING TECHNOLOGY AND THE SOCIAL WORLD

In IS research, the application of theoretical lenses (especially reference theories which have been borrowed from other disciplines) has been questioned by scholars (Grover & Lyytinen, 2015). Although these theories can provide rich explanations for different aspects of the IS environment (Weber, 2003), one of the main critiques of the application of reference theories in the IS field is borrowing these theories without modifying them in relation to the nature of the IT artefact. This problem has led IS research to fail in representing the unique aspects of the IS environment (Jones & Karsten, 2008).

Accordingly, in this study the choice of suitable theoretical perspectives should be done with close attention to the nature of IQ perception in a socio-technical environment (Weber, 2003). IQ is defined as a socially formed phenomenon (Section 3.1.1) and entities including information user, social context, communication medium (IT artefact) and communicated message are defined as real world entities forming IQ perceptions of information users (Figure 5-1). Positioning these entities in relation to each other and defining their interactions is the main step to theorising in IQ studies.

As the first step toward defining interactions between entities in an ontological model of IQ, this study positions the communication medium or IT artefact[69] to conceptualise existing interactions of it with other entities. The IS field is a relational field of inquiry which bridges the social and technological worlds (Lee, 2010). Accordingly, we need to define these entities — technological and social worlds — in ways that recognise the mutual dependencies and forms of embedding and characterising different forms of relations between them (Burton-Jones & Straub Jr, 2006).

In IS research, the relation between technology (IT artefact) and the social world has been debated extensively (Mingers & Willcocks, 2014). Orlikowski (2007, p. 1436), has differentiated between the following main views in defining technology:

- Technology determinism: The organisational use of IT had a basic start as a means of electronic data processing, and was a limited tool for decision support. Therefore, many researchers have approached IT or IT artefacts from a deterministic view, primarily as a means of representation and automation, data manipulation, transfer,

69 In information system studies, researchers have referred to the IT artefact as information and communication technology (IT) or even sometimes, an information system. In this section, the term IT artefact refers to the medium or technology of communication.

and storage. From this viewpoint, computerisation and big data analysis techniques are expected to process larger amounts of data with higher quality to improve decision making. This instrumental approach assumes that technology is “exogenous, homogenous, predictable and stable, performing as intended and designed across time and place” (Orlikowski, 2007. P, 1437) and treats technology as an independent variable in the research (Mingers & Willcocks, 2014). This view of technology is consistent with representation theory and communication theory[70] (Aakhus et al., 2014) and has been criticised for ignoring how technology is entangled with historical and cultural and individual influences (Orlikowski & Scott, 2008).

- Another view of concepts of technology or IT artefacts is the “human-centred” (Orlikowski, 2007, p. 1436) or “social deterministic” (Mingers & Willcocks, 2014, p. 49) view which focuses on humans’ interaction and sense making of technology in different situations. In this view, technology is understood according to different meanings assigned to it by different users (Orlikowski, 2007). The social deterministic view, in contrast to the technology deterministic view, studies the ways in which technology is socially and culturally constructed. Examples include social shaping technologies (Howcroft, Mitev, & Wilson, 2004) and social construction of technology (Pinch & Bijker, 1984). This view has been criticized for minimizing the role of technology and only focusing on humans’ interpretations and relations (Orlikowski, 2007).
- With the development of new technologies such as social networking and mobile technologies, the above understandings of IS phenomenon are changing. Information and communication technologies have become more entangled with different aspects of human life and have transformed the communication process. Thus, this situation raises the question of how emerging technologies can be studied and how interactions between the human cognition and social life can be conceptualised. To address these new challenges, the third and most recent view is “sociomateriality” which asserts that materiality (technology) is integral to organisations and technology and social systems are intertwined and cannot be separated. From this perspective, “social and the material are considered to be inextricably related — there is no social that is not also material, and no material that is not also social” (Orlikowski, 2007, p. 1437).

[70] Representation theory by (Wand & Weber, 1995) and communication theory (Shannon & Weaver, 1949) will be introduced and positioned later in this chapter.

Examples include actor network theory (Callon, 1990), and agential realism (Barad, 2003). Sociomateriality foundational assumptions[71] have been criticized by both critical realist (Mingers & Willcocks, 2014; Mutch, 2013) and non-critical realist researchers (Leonardi, 2013). The main critique of this approach is that this view still is not able to conceptualize and capture specific characteristics of technology and also, by focusing in empirical research on participants' descriptive interpretations, neglects the broader social structures.

- Another view of technology and social systems is to conceptualise them as two ontologically independent but mutually interacting entities; examples include the socio-technical studies of Trist and Murray (1990) and study of the process of information by Zubbof (1988).

This study, consistent with the last view outlined above, and following CR principles (Bhaskar, 1998), believes in the ontological separation of social systems and technology, and follows Mutch (2010) and Mingers and Willcocks (2014) in arguing against the socio-materiality position. This analytical separation between technology and the social world is in line with Archer's (1995) analytical separation of structure and agency, and provides similar benefits to those her work provides in social science studies (Dobson, 2001). Accordingly, in this study, IT artefact or technology is defined following Mutch's definition of information and communication technology (ICT) as "technologies for processing, storage and transmission of digital material, consisting of ensembles of hardware and software with distinctive features that allow for the physical storage and logical representations of different forms of data" (Mutch, 2010, P.507). This definition emphasises the importance of material aspects of technology in studying IQ within a social context.

According to Mutch (2010) information and communication are linked together in the process of meaning generation (Boland Jr, 1986), but to be able to study and analyse the related phenomena, they should be differentiated. Consistent with Mutch's (2010) argument and considering the definition of information in Section 4.3, it can be concluded that the information is influenced by different levels of technological structures (see Figure 4.5). Information (thus the technological infrastructures) also influences the meaning[72] and

[71] Most socio-material studies are based on agential realism foundations (Leonardi, 2013)

[72] The previous chapter defined information and meaning, and differentiated between; the 'message', 'semantic content' and 'meaning of the message'.

perceived quality of information (see Figures 4.4 and 4.9). According to this definition, technology is an independent entity in forming perceptions of IQ.

5.1.1 Semiotic lens in positioning technology and the social world

The concept of information, the meaning generation process and IQ perception are associated with human communication, involving signs, the use of such signs, and human interpretation and the sense-making process (signification) (Beynon-Davies, 2009). Beynon-Davies (2009) argues that the concepts of communication, information and human understanding can be best understood by use of a semiotic lens. Semiotics is the study of a sign system, introduced by De Saussure (1916) and constitutes the underpinning process that leads a sign to have a particular meaning (Beynon and Davis, 2009).

One of the greatest philosophers in the history of semiotics and the founder of the modern theory of signs is Charles Peirce (1839-1914). Peirce developed his branch of semiotics rather independently from Saussurean semiotics. Peirce's theory of signs believes that cognition, thought and even humanity are semiotic in essence, and defines semiosis as the "action of signs" or "the process in which the sign has a cognitive effect on its interpreter" (Noth, 1995, p. 42). Peircian semiotics is based on philosophy of physical sciences. He differentiates between "representamen" (the sign), the object (what representamen refer to) and the interpretant (signification or interpretation created in the mind of interpreter or receiver of the sign and corresponds to responses and reactions). A sign stands for an entity which can be physical, mental, imaginary, or another sign. Peirce developed a taxonomy of sign-object relationships that was briefly introduces in Section 4.3.3 (Oswald & Mick, 2006).

One of the main differences between Peircian and Saussurean semiotics is in their philosophical underpinnings. While Peirce believes in the existence of independent beings as objects in his semiotic triadic, Saussure considers only signs and their interpreter, and leaves out the object of referent of the sign (Mingers and Willcocks, 2014). Accordingly, Saussurean semiotics is aligned with constructivist philosophical assumptions and thus is inconsistent with CR.

Peircian semiotics is a domain of semiosis which is considered consistent with (and complementary to) CR (Bhaskar, 1993; Fairclough, 2004; Nellhaus, 1998). Bhaskar (1993) argues that "the centrepiece of any adequate theory of meaning must be the semiotic triangle." He proposes a semiotic triad that includes the referent (object), signifier (sign) and signified (interpretant) in a communication process. Nellhaus (1998) then argues that Bhaskar's triad can be mapped roughly to Peirce's semiotic triad. Accordingly, Peircian semiotics can be applied in this study to define the meaning generation process in relation to information user (interpretant) and sign (message of communication), admitting the existence of real world referents.

From these positioning statements, first on technology in relation to the social context and second on the important role of semiotics in communication and the meaning generation process, this study will draw on the semiotic framework proposed by Mingers and Willcocks (2014) to position communication media in relation to other entities in Figure 5-1. Mingers and Willcocks's semiotic framework, consistent with Mutch (2010), defines technology as ontologically separate from the social context and also applies Peircian semiotics to define the meaning generation process. Mingers and Willcocks (2014) argue that using semiotics enriches those areas central to the IS field, particularly in regard to emergent new technologies such as virtual worlds and social media.

Mingers and Willcocks's (2014) framework is used in this study to conceptualise the IT artefact (technology) in relation to the social world, positioning the information user in relation to both, and defining the meaning generation process (quality perception) as a semiotic act. Mingers and Willcocks's semiotic framework can be characterised as a CR meta-theory in the IS field, and is developed based on general theories of the communicative act by Habermas (1984; 1987) and semiotic theory by Peirce (Peirce, 1931-1958). It provides an ontological starting point for CR/semiotic research, and can enrich our understanding of IQ by providing underpinning theoretical concepts.

More precisely, Mingers &Willcocks's semiotic framework helps to achieve the following goals in this thesis: (1) to better define entities in an IQ stratified conceptual model (Figure 5.1) relying on Habermasian communication theory and Peircian semiotics; (2) to define the interaction between those entities; and (3) to define IQ perception as a semiotic act.

In order to achieve the above goals, entities defined in the stratified conceptual definition of IQ (Figure 5-1) will be mapped to Mingers and Willcocks's framework.

5.1.2 Mingers & Willcocks's framework

Mingers &Willcocks's framework (Figure 5-3) draws on Habermasian communication theory (1984; 1987) and defines three analytically separable worlds in relation to IS research: the personal world of an individual's beliefs, values, motivations and expectations; the material world of physical structures; and the social and cultural world of norms, practices and roles. The interactions between these three worlds — "sociation", "embodiment" and "socio/materiality" (Mingers & Willcocks, 2014, p. 61)—will be described in more detail in the following sections.

Mingers and Willcocks (2014) positioned semiosis at the centre of three worlds and as the heart of the communication and meaning generation process (Figure 5-3); communication and meaning generation facilitates the interaction of humans with the social and material worlds. Communication is the production, transmission and interpretation of the meaning represented symbolically in signs (primarily, but not exclusively, in the form of language) and is related to the semiotic domain (Mingers & Willcocks, 2014). Therefore, it is not possible to conceptualise the interactions between these three worlds except as mediated through semiosis (Beynon-Davies, 2009; Stamper, 2001) (Figure 5-3). For example, the interaction with information receiver (personal world) and semiosis is called import, and shows that signs have meaning for the information user because of what they represent or refer to and the intention of the communication. The material world also is related to semiosis, since all signs need to have some sort of physical representation and also be transmitted to the recipient through physical media. The social world is linked to semiosis through connotative systems from which signs get their meaning. The degree of these relationships is context-dependent and influences how they interact and generate emergent meanings

Considering the above definitions, the word 'semiosis' in the heart of the framework mostly refers to the signs and the communicated message, and their relationships with the real world, defined based on Peircian semiotic. For example, (Mingers and Willcocks, 2014, p.62) state; "Semiosis relates to the personal world [..] through generation and interpretation of signs and messages", and describes how semiosis "..also relates to the material world in that all signs have to have some form of physical embodiment in order to be signs and they also must be transmitted …". Based on these sentences, one can argue that semiosis in the centre of framework can be replaced by *sign* or *message* without changing the meaning of the statements. Mingers and Willcocks later in another paper (see Mingers and Willcocks, 2015), replaced *Semiosis* in the centre of the three worlds with message/text or communicated content.

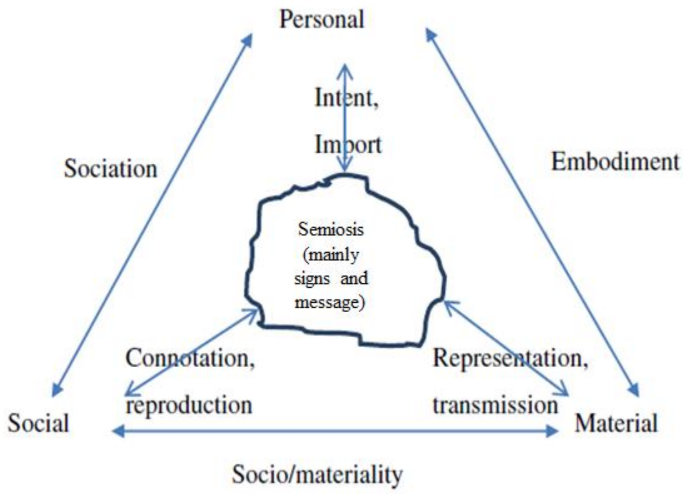

Figure 5-3: Mingers and Willcocks's (2014, 2015) semiotic framework, p. 61

5.1.3 Mapping the stratified conceptual model of IQ to Mingers &Willcocks's framework

Applying Mingers and Willcocks's semiotic framework and related theoretical concepts enriches our understanding of the entities defined in the IQ conceptual model, and helps to position these entities in relation to each other. In the following section, entities (social context, communication medium, information user and communicated message) are defined using theoretical concepts from Mingers and Willcocks's framework and CR principles.

5.1.3.1 Defining and mapping entities

Social Context

The social context or social world in Mingers and Willcocks's framework is consistent with CR principles; society pre-exists the individual. "[P]eople do not create society for it always pre-exists them. Rather [society] is an ensemble of structures, practices and conventions that individuals reproduce or transform" (Bhaskar, 1989, p.76). Mingers and Willcocks's critical realist views define society as "containing structures, practices, conventions realized in the form of 'position-practices' — role position and social practices" (Mingers and Willcock, 2014, p. 63). The social world, according to Habermas's (1984) definition, consists in "a system of norms against which an individual's behaviour can be judged to be in accord or deviate" (Mingers Willcocks 2014, p. 52). Social norms can form agents' (individuals') actions and judgements. By this definition, the context of information use (for example organisations) pre-exists (the individual) as social entities containing structures, norms and arrangements. Individuals within the social context maintain and sustain these structures, but they don't create new ones — they are the result of a collective, generational effort rather than the product of a sole individual's transformative power. This conceptualisation is also consistent with Archer's (1995) morphogenetic approach to conceptualising social structure and agency. In this study, while it is argued that IQ perception is a cognitive and subjective process, it is also held that an individual's reasoning is conditioned and guided by the structures of the social context of information use.

Medium of communication or IT artefact

Medium of communication here is part of the material world as described in Mingers and Willcocks's model. The definition of material world in Mingers and Willcocks's framework has a broader application and doesn't necessarily refer to technology, but technology is the focus of this study as the medium of communication. Data or signs have to be embodied physically in the medium so they can be transferred during the communication process. Stamper et al. (2000) also refers to the material of communication in his semiotic ladder as a physical level which designates the medium in which signs are embodied. With this definition, the communication theory of Shannon and Weaver (1949) can be used to conceptualise the medium of communication and to describe the transmission affordances (Mason, 1978). Representation theory (Wand & Weber, 1995) can be used to conceptualise the structures (deep structure, surface structure and physical structure) of the information system (communication medium) with the purpose of faithfully representing the external world (Weber, 1997).

Information user

According to Mingers and Willcocks's framework, both information user and information producer belong to the personal world. Habermas's critical social theory was situated within the domain of the subjective (or personal) world, which "consists in a totality of subjective states to which individuals have privileged access" (Mingers and Willcocks, 2014, p. 52). The subjective world is different from the other two (material and social) in the sense that researchers have no access to the actual subjective states of an individual.

Communicated message

In Section 4.4, the term data was used to refer to the system of signs which carries semantic content or information (Mingers, 1995). Introducing Peircian semiotics in this section, this study suggests that the term text can be used instead of data to represent the sign system more meaningfully. Text-semiotic studies based on a Peircian foundation started in the 1960s and showed that text can be studied as a sign in Peircian semiotics by its triadic of object and representamen relations, and its interpretant (Noth, 1995). Textual representmen consist in different kinds of signs and is not only limited to language signs and can include different visual or audio signs communicated with different media (Chandler, 2002; Noth, 1995). Text semioticians believe that text is dynamic (grows from icons to symbols and spreads among people)[73] and like signs, can belong to different categories of signs — iconic, indexical and symbolic — in terms of functionality (Johansen, 1986). However, since the goal of this study is to understand IQ perceptions in the use of communication technologies, it is assumed that text belongs to a category of symbols defined by Peirce. By this definition text as set of signs is a carrier of information or semantic content and has connotative relation with the signified. In this thesis, the term text will be used interchangeably with communicated message to represent the semiotic origins of a communication act.

5.1.3.2 Positioning the IQ perception process

After defining entities in the stratified conceptualisation of IQ, the IQ perception process and defined concepts (EQPI, EDQ and QPI) need to be positioned. In the previous chapter, IQ perception was associated with meaning generation as happening through the process of embodied cognition. Embodied cognition (Heidegger, Macquarrie, & Robinson, 2008; Merleau-Ponty & Smith, 1996) consists in denying the Cartesian assumption of a split between mind and body, and assuming the cognition process as an ensemble of sequential, logical activities. Based on this definition, the meaning generation process (IQ perception process), "is largely happening consciously through our body presenting our conscious mind with pre-structured meaning" (Mingers & Willcocks, 2014, P. 60).

Semiosis as defined by Peirce (1933) is the way in which signs are continually interpreted and re-interpreted and is the heart of the meaning generation process (Mingers & Willcocks, 2014)..Peirce (1933) distinguishes between three kinds of interpretation: immediate, dynamic and final. The immediate interpretation consists in simply appreciating the general meaning of the message – something that anyone familiar with language and sign systems is able to do sub-consciously. Dynamic interpretation brings an individual's knowledge and motivation to

[73] Sign's categorisation by Peirce is based on the relationship between signs and objects and consist in *Iconic, Indexical* and *Symbolic.* Iconic is when the relation between sign and the object is their similarity, indexical when sign can be related to the object as an occurrence or result (fire and smoke) and symbolic refers to the category of arbitrary and conventional signs like language.

the process of transforming semantic information into meaning. This stage, as defined by Peirce, is not totally individual but is socially structured. Finally, the last stage (final interpretation) is the information user's actual behaviour based on the information they received, which could be an action, a response or a decision not to do anything (Mingers & Willcocks, 2014). Thus, semiosis describes the meaning generation process and the nature of human cognition as an embodied structure of the body and nervous system (Mingers, 2001b).

Semiosis describes how meaning is generated in people's minds from the outside world (Mingers, 2014). Peirce (1933) describes how thinking is also a semiosis process and a dialogue between different phases of ego. So thinking essentially includes signs and the meaning of the signs. Accordingly, the IQ perception process (as a thinking process) also can be described as a semiosis process or transmission between signs and meaning. In an IQ perception using semiosis, it is assumed that people already have some expectations of the meaning and they need to translate these expectations to signs through semiosis process in order to be able to evaluate quality of a received message. In order to do that the information user needs to go through a sequences of reverse semiotic processes (Ritt, 2007), this time combining meanings (interpretants[74]) and replacing them by signs. Through a reverse semiosis process, information users translate their expectations of meaning to the quality of sign systems (or text) and syntactic criteria (reverse process of immediate interpretation). Through dynamic interpretation, individuals compare what they expected to receive in terms of sign systems — attributes of sign system, structure of text (EDQ) — against what (text) they actually received. During the dynamic interpretation stage, individuals interpret these variations (in the text and sign system) and transform it into an understanding of quality (QPI). Finally, through final interpretation, the perceived quality is represented in the form of a behaviour such as a decision to use or not to use the information (Figure 5-4).

Figure 5-4 represents the development of the stratified conceptual model of IQ (Figure 4.9) using Mingers and Willcocks's framework to define a CR general meta-theory (Cruickshank, 2003) of IQ. The IQ perception process in the user's mind is an event happening in the personal world, that is, in the realm of an individual's cognitive system and thus in the actual domain.[75] IQ perception is a cognitive semiotic process which happens as a result of an individual's interaction with a sign system or text (Figure 5-4). Text gets its meaning from

[74] Interpretant is Peirce's term for the meaning of the sign, or something created in the mind of the interpreter (Noth, 2005, p.43)
[75] The actual domain in relation to the researcher's experience and empirical domain.

social conventions through connotation. Text should have physical embodiment in the media of communication (representation) and also should be transmitted to the information user. Thus, to study IQ, ‘text’ can be positioned at the centre of Mingers and Willcocks’s (2014) framework instead of ‘semiosis’ (according to previous discussions in this chapter and consistent with Mingers and Willcocks (2015)). The developed CR general meta-theory (Figure 5-4) positions IQ perception and the three concepts EQPI, EDQ and QPI as concepts in actual domain and related to the personal world in Mingers and Willcocks’s framework.

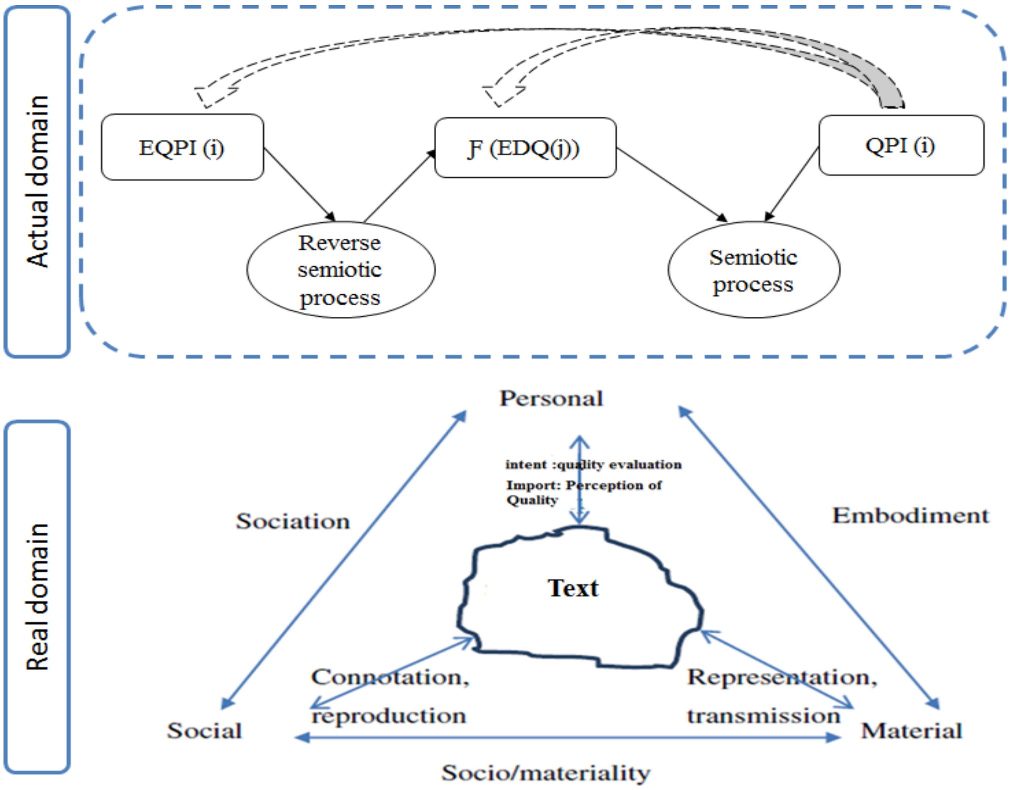

Figure 5-4: CR general meta-theory of IQ

Applying Mingers and Willcocks’s framework to clarify the entities and their interactions in the IQ conceptual model and define quality evaluation in the user’s mind as a semiotic process, in the next section, the research agenda and directions to study IQ within this new conceptualisation will be further developed.

5.1.4 IQ research agenda

Gable (2011), following CR principles, has argued that the development of the research questions would not occur at the initial conceptualisation stage of the research problem, but instead would progressively emerge through the researcher's reflective and iterative engagement with the problem, meta-theory, general theories and domain specific theories.

As evidenced in the earlier chapter of this thesis, the research questions in each chapter has been evolved and revised based on the findings of each chapter. In this chapter, by extending the stratified conceptual model of IQ to a CR general meta-theory of IQ, the research questions in chapter 4, can be further extended.

In Section4.5, two research questions one ontological (RQ1.1) and the other one epistemological/methodological (RQ1.2), were presented based on the proposed stratified conceptual framework (Figure 4-9). In this chapter by identifying the entities in the domain of real the RQ.1 can be revised as below[76]:

RQ1.1. How do entities in the real world (information user, social context, communication media, text) interact with each other, and what mechanisms emerge from these interactions that change IQ related concepts (EQPI, EDQ and QPI)?

One of the main implications of CR for studying IQ is that, despite IQ being a subjective phenomenon, drawing on CR general meta-theory of IQ, an individual's judgment regarding quality of information is influenced by social structures (the context of use and wider context the individual belongs to) and material world. Therefore, this study argues that, IQ, if not completely, at least partially can be explained through the common generative mechanisms existing in different contexts.

According to this conceptualisation, more detailed research questions can be proposed based on CR's main question: "what must reality be like in order to make this event/observation occur?" These questions represent the emergent characteristics of IQ perception.

RQ1.1. A: How can the personal world, through its structures and mechanisms, influence the IQ perception process through changing:

- Expectations of the meaning (EQPI)?
- Expectations of the sign system (EDQ)?
- Perceptions of the quality (QPI)?

[76] Section 1.3, table 1.1 represent the overall evolution of RQs across all chapters.

RQ1.1. B: How can the social world (task, social norms, culture and so on) through its structures and mechanisms, influence:

- Expectations of the meaning (EQPI)?
- Expectations of the sign system (EDQ)?
- Perceptions of the quality (QPI)?

RQ1.1. C: How can the material world, through its structures and mechanisms, influence:

- Expectations of the meaning (EQPI)?
- Expectations of the sign system (EDQ)?
- Perceptions of the quality (QPI)?

These research questions for studying IQ shift the current focus of IQ studies from measurement and the development of measurement tools to understanding why and how and for whom information provides more value. This is consistent with Pawson and Tilley's (1997) definition of Realist evaluation. Realist evaluation is not just inspecting outcomes or judgement of information by users, but analysing the outcomes to discover mechanisms and explanations behind them (Carlsson, 2005).

The above research questions can be comprehensively addressed via extensive future empirical studies (see Appendix A as a hypothetical example). However, to provide the basis to address these questions and explain the possible mechanisms in the IQ evaluation process in the user's mind, in the next sections of chapter 5, this study draws on existing knowledge including general and domain theories to better describe different aspects of a CR general meta-theory of IQ (Figure 5-4).

5.2 ELABORATION OF THE MODEL USING THEORETICAL LENSES

In this section, the CR general meta-theory of IQ (Figure 5-4) will be described in more detail, incorporating different theoretical lenses from different disciplines. According to Danermark et al. (2001), by redescribing the components of the research phenomenon in different theoretical contexts (abduction), original ideas about the research phenomenon will emerge and assist better formulation and scoping of research questions.

Since social reality is complex, it is difficult to identify all variables and their effects; thus multiple theories may be required to describe particular aspects of a social phenomenon. However, in the research process, there is no simple and infallible way to choose theory. Bennett (2013) applies a mechanism-based framework to integrate different theoretical lenses from different disciplines to describe the mechanisms related to the context of political studies. He proposes that this simple but open-ended framework can be used as means of positioning theories from different disciplines in a complementary way to provide better explanations for the phenomenon (Bennett, 2013).[77] The mechanism- based view provides the possibility to integrate different theoretical lenses, considering them as (explanation for) possible generative mechanisms which may or may not work in the context of a study.

Accordingly, this thesis applies a CR general meta-theory of IQ as a mechanism-based framework to integrate and position different theoretical lenses in relation to IQ in a complementary way. This study, consistent with Bhaskar and Danermark (2006) and Gable (2014), argues that an ontological view of the phenomenon based on CR meta-theoretical assumptions can work as an underpinning base for analysing and positioning different theoretical lenses (epistemologies). Accordingly, this study builds a taxonomy of theories which can provide explanations of interactions between structural elements of the developed CR general meta-theory of IQ and IQ perception (Figure 5-4). The resulting taxonomy enables typological theorising about the combination of causal mechanisms and their operation in the context of the study.

Two approaches have been applied to find the theoretical lenses relevant to the developed CR general meta-theory of IQ: first, to describe the interaction between entities and structures, relevant theories introduced by Mingers and Willcocks's (2014) framework and Mingers' (2014) are identified; second, different theoretical lenses applied by current IQ studies have been investigated as well. The latter are theories that can help to describe the interactions between entities and the process of and concepts for understanding IQ. The search process to find relevant theories is based on backward and forward citations from the above sources. IQ studies with theoretical bases are mainly identified by drawing on existing review papers. Theories are then positioned based on the explanation they can provide regarding different entities in a CR general meta-theory of IQ and interactions deemed important in the perception of IQ (Figure 5-4) and to address the research questions above (Section 5.1.4). The developed taxonomy of theories based on a CR general meta-theory of IQ does not exhaust all possible theoretical approaches, but provides a guideline for researchers to know where to look and how to position theories related to the IQ concept and based on proposed CR general meta-theory

[77] The phenomenon of study in Bennett's work is international relations.

of IQ. The case example in Appendix A[78], Table A.2, Column 5, shows that identified theoretical lenses can also be used in the analysis of empirical data to support identification of generative mechanisms and provide explanation for observed results (Column 4). Positioning these theories in Column 5 of Table A.2 does not mean that these theories necessarily are able to explain the findings in Column 4. Theories in Column 5 of the Table A.2 can be investigated in relation to the findings of the study (in Column 4) to be either confirmed or rejected. In the next chapter, these theoretical explanations are integrated with other resources to develop a domain specific meta-theory of IQ.[79]

In the next section, the interactions between entities, individual, social, material and text domains related to IQ perception are explained in relation to three emergent concepts: expectation of the meaning (EQPI); expectation of the sign system (EDQ); and perceived quality (QPI).

5.2.1 Individual information user (personal world)

Quality perception is a micro-level event and is related to an individual's cognitive process. Personal world, in this study, mainly focuses on the information user. Information users bring their knowledge, expertise and intentions to their judgement of IQ.

The IQ evaluation process in users' minds was defined earlier in this chapter as a semiotic process (semiotic and reverse semiotic). This process is not linear but is influenced by the social, material and personal worlds. In order to understand how the personal world and an individual's characteristics influence IQ perception (the research question RQ 1.1.A), this study draws on disciplines and theoretical views which can explain an individual's understanding and meaning generation process. Theories from the psychology discipline in general, and more specifically theories on cognition and decision making, can be used in relation to this section. In IQ studies, the information science discipline is more focused on the individual level, and examples of theoretical lenses (at the individual level) for the study of IQ can be found in this area (Hilligoss & Rieh, 2008; Rieh, 2002).

In order to answer the first research question above (RQ 1.1.A), the theoretical lenses at the individual level should be analysed for how they can explain the concepts related to IQ perception (EQPI, EDQ and QPI). The main theoretical lens in relation to IQ perception

[78] Appendix A is a hypothetical case example that has been introduced in the chapter 1 and is referred to in this chapter and chapter 6 to represent how the guidelines suggested in this thesis can be applied in an empirical IQ study.
[79] Referring to Cruickshank's hierarchy of theories in Section 3.4.2.

introduced below is a general theory of persuasion — the elaboration likelihood model (ELM) (Petty & Brinol, 2010; Petty & Cacioppo, 1986) used by Hilligoss and Rieh (2008) to show the importance of heuristics in credibility assessments. ELM is used in this thesis to explain the general process of IQ perception and also helps to identify other theoretical lenses.

ELM (Petty & Cacioppo, 1986) describes the basic process underlying an effective and persuasive communication.[80] Persuasion means "changing a person's mental states, usually as a precursor to behavioural change" (O'Keefe, 2004, p. 32). This theory is aimed at describing how communication can induce attitude change and defines attitude as a kind of persuasion and a "general evaluation people hold in regards to themselves, other people, objects and situations" (Petty & Cacioppo, 1986, p. 127). The basis of this definition is similar to many of other psychological studies of attitudes (Petty, 2010, Chaiken, 2007)

Accordingly, and following the stratified conceptualisation of IQ outlined in Chapter 4 (Figure 4.9), persuasion and attitudes belong to the actual domain in the CR strata of reality and can be associated with the quality of perceived information (QPI). Thus, regarding persuasion theory QPI can be defined as an attitude that alters users' behaviour and decision making processes to use or not to use information. This behaviour is observable in the empirical domain. In relation to the semiotic process described above (Section 5.1.3.2), dynamic interpretation results in forming attitudes.

According to ELM, people's involvement in evaluation of the communicated message varies on a continuum that goes from the absence of thought (Bettman, Johnson, & Payne, 1986; Langer, Blank, & Chanowitz, 1978) to the complete elaboration of a message. The degree of thoughtful elaboration is dependent on the "person's motivation and ability to evaluate the communication" (Petty & Cacioppo, 1986, p. 129). The theories which assume people generally engage in thoughtful evaluation of a message are located at the high end of this continuum. Examples of these theories are cognitive response theories (Greenwald, 1982), which describe how elaborating, integrating and manipulating information changes users' response to the message that was communicated to them (Appendix A, Table A.2 , Row 16 shows where this theory can be possibly applied in identifying mechanisms in a hypothetical IQ study) . Integration theory (Anderson, 1981) defines two aspects of information as value and weight, and states that information with high value and high weight has a higher chance of being accepted by users as high quality information. On the other side of this continuum stand

[80] It is assumed here that all communication in the context of IQ is supposed to be persuasive.

theories such as the self-perception theory (Bem, 1972), which describes how people may like or dislike an object based on inferences drawn from their behaviour. This means that people might consider information of high quality if they have applied it (or sourced it) in their decision making process in the past. For example in the case example in Appendix A, Table A.2, Row 28, self-perception theory, can provide explanation for IQ perception and supports explanation derived in Column 4. Based on the heuristic model of persuasion (Chaiken, 1980), individuals are more apt to minimise their use of cognitive resources, and are guided by the principle of least effort when processing a message. People may evaluate a message based on their past experience (for example, people agree with people they like). In IQ evaluation, it means that people will deem messages from the sources (information producers) they like as being of higher quality than those from sources they don't know and trust (EDQ). The case example in Appendix A, shows how theory of heuristic model of persuasion can be used as explanation in IQ studies. (See Table A.2, Row19 and 12). An example of this behaviour in IQ studies is mentioned in Wang and Strong (1997). The social judgement theory (Sherif, Sherif, & Nebergall, 1981) argues that people mostly evaluate a message on the basis of their perceived position (ego-level). Messages are contrasted and rejected if they appear discrepant to the position of the recipient of information. Another related theory is self-monitoring theory, which represents the degree to which social context might be taken into account by an individual when evaluating and selecting information (Snyder & DeBono, 1985). High self-monitoring communicators are more likely to apply factors embodied in the social context and subtle norms and task characteristics as the criteria of information evaluation (Sitkin,, , Sutcliffe, & Barrios_Choplin, 1992) (Appendix A, Table 2, Row 31).

In the IQ evaluation process, in the user's mind, both systematic and unconscious processing happen simultaneously (Chen, Duckworth, & Chaiken, 1999). The information user starts from their expectations (mainly influenced by entities and structures in the material and social world) in a thoughtful process; however, their final perception of quality (QPI) is the result of both thoughtful and unconscious evaluations of information. Sitkin et al. (1992) argue that recipients, when reflecting thoughtlessly on the message, may consider form of communication and format of message (EDQ) more than content of the message. Information users might also respond emotionally to information (Rieh, 2002).

The theories introduced above are related to cognitive evaluation of a message and mechanism on the personal level, influencing the final quality perceived (QPI) from the message, and can be used in relation to RQ 1.1.A, to explain the mechanisms active in the empirical situation. Different psychology theories were brought in to describe how the final perception of quality and consequent behaviours might vary according to conscious and un-conscious embodiments of human being. Table 5-1, shows how the theories discussed above (the top row of Table 5-1) are associated with IQ concepts (the first column of Table 5-1); EQPI, EDQ and QPI. Since these theories are focused on individual cognitive process, they are mostly useful to explain the process of IQ perception (EDQ and QPI) rather EQPI in IQ perception process. Expectation of quality are formed mainly through social and contextual factors which will be described in the following sections.

Table 5-1: Theories on individual level in relation to IQ concepts

	Integration theory (Anderson, 1981)	Self-monitoring theory (Snyder, DeBono, 1985)	Heuristic model of persuasion (Chaiken, 1980)	Self-perception theory (Bem, 1972)	Elaboration likelihood model (Petty, Caciappo, 1986)	Social judgement theory (Sheriff and Sheriff, 1967)
EQPI[81]	NA	Task characteristics and social norms	NA	NA	NA	NA
EDQ[82]	Value and weight are defined objectively	NA	Users rely on objective criteria based on their experience	NA	NA	NA
QPI[83]	High quality is defined as high value and high weight	NA	NA	Prior inference or acting on information influence perception	Describes quality perception as both conscious and unconscious	People's perceived position influences their perception

[81] Expected quality of information or in semiotic terms, expected meaning.
[82] Expected data quality, or in semiotic terms expected qualities of sign system.
[83] Perceived quality of information or perceived meaning.

5.2.2 Social world

The social world includes the context (norms, powers and relations) that information is being used and evaluated in, and also the wider social context (economy, history, culture, gender and so on) that an information user belongs to (Layder, 1998). The social context of information use (like organisations) is a system of social norms which influence individual choices and behaviours according to the power and control system (Stamper, et al., 2000), thus also influence information judgement and quality perception. Fulk et al. (1987), relying on the social information theory of (Sitkin et al., 1992) argue that the social environment can affect users' objective rationality through social norms. For example, social norms might define that formal language is not suited for a specific kind of communication.

According to the proposed ontological framework for IQ (Figure 5-4), the social world influences the quality judgement throughout its interaction with the personal world (referred to as social-agent relation, and can be analysed through sociology theories) and also through its interaction with the communicated text. Based on Mingers (2014) and consistent with text semiotics (Chandler, 2002; Noth, 1995), text receives its meaning from social norms and conventions (connotations). IQ related concepts are formed through both of these interactions (RQ 1.1.B in section 5.1.4). These two aspects will now be described relying on existing theoretical lenses.

5.2.2.1 Social world-text interactions

Mingers (2014), in his semiotic framework, defines the interaction between the social world and text, using semiotics and the concept of codes.[84] A sign system or text gets its meaning from the social and cultural context. A code is defined as the system of social and cultural connotations that makes signs and symbols represent meaning (Wittgenstein, et al., 1958). “A code is a set of practices familiar to the user of the medium operating within a broad cultural framework” (Chandler, 2002, p. 148). Codes “structure the relation between signifier and signified and between the units within a syntagm and across a variety types of texts” (Mingers, 2014, p.19). Codes make the communication between sender and receiver of the message possible if they share a similar code structure.

Both expectation of meaning (EQPI) and expectations of the text qualities (EDQ) can be formed based on the existing social codes. Each group of codes and their combinations can

[84] This assumption is true when we study text as a symbolic sign.

alter the criteria that users apply in their judgement of IQ. Code analysis helps to define the expected structure (EDQ) of the received text for the user.

Codes of communication can be studied according to the concepts of genre and discourse (Mingers, 2014).[85] Genre can be considered a kind of code which also gives meaning to the text (Chandler, 2002). A genre describes the combination of content and style of the text which develops in relation to communication form and social activities (Bakhtin, 2010). “A genre is a particular way of acting socially, which means acting together […], there are different genres for consulting, discussing and interviewing” (Fairclough, 2005, p.925). Genre has been a promising concept in defining communication, especially in IS research (Yetim, 2006).

Yates and Orlikowski (1992) use the concept of genre to describe different types of organisational communication. “A genre of organisational communication such as letters, resumes, and announcements is characterised by fixed patterns of communicative action, and structures communication by creating shared expectations of the purpose, content and form of the interaction, thus easing the burden of production and interpretation” (Yetim, 2006, p. 59). It has been suggested that understanding of genre and related concepts fosters contemplation and discussion among all stakeholders, and enables consensus about the preferred features of communication and information systems (Yetim, 2006). Accordingly, genres can represent both expected content and meaning defined as substance (for instance, positive or negative recommendations) and also forms of communication as required fields of data, language, symbols and structure (Yates & Orlikowski, 1992). Yates & Orlikowski (1992), drawing on the notion of social rules (Giddens, 1984), argue that genre rules can determine the appropriate substance and form of a communication act. Thus, understanding the genre of communication can help to define users’ expectations of the information (EQPI) and also their expected attributes of the text and data qualities (EDQ). An example is a business letter written to another organisation: Genre rules specify that the substance consists in delivering a business interaction (EQPI); they also specify the form of the letter in terms of specific format and correct, relatively formal language (EDQ).

Genre also “exists at various levels of abstraction, from very broad to very specific” (Simons, 1978, p. 37). For example, a recommendation letter can be a subgenre of a business

85 “A discourse is a particular way of representing certain parts or aspects of the physical, social or psychological world” (Fairclough, 2005, p. 925).

letter. This classification also helps to apply the genre rule at higher levels to define both the substance and form of the communication in sub-genre categories.

With this definition, IQ judgement in the user's mind is influenced by the rules related to substance and form, defined as the genre of communication. Thus, by identifying types of communication genres within a study's context and their related substances and forms, IQ studies are better equipped to explain IQ related concepts — EQPI (as substance) and EDQ (as form) — in relation to the social context. However, it is important to note that in defining genres there should be a balance between too broadly and too narrowly defined genres, and the normative scope of the genre should be carefully considered (Yates & Orlikowski, 1992).

A social theory that is suitable to develop a typology of genres in communication, based on communicative acts is Habermas's (1984) theory of meaningful communication. This theory proposes a typology of social actions, and has a broad range which enables it to encompass other social theories (Lyytinen & Hirschheim, 1988). This study relies on Habermas to provide more explanation of the genres of communication.

Habermas suggests four kinds of social actions that an agent or actor might engage in in social activities: strategic, communicative, instrumental and discursive. This study, in relation to IQ judgement in the user's mind, focuses on communicative action (Lyytinen & Hirschheim, 1988). IQ perception consists in meaning generation and a sense making process, which are defined as communicative action by Habermas (Habermas, 1984).

Following Habermas, it can be argued that a communicative action might possess the following characteristics; comprehensibility, truthfulness (sincerity), correctness (truth), and appropriateness (rightness). Comprehensibility means understanding the utterance correctly in terms of connotation system; truthfulness is about the sincerity of the speaker (information producer (Lyytinen & Hirschheim, 1988)); correctness is about a faithful presentation of the objective (real) world; and appropriateness occurs when both producer and receiver share the same social norms (Mingers, 1995).

Within the communicative act, different forms of communication are defined (Habermas, 1984) — illocutionary and perlocutionary;[86] each of them may require a different combination of the above characteristics to be considered as valid by communication parties. In IQ studies, validity is associated with the expected quality of meaning or EQPI.

[86]"When users try to convince someone or something they perform a "perlocutionary act", or they may wish to show conventional intentions and thus perform an illocutionary act" (Lyytinen & Hirschheim, 1988, p. 26).

For example, in an organisational context, since the content of the communication is considered pragmatic[87] and rule-based, an illocutionary act is more common. Illocutionary acts have been also categorized to five types (Searle and Vanderveken, 1985); "assertive (to say something that may be true or false); commissive (to commit oneself to do some future action); directive (to pledge someone else to future action); declarative (to declare something to be the case); and expressive (to express psychological attitudes toward something)" (Lyytinen & Hirschheim, 1988, p. 26). Different illocutionary acts have different kinds of validity criteria (Habermas, 1984). More details on different criteria (validity claims) assigned to different communication acts are discussed in Chapter 6. The above discussion shows that depending on the kind of communication act, different kinds of criteria might need to be satisfied for the communicated text to be considered valid. The comprehensibility or clarity of a message is based on understanding the immediate meaning of the communicated text (immediate interpretation as defined by semiosis), so comprehensibility is a validity criteria or EQPI for all kinds of speech of acts (Mingers, 1995).

Habermas's communication theory is the rationale behind the decision to put some quality criteria over others when considering the kind communication act. It should be noted, however, that genre and the conventions of the communication act depend on the medium's features (material world in this study) (Yates and Orlikowski, 1992), and how they shape communication practice.

5.2.2.2 Social world-individual interactions

The 'sociation'[88] relationship is defined as the relation between a structure and action (IQ perception). It has been widely studied in social science literature, and especially in CR (Mingers and Willcocks, 2014). In CR, this aspect has been debated by Bhaskar (1979), Archer (1995; 2006) and Mutch (2010). The main point in CR studies is that "social and individual are conceptualized as two real, independent but mutually interlocking systems" (Mingers & Willcocks, 2014, p.63). While social structures have a realist ontology, they only exist through the agents' activities which they govern (Bhaskar, 1998). This is also called 'sociation' in Mingers and Willcocks's (2014) framework:

> Society is an "ensemble" of structures, practices and conventions realized in the form of "position-practices" — role positions and social practices. It thus pre-exists the

[87] Because "it is caused by a particular person with particular intentions and at a particular time" (Mingers, 1995, p. 296)
[88] This terminology is borrowed from Mingers and Willcocks (2014) and refers social and agent relation and how individuals are socialized and their actions are conditioned by their social positions.

> individuals who occupy these positions and conditions the activities they undertake (Bhaskar, 1998). But, at the same time, society is reproduced or transformed by that individual's activity. (Mingers & Willcocks, 2014, p. 62)

The social world forms intentions and individuals' attitudes and behaviours in relation to use and judgement of information. Sociological theories which can describe the macro-micro interactions or relations between structure and agent can be used to explain this aspect of the model and thus answer research question RQ 1.1.B in Section 5.1.4. Communication studies also suggest that the social world can change people's behaviour and system of meaning. For example, Kling and Gerson (1977) showed that the use of computers is facilitated by a network of supportive social relationships. Hiltz and Turoff (1993) argues that people's understanding of the quality of a system is influenced by the group or subculture that they belong to.

Social information processing theory (Salancik & Pfeffer, 1978) is a communication theory which is rooted in psychology and specific to work environments. One of the premises of this theory is the definition of meaning as a social construct, which embodies the requirement for justifiable behaviour, and constrains an individual's justifications and rationality through social norms and expectations.[89] According to social information processing theory, a social environment can influence individuals' statements of attitudes and needs by providing the construction of meaning, socially acceptable beliefs, needs, and behaviours (Salanick and Pfeffer, 1978).

Accordingly, social context (mainly including people and groups that an individual is influenced by) can influence the IQ perception process through social norms and expectations, by influencing intentions to use information, information needs and even users' interpretations. Thus, this study mainly associates users' expectations of meaning (EQPI) with social norms and expectations. In social information processing theory, the criteria for quality assessment (EDQ) and even perceived quality (QPI) can be altered by social influences.

Social information processing theory holds that features of an environment (including task and technology) are subjective and are not given but constructed socially and individually. Although this assumption is not consistent with CR and Mingers and Willcocks's framework, which posits the existence of social structures independent of human's perception, this theory can still be adapted to identify mechanisms in the immediate social environment influencing the reasoning and behaviour of the individual.

[89] Rationality refers to supporting causes for individual's action (Salancik & Pfeffer, 1978, p. 231).

However, these assumptions and related causal mechanisms should be applied with attention to other possible mechanisms in the context of the empirical study. For example, according to Thomas and Griffin (1983), an individual's experience with tasks and systems reduces the influence of the social environment and other people's judgement in IQ evaluation process.

The case example in Appendix A, shows how social environment influences IQ perceptions. It also shows how social information processing theory (see Table A.2, Row 9 and Row 13) can provide explanations for findings (Column 4) in the context of IQ studies.

5.2.3 Material world

Mingers and Willcocks (2014) define the material world as the medium of communication, whether it be technological or not. All means of communication (such as sound, sight) can be considered as kinds of media or part of the material world. This study, when referring to the material world, mainly refers to a technological medium of communication which gives some sort of physical embodiment to the text and makes it accessible for users (in IS this is predominantly visual or auditory).

In order to answer the third research question (RQ 1.1.C) in Section 5.1.4, the relation between the material world and the IQ perception process can be described in terms of three aspects: the relation between the material world and the individual; the relation between the material world and text; and the relation between the material world, social world and the individual (Figure 5-4). Sitkin et al. (1992, p. 564), consistent with Mingers and Willcocks, define a communication medium "as a conduit through which data and meaning are conveyed or manifested". The term conduit here refers to the communication medium both as a channel and a symbol.

The medium as a symbol in the communication process will be discussed later in this chapter in relation to the social world (Volkoff & Strong, 2013). The medium as a channel will be discussed in relation to text and the personal world, considering its affordances and liabilities. Affordances are what media enable to occur, while liabilities are what they supress or disallow (Mingers, 2014).

5.2.3.1 Material world-text interactions

Signs, in order to be accessible by users, need to have some sort of physical embodiment as well as the ability to be transmitted through some sort of physical medium. The material world (communication media) provides this accessibility through representation and transmission mechanisms (Mingers and Willcocks, 2014). The medium affects the message and the content (and thus an individual's perception of quality) through representation and transmission mechanisms (McLuhan, 1994). These mechanisms are the result of a communication medium's affordances and liabilities.

Transferring a message, as the affordance of the medium, has been the topic of many studies on media and communication which have focused on the effectiveness and efficiency of the transmission process. According to Belkin (1975), transmission is the ability of a medium to "transmit bits of data as bundles of physical characters or images" (Sitkin et al., 1992, p. 566). This understanding of media is also related to Shannon and Weaver's communication theory (1949), which is mainly concerned with how accurately a sign can be transmitted, and is focused on technical problems throughout the communication process. Mason (1978), relying on communication theory, developed a framework for IQ that considers information as a physical product and defines quality criteria related to the communication process.

Regarding representation mechanisms, representation theory is a useful lens within IS. Representation theory is a native IS theory (Burton-Jones & Grange, 2012). The main assumption of this theory is that "IS is a representation of real-world systems as perceived by users" (Wang and Wand, 1996 p. 88). According to this theory, people use the system at different levels to interact with its representation. Other structures (underlying technologies) are the means to the end (representation). In representation theory, it is desirable to have a representation that faithfully represents some domains. For example, an inventory management system can only be helpful in making purchasing decisions when it is able to provide accurate representation of what is stored in the physical warehouse (Burton-Jones and Grange, 2012).

From the perspective of representation theory, the purpose of all systems (for example communication technologies used within organisations) is to represent some aspects of the world to the users. The unique aspect of this theory is to focus on faithful representation and associate it to the design of the system and sign system (token used) (Burton-Jones & Grange, 2012). In relation to the design of the system, Weber (1997) introduced three structures: deep structure is about the specific domain represented by the information system, such as definitions related to different fields of an inventory system in a data base; surface structure includes interface and facilities users' interactions with representations such as the design of a website, menu reports and layouts; and physical structure includes devices such as keyboard, monitors, storage and networks (Weber, 1997). In representation theory, any IQ problem is related to the failure of any of these structures to represent the external world.

In IQ studies, Wang and Wand (1996, P.91) defined IQ problems based on deviations from representation theory. "A real-world system is said to be properly represented if: (1) there is exhaustive mapping from the lawful state of real world ($RW_{L)}$ domain to the lawful state of the information system ($IS_{L);}$ (2) no two states in RW_L are mapped into the same state in IS_L" Accordingly, Wand and Wang (1996) hypothesised sets of criteria as EQPI, representing the design and technology related aspects of the system.

IQ studies in IS and computer science (CS) are mainly developed based on the assumptions of representation theory. These studies can provide explanation of material aspects of CR general meta-theory of IQ, and are focused on improving the quality of perception through improving transmission, storage and representation. However, the material world should be studied in relation to the personal and social world and other active mechanisms in the context of the study.

A medium can also facilitate the use of different representation forms which eventually contribute to change in the meaning of the communicated text (QPI), (Sitkin et al., 1992), or how users evaluate text in terms of quality (Batini et al., 2014). New technologies provide the possibility of different representation forms such as multi-media, and also they provide access to new kinds of sign systems in communication. An example of this could be the use of emoticons or different features embedded in new social technologies. Bertin (1983) in his major work, Semiology of Graphics, compares iconic representations with graphic representations in terms of ambiguity. The same concept presented with different symbols could be perceived differently in terms of quality by users. Analysing how different media provide access to different forms of presentation and how they alter the perceived meaning and perception of quality is important in designing systems and improving perceived quality for users. The case example in Appendix A provides an example of how the form of text provided by wikis can change quality perception (Table A.2, Row 4).

Media choice theories focusing on the characteristics of media can also be used to explain the interactions between material and text. For example, Daft and Langel's

(1986) media richness theory (or information richness theory)[90], explains how, based on some affordances of media in representation such as supporting multi-media and form of language, communication can be perceived as less or more rich. Richer communication means that it can promote and clarify individual understanding within a time frame.

The case example in Appendix A (Table A.2 Rows 2 to 7,) shows how the above introduced theories can be applied in studying IQ; in coding the collected data (specifying inquiries in data collection), in analysing research results and also in providing explanations. This example also shows how the explanation provided by these theories (representation and communication theories) needs to be revised considering other theories and existing mechanisms in the context of the study. For example in this case representation theory can explain the criteria for EQPI (preciseness and completeness, being relative) but this theory is insufficient to explain the source of IQ problems. In this case information users (students) consistent with representation theory, assume role of the wikis as being representative of the real world (their courses contents and their assignments). However, the intention of designing wikis at the university context is to encourage collaboration in knowledge production. Thus the main source of IQ problem in this case is related to inconsistent perceptions of the role of the system in use.

5.2.3.2 Material world-individual interactions

The relation between the material world and the individual is defined as embodiment by Mingers and Willcocks mainly based on the works of Dourish (2004) and (O'Neill, 2008).

> Between the personal and the material worlds we have a relation of embodiment. This occurs in two ways — the first is embodied cognition which is to do with the physical human body and the manner in which this inextricably links thought and action…. The second concerns technology, taken very broadly, and the ways in which it both enables and constrains human action. (2014, p. 63),

The first part of this definition of how human action is linked to human cognition underlines how the information user is involved in both the virtual and real worlds. For example, in studying IQ in an organisational context, this can be interpreted as how an individual's role (for example their organisational position) and personality are represented

[90] Richness of information is defined by Daft and Lengel (1986, p. 560) as "the ability of information to change understanding within a time interval."

within the system: what is an individual's role in the information production and control process? What are their permissions? (Schultze & Orlikowski, 2010). The second part of the above definition describes how media, through affordances and liabilities, can enable or constrain human action in the use or production of information. For example, how do information users interact with the system? How do they navigate and find information?

The latter concern can also be related to the embodiment relationship between mind and body. For example, when talking about computer systems, everyone would assume that desktop/laptop computers require an individual to sit at a desk and dedicate their full attention to interacting with the system; however the development of new devices and technologies has changed the way that both body and mind interact with the system (as in touch technologies and how they have changed both physical and cognition interaction), therefore altering the amount and kind of cognitive effort in processing information (O'Neill, 2008). Grudin (1990) describes the history of human interactions with computers from being directly focused on machines to mobile technologies and other recent devices, able to incorporate users' lives and social settings. An example could be the differences in the interaction of users with word processing systems and how it has changed with current mobile devices.

Accordingly, in studying IQ, different kinds of users' interactions with communication media can alter the cognitive process and thus IQ perception. Further research questions that can be asked by IQ researchers are: How does the evolution in interaction with the system influence users' expectations of the meaning? Or how does it merely affect the actual measurable criteria and final perceptions?

However, rather than 'embodiment', an individual's interactions with the communication media can be related to their experience, knowledge and past attitudes and behaviour. Prior experiences of the system can alter the expected meaning and expected message/text qualities and evaluation criteria. This experience can be formed individually, or more generally, socially, within a social sub-culture or group (Fulk et al., 1987).

The case example in Appendix A, Table A.2, Rows 14 to 19 provides implications and examples of the interactions between media of communication and individuals in the study of IQ. The main theoretical lens that explains some of the mechanisms involved in interactions between the personal and material worlds and IQ perception is information processing theory. There is a lack of theoretical approaches to this aspect of the proposed model.

Many aspects of the interactions between individuals and the material world, such as users' understanding of media or the symbolic meaning of the media, although important in the relations between the material and the individual, are formed in a social context and will be elaborated in the next section by describing the interaction between material and social worlds.

5.2.3.3 Material world-social world interactions

Socio-material interaction has been a recent focus of research in IS studies. Mingers and Willcocks (2014), using CR principles, conceptualise the social and material worlds as independent but mutually interactive and shaping entities. This position is different from the common definition of socio-materiality in literature, which is mostly influenced by Orlikowski (2000, 2007) and Leonardi and Barely (2008). In relation to IQ perception and the meaning generation process, this study focuses only on how perceptions of the media are formed within a social context as part of socio-material interactions. Consistent with the previous section, a social understanding of media through sociation alters an individual's judgement of the perceived information.

A medium can be the representation of nonverbal, tacit codes embedded in the social context's (organisational) culture and thus can be considered as a symbol in communication itself (Eisenberg & Riley, 1988; Sitkin et al., 1992). Media can change the meaning of the text regardless of the text. When a medium gets to the state of being a symbol, even the use of that medium can represent some kind of meaning or expectation of the meaning (Peters, 1978). This means that the meaning (quality) of the message received by the users can be changed by the media they have been using. The symbolic meaning of media is understood by individuals within a social context through sociation interaction.

Symbolic meaning of a media can have different aspects; Sitkin et al. (1992) mention power, competence and productivity in an organisational context (Feldman & March, 1981). An example could be using innovative technologies and platforms, which in some contexts could be perceived as innovative and effective and in some other contexts may be perceived as a redundant system. The case example in Appendix A shows that using wikis is perceived by some staff at university as redundant.

One of the epistemological assumptions associated with the symbolic meaning of media resides in the unique nature of communication; the value and the meaning contained within the medium are context-dependent and can vary depending on the different situations in which they occur. Whereas the physical capacity and attributes of the medium is invariant across different situations, the different contextual settings can change the symbolic meaning of the medium (Sitkin et al., 1992). Although this is an interpretivist approach, this thesis, consistent with CR assumptions, believes that common symbolic meaning exists across a number of contexts and interpretations of the meaning can be institutionalised across different contexts (Sitkin, et al., 1992). For example, a new technology (as characteristic of the material world) can be considered innovative in some contexts, and more futuristic in other contextual cultures. In the case example in Appendix A, staff members with a generally lower level of interaction with technology (contextual factor) were more inclined to perceive wikis as redundant (symbolic meaning). Symbolic meanings of media can be also defined beyond one organisational context (immediate context) and in the wider social context. An example of this could be how media such as Facebook or Twitter have found their symbolic meaning within different socio-cultural contexts.

In relation to IQ, the symbolic meaning of the media primarily affects expectations of the quality of text/message communicated by that media. For example, Strong et al. (1997) studied three systems within three different organisations. They showed how users' expectations vary from a system defined as a "service bureau" compared to the systems with more central roles in the organisations. A typology of symbolic meanings of different kinds of media across different contexts can help to explain some mechanisms in the expectations and perceptions of IQ.

5.2.4 Taxonomy of the theories

This section reviews different theoretical lenses in relation to the proposed IQ model (Figure 5-4). These theories, with different or even conflicting ontological assumptions, can work together in a complementary way and within CR general meta-theory of IQ to explain possible mechanisms working in relation to different aspects of IQ phenomena. Theories about mechanisms generate researchers' expectations of what should happen in the empirical results if the proposed mechanisms are activated in the context of the study and empirical instrument (observation, survey, interviews and so on) and research mechanisms operate in the assumed manner (Bennett, 2013).

This taxonomy, consistent with stage 3 in Danermark et al.'s (2001) explanatory methodology, draws on abduction as the logic of analysis and the assumption that a research phenomenon can be better understood if it is explained by new sets of ideas and theories. The sets of theoretical lenses introduced in the above sections provide a better understanding of the

IQ phenomenon and can also be used in the analysis of empirical data to form or support possible hypotheses about existing generative mechanisms. Table A.2 in Appendix A column 5 shows theoretical lenses which can explain the mechanisms in each row. Overall, the hypothetical case in Appendix A and Table A.2 show that different theoretical lenses should be applied, synthesised and integrated in order to understand IQ perception from the information user's point of view.

The explanations that this section (section 5.2) provides could never be inclusive, since there are always unknown, disconnected or in-accessible mechanisms, especially when the research phenomenon (IQ) involves human judgement. The resulting theoretical space is diverse, complex and incomplete, but it introduces a manageable number of theories about mechanisms (Bennett, 2013) for studying IQ based on the proposed CR general meta-theory. Table 5-2 represents the developed taxonomy of theories discussed in the above sections. Theories are positioned in relation to a CR general meta-theory of IQ (Figure 5-4) and based on their explanatory powers in relation to IQ related concepts (EQPI, EDQ and QPI).

The first row in Table 5-2 shows the three main entities in the IQ model (and related proposed research questions in Section 5.1.4); the second row specifies the interactions between entities in the IQ perception process: (1) the personal world influences IQ perception through an individual's cognitive process; (2) the social world influences IQ perception through interaction with the personal world and (3) interaction with text; (4) the material world influences IQ perception through interaction with the personal world, (5) text, and (6) social world. The first column in the table presents the concepts defined in relation to IQ perception (EQPI, EDQ and QPI); for example, social information processing theory (SIPT*)* can be used to explain the interaction of the social and personal worlds and how this interaction can form expectations of quality (EQPI) or influence the perception of quality (QPI). The taxonomy proposed here is not complete, and a more comprehensive study of appropriate theoretical lenses is required to complete this table. For example, in relation to cell 5-2, this study does not identify any theoretical lenses. Although this reflects the limitation of the search strategy in this study, it also points to lack or scarcity of theoretical lenses in relation to cell 5-2[91].

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[91] Cell 3-3 and cell 6-3 are empty because of the nature of defined interactions in the IQ concept. For example, social world-text interaction can influence expectations of quality (cell 3-1) and expectations of sign systems (cell 3-2) but it does not by nature explain users' cognition processes or behaviour in relation to perception of quality (cell 3-3).

Table 5-2: Taxonomy of theories based on their explanatory power in relation to the IQ related concepts

	Personal (RQ1.1.A)	Social (RQ 1.1.B)		Material (RQ 1.1.C)		
	(1): Cognitive process	(2): To personal world	(3): To text	(4): To personal world	(5): To text	(6): To social world
(1): EQPI (expected quality of information or meaning)	Self-monitoring theory (Snyder & DeBono, 1985)	Social information processing theory (SIPT) (Salanick and Pfeffer, 1978)	Habermas's theory Structuration theory (Gidden, 1984), (Yetim, 2006)	Media choice based on SIPT (Salanick and Pfeffer, 1978)	Representation theory, media choice theory (Daft and Lengal, 1986)	Symbolic meaning of media
(2): EDQ (expected quality of sign system)	Heuristic model of persuasion (Chaiken, 1980) prominence interpretation theory (Fogg, 2003)	SIPT	Structuration theory (Gidden, 1984), (Yetim, (2006)	SIPT (Salanick and Pfeffer, 1978)		Symbolic meaning of media
(3): QPI (Quality of perceived information or meaning)	Self-perception theory (Bem, 1972) Elaboration likelihood model (Petty & Caciappo, 1986) social judgement theory (Sheriff and Sherif, 1967) prominence interpretation theory (Fogg, 2003) integration theory (Anderson, 1981)	SIPT		SIPT (Salanick and Pfeffer, 1978) embodiment related theories	Communication theory (Shannon and Weaver, 1949) semiology of graphics (Bertin, 1983)	

This taxonomy serves the following goals in the research process:

1) Researchers can narrow down their research scope and research questions by drilling down in any box in the taxonomy to refine or create theories about mechanisms that can be activated.

2) Provides a checklist for researchers to make sure that they have considered different and alternative explanations in the formation of IQ related concepts.

3) Researchers can re-define the scope or conditional factors of any of the theories in the table in relation to IQ and define conditions under which the defined mechanisms are stronger or weaker.

4) Researchers can use this taxonomy of theories to develop "typological theories"[92] on how interaction between different mechanisms can shape specific perceptions of IQ for specified situations and populations.

However, not all the above theories have similar explanatory power in relation to the context of the study. For example, representation theory might be able to provide explanation for some contexts but not others. In the case example in Appendix A, users (students) expect the system (wikis) to satisfy the goals of representation theory (exhaustive and precise representation of the real world) but the intended goal of designing wikis was more about facilitating collaboration in knowledge production. This conflict between the real intention of the system and users' expectations can lead to low perceptions of IQ. This example shows that the above theories should be used carefully in relation to the all existing mechanisms.

5.3 CONCLUSION

In order to better theorise the concept of IQ and in the movement from meta-theoretical assumptions of CR toward empirical studies, this chapter focuses on developing a CR general theory of IQ (consistent with Cruickshank's level of theorising described in Section 3.4.2).

Following stage 3 of Danermark et al.'s (2001) methodology, different theoretical lenses are applied to re-contextualise IQ as the research phenomenon (Section 3.4.3.3). In order to do that, firstly a semiotic framework proposed by Mingers and Willcocks (2014) is applied to better explain the entities involved in the formation of IQ, with specific attention to positioning the IT artefact in relation to social and personal worlds. This allows the articulation of new research questions regarding the study of IQ. Then a variety of general and domain specific theories were applied to address the research questions proposed in Section 5.1.4, and to provide some possible explanations in relation to IQ phenomena. This produced a taxonomy of theories in relation to the proposed CR general meta-theory of IQ.

[92] Typological theories are domain specific theories which identify contingent generalisation on how and under what conditions different mechanisms can be enacted and produce different research outcomes (Bennett, 2013).

Chapter 6: **Middle Range Theorising [Developing Domain Specific Meta-Theory (DSMT)]**

The abstract definition of IQ as a stratified conceptual model (developed in Chapter 4) and CR general meta-theory of IQ (developed in Chapter 5) together constitute a valuable tool in the research process. They provide insights about entities and structures in the domain of real and events in the domain of actual which otherwise is not accessible through observations in domain of empirical. However, the value of these abstract definitions is only fully realised through the study of concrete phenomenon in the domain of empirical (Danermark et al., 2001). Thus, it is important for researchers to be aware of the relation between abstract and concrete phenomena. A concrete study based on CR principles should adhere to CR meta-theoretical assumptions and also to the CR ontology of the research phenomenon. The ontological understanding of the phenomenon helps to better establish the scope and design of the empirical study and also helps with the selection of methods that better represent the phenomenon in the empirical domain. Accordingly, this chapter focusing on the domain empirical in the proposed IQ framework, aims to achieve this goal and answer the second main research question of this thesis — "how to study IQ as a research concept?" and proposes guidelines for the application of a CR general meta-theory of IQ and abstract definitions for studying IQ empirically.

In Danermark et al.'s (2001) methodology, stages 4, 5 and 6 can be associated with the empirical phase of a study (Gable, 2011). Stages 4 (retroduction) and 5 (comparison) suggest how researchers should analyse empirical data to identify explanations (mechanisms) in the context of the study (see Section 3.4.3). According to Danermark et al.'s methodology and consistent with CR principles, research on the empirical level is informed by abstract concepts both in designing the overall approach of the study and also in analysis of the empirical data. However, Danermark et al.'s methodology does not specify how the empirical phase of research should be designed based on abstract concepts. This chapter aims to address this gap and defines the links between a CR general meta-theory of IQ and empirical data, and suggest guidelines for conducting stages 4, 5 and 6 of the Danermark methodology in the context of empirical IQ studies (Figure 6-1).

As discussed in Chapter 3, CR as a philosophy for science does not provide directives on the empirical or concrete levels of research (Bhaskar, 2013; Lawson, 2006). CR meta-theories work as under-labourer in the research process and guide researchers in their methodological choices (Cruickshank, 2003; Smith, 2008). Cruickshank (2003) introduced a hierarchy of realist theories. In this hierarchy, meta-theoretical assumptions are on the highest level, and the ontological definition of the phenomenon is on the next level of abstraction (Section 3.4.2). To be able to research a phenomenon in the empirical domain and develop domain specific theories, the link between abstract and empirical can be made by domain specific meta-theories. Domain specific meta-theories were defined earlier in this thesis as under labourers for empirical studies; they guide researchers in choice of the methods and in analysing empirical data to develop theories related to the empirical domain. In this study, Chapters 4 and 5 were focused on developing a CR based general meta-theory or ontological principles of IQ. This chapter focuses on developing a domain specific meta-theory that guides the study of IQ on the empirical level (Figure 6-1).

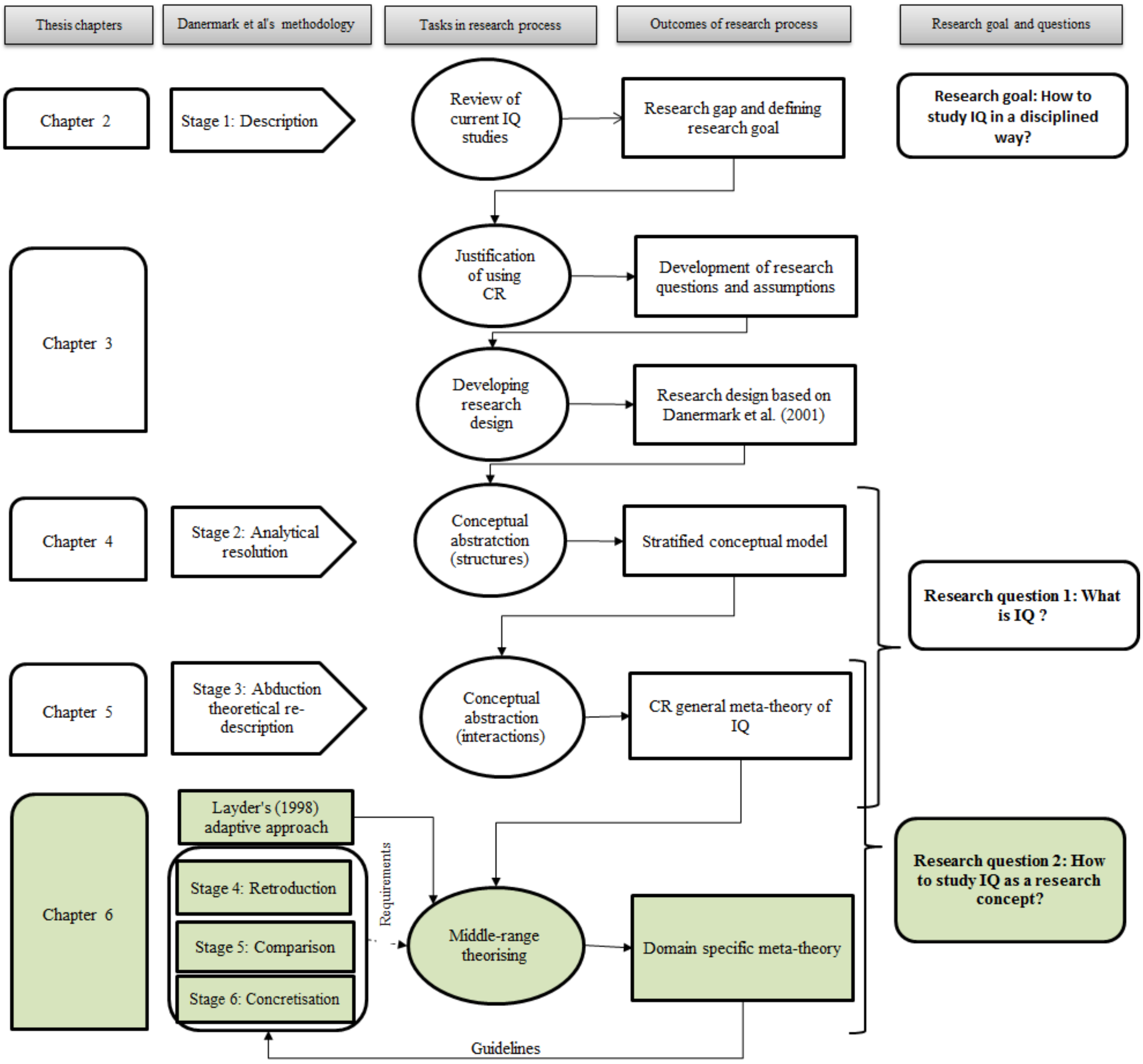

Figure 6-1: Research Design Overview

The domain specific meta-theory (DSMT) developed in this chapter aims mainly to fashion a stronger alignment between general theories and empirical approaches in IQ studies (across disciplines but with a focus on improving IQ studies in the IS discipline) and also provides an analytical guideline to assist researchers in retroductive analysis[93] (Section 3.2.5.2) of empirical data. The proposed DSMT defines the links between abstract concepts and empirical data and also supports the process of analysis of empirical data in stages 4 and 5 of Danermark et al.'s (2001) guidelines by facilitating the retroduction process and the identification of generative mechanisms (Figure 6.1). The DSMT specifies the kind of data required to study IQ and also proposes a provisional coding system. Different data collection

[93] Using retroduction as the logic of analysis.

methods and data analysis could be used within this framework if they are able to provide the required data.

To develop DSMT, this study follows Layder's (1998) approach in developing an adaptive theory, arguing that adaptive theory by Layder's definition is at the mid-range level of theorising and can be considered a domain specific meta-theory in Cruickshank's hierarchy of theories. Adaptive theory as a domain specific meta-theory aims to link the general theories and ontological assumptions to the study of phenomena in the empirical domain.

In the first part of this chapter, the approach of this study in developing DSMT based on Layder's (1998) approach will be described, and in the second part (from Section 6.3) the developed DSMT of IQ and its implications in the research process will be discussed in detail. To better depict the implications of the proposed framework in IQ studies, a case example of studying IQ is introduced in Appendix A and is referred to in different sections of this chapter. The case example is about how IQ is perceived by students using wikis in a university context and how their perceptions are influenced by different contextual factors. The proposed DSMT is then applied to this hypothetical case to form the research design and as an analytical framework. It is recommended that readers first read the explanation of case example before reading Section 6.2 in this chapter.

6.1 FROM CR GENERAL META-THEORY OF IQ TO DSMT OF IQ

To develop a domain specific-meta theory, Cruickshank (2003) suggested that researchers should engage with current literature on the domain of the study as well as with meta-theoretical assumptions. However, Cruickshank's approach does not provide guidelines on what the general elements of a DSMT are, or how it can be applied to the empirical studies in the field.

Accordingly, this study draws on Layder's (1998) approach to adaptive theory, and adapts it to develop DSMT from a CR general meta-theory of IQ. Adaptive theory is defined by Layder (1998) as a middle-range[94] theory that links ontological and abstract definitions to empirical data. This study argues that adaptive theory (Layder, 1998) can be positioned as a DSMT in Cruickshank's hierarchy (Figure 3.2).

[94] The notion of middle range for adaptive theory differs from the one applied by Merton (1967) as it is open-ended and more inclusive of grand theories on the abstract level. In this chapter the term middle-range theorising is applied consistent with Layder (1998).

Layder's adaptive theory is specifically an approach designed to integrate theory with the research process. In order to do that, adaptive theory avoids adhering to either inductive (grounded theory approaches) or deductive (Merton's (1967) modes of inference. It tries to combine them by avoiding rigid, dogmatic definitions of these logics and approaching them as open discourses[95]. Thus, the adaptive theory approach in applying theories corresponds with retroduction as the mode of inference presupposed by CR[96] (Bhaskar, 1986) and provides a practical approach in relation to stage 4 of Danermark et al.'s (2001) methodology (Carlsson, 2009).

The adaptive approach is also based on the inextricably bounded nature of the ontological and epistemological assumptions in the research process. The ontological bases of the adaptive approach are in line with CR principles and Bhaskar's (1998) notion of ontology for social life (Carlsson, 2003, 2009; Danermark et al., 2001; Gable, 2011) and can be used to guide theorising in empirical studies based on CR. Accordingly, adaptive theory, consistent with Bhaskar (1998), Archer (1995), and Mingers and Willcocks (2014) assumes an ontologically separated but mutually interlocking relation between systemic elements of society and agency. "Adaptive theory also represents a methodological approach which takes into account the layered and textured nature of social reality (its ontological depth)"[97] (Layder, 1998, p. 27) consistent with Bhaskar's (1998) notion of 'stratification' and 'laminated system'. The adaptive approach also calls for an epistemological basis that can represent both the subjective and objective nature of social life and thus rests on neither a positivist nor an interpretivist approach to research (Layder, 1998). In this respect, adaptive theory provides an avenue for upholding the critical realist promise of facilitating an empirically validated, two-way passage between meta-theory, domain-specific and specific theories by grounding theory in data (Cruickshank, 2003).

Layder's Adaptive theory combines the use of existing theories with theory generated from data analysis. Theories such as Gidden's (1984) structuration theory or Archer's (1995)

[95] In Section 3.4.2 and also 2.4.2 both inductive and deductive approaches in applying theories in research process were described and it was explained that both approaches have some deficiencies regarding using theories in the research process.
[96] Section 3.4.3.4 describes in more details how adaptive theory approach is consistent with retroduction in the logic of analysis.
[97] It should be noted that ontological depth defined by Layder (1998) refers to the concept of laminated systems in Bhaskar's ontology. It is not similar to ontological depth in the CR definition

morphogenesis theory are general theories[98] which are concerned with general aspects of social reality. These theories can be applied in the research process but researchers need to avoid a deterministic approach and be sceptical about their potential applicability (Layder, 1998). Adaptive theory provides the approach and principles in application of general theories such as Gidden's and Archer's in the research process, avoiding both strong deductive or inductive logics of inference.

This study relies on adaptive theory, identifies the elements of it and adapts Layder's approach in developing and defining these elements to build a DSMT of IQ. Since adaptive theory is a sociological theory, the approach and definitions had to be modified in relation to both CR general meta-theory of IQ and the IQ domain. Thus adaptive theory is first reviewed and modified in relation to CR general meta-theory of IQ and meta-theoretical assumptions (Section 6.3.1) then, current studies in IQ, IS and other related fields have been synthesised to revise the terms and elements of adaptive theory in relation to the IQ domain (Section 6.3.2).

6.2 ELEMENTS OF ADAPTIVE THEORY

Layder in 1998 developed the adaptive theory to guide social science researchers in designing their research approaches. Adaptive theory works as a domain specific meta-theory in Cruickshank's hierarchy and facilitates social science studies, drawing on a multi-level ontology of the social world (Layder, 1993) and the assumption of an ontological separation of structure and agency.

Adaptive theory, in terms of an immediate focus on the empirical world, can be qualified as 'middle-range' and is primarily focused on undogmatic and flexible theory development (domain specific theories) and elaboration rather than theory testing (Carlsson, 2003).

Adaptive theory as proposed by Layder (1998) consists of the following elements which make the link between theoretical concepts and social science studies:

- Concepts
- Clustering of concepts (as a coding system)
- Typologies

[98] According to Layder (1998), 'general theory' refers to social theories "which have broad explanatory remit" (Layder, 1998, p.14). He considers works of Habermas, Parson, Foucault and Giddens, as reflections of general theories in social science.

Theoretical lenses and abstract concepts provide the basis for developing the above elements as analytical tools in the research process.

6.2.1 Concepts

Concepts are the basic building blocks of adaptive theory (or domain specific meta-theory in this thesis). Concepts provide "general abstract definitions which groups objects or social phenomena together in terms of a combination of aspects" (Layder, 1998, p. 159). Concepts, according to Layder (1998), can be borrowed from a body of existing theories, can be generated from empirical data, or can be synthesized by researchers to help in the analytical process. The kinds of concepts introduced by Layder (1998) include orienting, core, satellite, behavioural, systemic, bridging and so on[99]. Layder (1998) introduces orienting concepts as the first step toward developing the conceptual clusters and identifying other research concepts. Orienting concepts are concepts that have been borrowed from the existing body of general theories or from empirical and substantive areas of research. Orienting concepts (consist in 'core' and 'satellite codes' in a hierarchical form) are most useful as a provisional means of ordering data (Lewins, 2001) and suggesting forms of explanation for the data. Such concepts also suggest lines of empirical enquiry by outlining specific research objectives or different ways of inquiry including method and area of investigation.

In using orienting concepts in the analysis or coding of empirical data, the first step is to identify the extent to which a particular concept can point to or indicate particular aspects of empirical data and vice versa. Theoretical concepts represent unobservable entities or mechanisms happening in the real or actual worlds (Layder 1998, Danermark et al., 2001). Therefore, researchers need to find out what may be the logical representation of these entities in the empirical world. Knowing that empirical data is a valid representation of theoretical concepts and defining the link between them accurately is essential for production of well-executed research. This link between theoretical concepts and empirical data is what Layder (1998) introduces as concept-indicator links.

According to Layder, understanding the nature of concept-indicator links means that one has a firmer grasp of the relation between theoretical ideas and empirical data; this

[99] Layder (1998) has not clearly differentiated between orienting concepts, core concepts and satellite concepts. But he refers to core and satellite concepts as 'codes' in his book, which means they are closer to empirical data than orienting concepts. Both core and satellite codes can be part of orienting concepts (can be borrowed from exiting body of literature) in coding process. In this study concepts at the high level are considered as 'core concepts' (behavioural, systemic and bridging in Figure 6.2) and satellite concepts are in lower levels of hierarchy.

understanding helps to define the research process itself and how someone can acquire knowledge about theoretical concepts. Layder defines three different kinds of concept-indicator links as behavioural, systemic and bridging or mediating concepts.

Layder defines *behavioural concepts* as aspects of an individual's behaviour, inclinations and attitudes which include some references to their identity and the meaning of the relationships they are involved in. *Systemic concepts* in Layder's definition refer to social structures belonging to the real world. These concepts are not static, but they are beyond the reach and influence of individual actors. They are mostly observer (researcher)-defined rather than participant-defined. The validity of these concepts is defined as their capacity to explain and analyse the structures of reality (objective adequacy); examples include institutions, language, culture, social norms and so on. They are the result of a collective, generational effort rather than the product of a sole individual's transformative power (Layder, 1998). *Bridging concepts* are introduced to represent the interactions between structure and agency or combined effects of behavioural and systemic concepts.

6.2.2 Conceptual clusters (coding system)

Layder defines conceptual clusters as "networks or frameworks that represent the grouping of concepts together into a wider configuration" (Layder, 1998, p. 159). Conceptual clusters refers to how different concepts can be grouped together according to the theoretical views they represent. Conceptual clustering shows how the empirical data can be related to higher theoretical views through networks of concepts. Conceptual clusters help the researcher in the analytical process by providing a coding system and associating empirical data to theoretical concepts.

Conceptual clusters provide the basis of a coding system. Coding is the main element of data analysis that this study focuses on and is of primary significance for both qualitative and quantitative research methods. It is meant as a choice of categories or symbols used to summarise the meaning and implications of data. Coding traditionally means applying labels to particular extracts from a data set in order to be able to identify these extracts as descriptive categories. However, the question of which system of coding should be used in research practice is always an important concern for a researcher.

Layder suggests using general theories in the research process as an orientation to empirical data rather than as a rigid interpretative scheme that sorts empirical data into certain categories. According to Layder's approach towards coding data as an open-ended provisional approach, data analysis starts with a theoretically informed, structured pattern of coding, which differentiates it from an open coding approach applied by grounded theory (GT). However, even applying a provisional coding system, researchers should be open to discover new codes through the analytical process.

The provisional coding process starts from theoretical concepts or orienting concepts as core and satellite codes (conceptual clusters). Using theoretical concepts as the starting point in the coding process helps to identify structural concepts that cannot be derived from people's perceptions and meanings.

This study develops a conceptual cluster as a provisional coding system in order to facilitate the move from a CR general theory of IQ to empirical research. The value of this conceptual cluster or coding system resides in how it fills the gaps between high-level theories and empirical studies in the domain of information quality.

6.2.3 Typologies

Typologies and typology development have been introduced by Layder (1998) as one of the strategies in theory generation that rely on current theories and empirical data. Typology is defined by Layder as a classification of types of social phenomena as they fall within a particular category. Typologies are very useful tools to fire the theoretical imagination. Typologies force researchers to ask questions about underlying structures of empirical data. Typologies provide the basis for comparative analysis of why some phenomenon is the same as or different to others. In CR terms, typologies facilitate the discovery of generative mechanisms. Typologies facilitate comparative analysis and provide access to mechanisms (Pawson and Tilley, 1997). Considering typology as the means of access to choices, this study argues that typologies of structure provide the basis for disciplined diversity in IQ conceptualisation by helping to discover a common mechanism in IQ studies in different contexts. In this study, an initial typology of contextual structures and their interactions is developed as part (as a result) of the coding system and based on the synthesis of existing current studies on IQ.

6.3 DEVELOPING DOMAIN SPEICIFC META-THEORY (DMST) FOR STUDYING IQ

Following Layder's (1998) approach in this section, the proposed DSMT in this study also needs to include concepts, the clustering of concepts, and typologies. In order to develop conceptual clusters and define other related research concepts in this thesis, Layder's (1998) approach to developing adaptive theory is first reviewed and modified in relation to a CR general theory of IQ and meta-theoretical assumptions. Then, relying on the developed conceptual clustering as a coding system, current studies are synthesised to develop a typology of contextual structures in studying IQ.

6.3.1 Mapping adaptive theory elements to a CR general meta-theory of IQ

Orienting concepts derived from existing theoretical lenses were introduced in the previous section as the starting point for building conceptual clusters. Thus, in order to build a DSMT of IQ, this study first defines the orienting concepts. Based on Cruickshank's (2003) hierarchy of theories, orienting concepts on this level are derived from a CR general meta-theory of IQ, forming core and satellite codes for analysing empirical data in the study of IQ.

To build a DSMT for studying IQ and in order to move toward empirical research from theoretical concepts, this study adapts Layder's (1998) definitions of concept-indicator links to define the representation of theoretical concepts in empirical data. However, understanding the nature of the link between theoretical abstract concepts and empirical data is a challenging and important task for researchers in the interpretation and analysis process (Layder, 1998). Since adaptive theory as defined by Layder (1998) represents the multi-level ontological and theoretical assumptions of the social world (Layder, 1993), the definition of concept indicator links should be adapted with attention to differences between the ontological foundation of Layder's approach and the CR general meta-theory of IQ proposed in this study. However, it is the similarities between the philosophical assumptions of adaptive theory and CR that make this adaptation possible in the first place.

The concept indicator links in Layder's adaptive theory are in line with his proposed research map (Table 6-1). Layder (1993) proposed a multi-level ontological framework (called a research map) consisting of self, situated activities, setting, and context which shares the underpinning assumptions of the laminated system defined by Bhaskar and Danermark (2006).

Table 6-1: Research map (adapted from Layder (1993, p. 72)

Research element	**Research focus**
Context	Macro social organization such as genders, national culture, values, traditions, forms of social and economic organizations and power relations

Setting	Intermediate social organization and activity, like department, teams, social clubs
Situated activity	Social activity, face to face activity involving symbolic communication, meaning, understanding (affected by both context and setting and subjective disposition of self below
Self	Self-identity and individual social experience, influenced by above and also interacting with unique psychobiography of individual

The research map proposed by Layder can be considered to be at the level of general theory in Cruickshank's hierarchy, which leads to the construction of adaptive theory or domain-specific meta-theory in Cruickshank's hierarchy of theories (Section 3.4.2). Different levels in Layder's research map are now described, and then, based on the ontological differences between the CR general theory of IQ and the research map proposed by Layder, concept indicator definitions are revisited and then applied to building a domain specific meta-theory of IQ.

The first level in Layder's layered view of social activities is the 'self', can be characterised by the biographical experiences within social situations" (Carlsson, 2003). In dealing with social situations, individuals use their own mental models or their own 'theories' which are formed through their biographical experience. The type of concept indicator links associated with 'self' are *behavioural concepts*. According to the CR general meta-theory of IQ in Chapter 5, the personal world is defined as one of the entities in the quality evaluation process (Section 5.1.3). The concept of 'self', defined by Layder (1993) can be used to describe some aspects of the personal world which represent the importance of personal reasoning and characteristics in perceptions of IQ. Behavioural concepts (Layder, 1998) can be applied as concept indictor links to represent the personal world in IQ general theory.

The next level in Layder's ontological model is 'situated activity', which focuses on the nature of social involvements and interactions and refers to the dynamic of face to face interactions. For example, in studying the use of enterprise information systems, use of the system can be defined as an example of a situated activity (Carlsson, 2003). Situated activity is defined as the individuals' meaning and understanding affected by the context and settings of the study (Layder, 1993). Thus, In IQ CR general meta-theory, situated activity can be associated with IQ perception (as form of a meaning) in the individual's mind. In adaptive theory, concept indicator links which represent situated activity in the empirical domain are also defined as part of behavioural concepts. Consequently, in this thesis, the three defined concepts — EQPI, EDQ and QPI — are representation of situated activities as behavioural concepts.

'Setting' refers to the immediate environment of social activity, for example organisational culture and norms, teams within the organisation and so on. The concept indicator links that can represent setting are defined as *systemic concepts* in adaptive theory. In IQ general theory, the setting and immediate environment of IQ evaluation is part of the social world. Thus, systemic concepts in relation to setting can be used as concept indicator links to represent the social world in IQ general meta-theory.

Finally, Layder (1993) defines 'context' as the more remote environment of social activity which refers to large scale social features. Although 'setting' and 'context' are entangled and there is not a clear border between them, their separation can also be fruitful in research (Carlsson, 2005). Adaptive theory does not differentiate between 'setting' and 'context', and uses the systemic concept to define concept indicator links for both. The CR general meta-theory of IQ in this study also does not differentiate between 'context' and 'setting', and refers to both of them as the social world. 'Context' in IQ general meta-theory is important in relation to text and also in forming 'self' or individual characteristics. In the CR general meta-theory of IQ (Figure 5.4), sociation interaction is more related to interactions between the immediate environment or setting with individual or personal world.

The above application of Layder's research map provides more details and a lower level of abstraction for entities and the social and personal world in the CR general meta-theory of IQ. However, Layder's (1993) research map (and thus adaptive theory) does not include IT artefacts or the material world defined in the CR general meta-theory of IQ. Since the systemic concepts defined by Layder are objective and observer independent, this study refers to concept indicator links for the material world as *systemic material concepts* to differentiate them from systemic social concepts. To define systemic material concepts and the relevant concept indicator links, this study relies on theories and empirical studies in the field of information systems and across different disciplines in the field of IQ (more details in Sections 6.3.2.4, 6.3.2.6 and 6.3.2.7). The importance of the material world in IQ general meta-theory is defined by the interaction of material world with text, personal world and social world; thus concept indicator links for material concepts also need to represent these interactions.

Adaptive theory also argues that when studying a phenomenon at the micro level or in the personal world, the importance of systemic concepts (both material and social) relies on their interweaving with the personal world or behavioural concepts. For example, the importance of macro-level social context in studying IQ should be investigated in relation to IQ perceptions in the user's mind. According to CR general theory of IQ (Chapter 5), the social world influences IQ perceptions through interaction with text (for example, language and connotation system) and personal world (individual's identity). In this study, the latter is referred to as a bridging concept and the former is used to define systemic social concepts (Figure 6-2).

To represent a combined focus on both behavioural and systemic concepts, adaptive theory introduces *bridging or mediating concepts*. In the following sections, this thesis extends and modifies Layder's definition of bridging concepts to include the interactions between the material world with the social and personal worlds (Mingers and Willcocks, 2014). Bridging concepts influence an individual's reasoning in their quality evaluation process and provide a useful analytical approach to studying interrelated entities in IQ general meta-theory.

The above discussion shows how Layder's stratified research map and adaptive theory, as a middle range theory, can be utilised to develop a domain specific meta-theory to study IQ based on the CR general meta-theory developed in chapter 5. This thesis argues that such a middle-range theorising by defining the links between theoretical concepts and empirical data could facilitate empirical studies in the IQ field.

Figure 6-2 summarises the above discussions and shows the conceptual clustering, or high level coding system, that results from the re-working of adaptive theory in this thesis. This figure shows how the CR general meta-theory of IQ (Figure 5.4) can be defined in terms of concepts and concept indicator links.

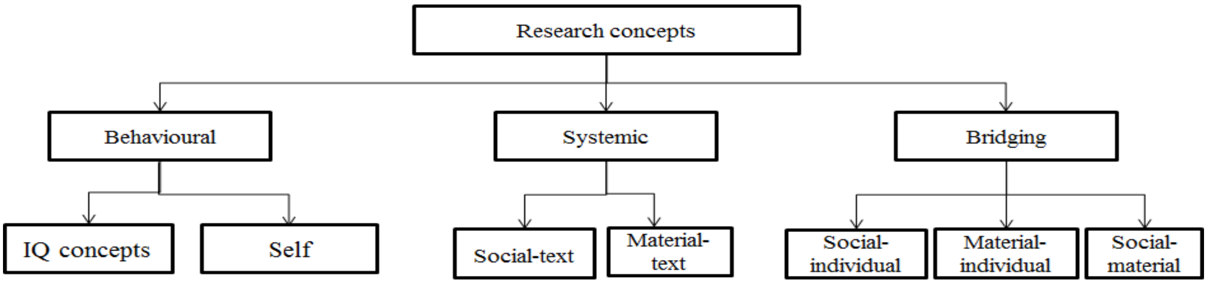

Figure 6-2: Conceptual clustering or initial proposed coding system[100]

Accordingly, in the upcoming sections, the proposed conceptual clustering in Figure 6.2 is used as a coding system to synthesise current IQ studies. A typology of concepts is then developed by defining the concept indicator links.

6.3.2 Defining concept-indicator links in the IQ domain

To define concept indictor links for concepts in Figure 6-2, this thesis relies on: Layder's definitions; on theoretical lenses introduced in Chapter 5; and on empirical studies in IQ and other related domains. Defining these links, the developed typology of contextual structures can be used as a provisional coding system for conducting empirical IQ studies.

To define the links between concepts in Figure 6.2 and the IQ domain, consistent with the work of Cruickshank (2003) and Smith (2008), this study first relies on a synthesis of current IQ studies. The main goal in synthesising the literature is to find concrete examples of theoretical definitions in the current IQ studies, and to then position these studies in relation to the CR general meta-theory of IQ.

This section does not follow a systematic approach to the review of existing studies (Chalmers, 2004). Instead, this thesis draws on arguments (Boell & Cezec-Kecmanovic, 2011; Greenhalgh & Peacock, 2005), that a systematic literature review is only appropriate for closed research questions. In relation to the IQ model proposed in this study and the conceptual cluster developed above, varieties of papers from different research disciplines are required. The analysis process for each paper included developing a deep understanding of authors' explicit and implicit assumptions, their methodologies and findings, and then linking these to related aspects of the CR general meta-theory of IQ. Accordingly, a conventional systematic literature review is not able to satisfy these requirements. The approach to selection and analysis of the papers which suit the goals of this study is now explained briefly.

[100] As it was explained earlier (see Section 6.3.1) IQ perception and the three related concepts (EQPI, EDQ and QPI) can be mapped to *situated activities* in Layder's research map.

Existing IQ studies were reviewed to begin instantiating a CR general meta-theory of IQ, and to identifying related concepts in concrete situations. Details of paper selection are explained in Chapter 3. However, this first stage of the literature review showed that IQ studies could not provide insights to all aspects of the proposed model and required concepts. Therefore, I had to consider other fields of research, better able to provide understandings of different aspects of the CR general meta-theory of IQ. The areas of research investigated in relation to different aspects of the model were:

- In relation to the personal world and individual characteristics of IQ perception, IQ studies in the field of information science were reviewed. Based on a forward backward citation approach, these studies led to the disciplines of psychology and decision making research fields.
- In relation to the social world and its interaction with the personal world, studies related to social information processing theories (Sitkin et al., 1992) were investigated.
- In relation to the social world's interaction with text (the systemic concept), the study engaged with social theories of language and communication, such as genre and discourse studies, to identify how these concepts could be applied to studying IQ at an empirical level.
- In relation to the material world's interaction with text, both information system studies and computer science studies were reviewed. IQ studies can provide examples of different kinds of interactions on this level. However, only a few studies focus on the specific capabilities of communication media in relation to users' perceptions of IQ.
- The embodied interaction between the material and personal worlds was one the most difficult aspects of the model to be contextualised in relation to IQ. Few studies exist to explain this kind of interaction and how it changes an individual's cognitive understanding. It was also difficult to provide a classification of different kinds of embodiment due to the varieties of existing technologies and limited resources on this topic.
- Finally, to understand the relation between the material and social world, this study relied on information processing theories (Sitkin et al., 1992) and socio-material studies (Orlikowski & Iacono, 2001) to identify examples of the

interactions between the medium of communication and the social world influencing information judgement and IQ perception at the individual level.

The analysis of selected papers was done in different stages and each stage informed new directions in paper selection and analysis. The findings are presented and discussed according to the three core concepts in Figure 6.2; behavioural, systemic and bridging concepts.

Behavioural concepts are related to individual's attitudes and their identity. These group of concepts have been investigated in two distinctive categories (Layder, 1993); behavioural concepts related to 'situated activities' as the quality of meaning perceived by the individual (QPI), and behavioural concepts related to 'self' as predispositions or attitudes related to an individual's identity.

According to the CR general meta-theory of IQ as explained in Chapter 5 and Layder's (1998) framework, systemic concepts refer to social and material structures which belong to the real world, and are beyond the reach and influences of individuals. Social and material structures are described on the basis of their interactions with text in the quality perception process and in the proposed CR general meta-theory in Chapter 5. According to the proposed conceptual clustering (Figure 6.2), both of these structures are represented as systemic concepts.

Bridging concepts represent the interactions and combined effects between behavioural and systemic concepts. They are introduced in three categories of what they represent and include:

- The interaction between the social world and the individual;
- The interaction between the material world and the individual; and
- The interaction between the material and social worlds.

For each of them, typification or indicators in the empirical world are defined as well.

The final outcome is a typology of research concepts and their concept indicator links which represent a domain specific meta-theory for studying IQ in empirical studies. Since information system research and relevant studies have been the focus of this study, in the following sections, when referring to 'context' and related aspects of it, mostly it implies organisational environment. However, in most cases these terms can be used in other contexts with a few modifications. To better show the application of the proposed domain-specific meta-theory, all concepts and categories are shown in a case example in Appendix A. This case example represents a hypothetical application of the suggested framework to the study of IQ in a particular context. In the following sections, where required, the reader is referred to the example in the Appendix A.

6.3.2.1 Behavioural concepts: Situated activities as events

IQ perception is a meaning generation process that happens at a micro-level, or in the personal world. According to the stratified conceptualisation of IQ in Chapter 4 (Figure 4.8), meaning generated in the information users' mind is an event happening in the actual domain. IQ perception and the related phenomena of EQPI, EDQ, and QPI[101] were identified as belonging to the category of situated activities in Layder's (1993) research map, and also can be represented in the empirical domain by behavioural concepts (Figure 6.2).

The three defined concepts in relation to IQ perception of EQPI, EDQ and QPI can also be defined as attitudes, according to Petty and Cacioppo (1986), Eagly and Chaiken (2007) and Petty and Brinol (2010) as discussed in Section 5.2.1. Researchers do not have access to attitudes unless they can be presented under any kind of observable users' behaviours in the empirical domain (such as any observable decisions or their answers to interview or survey questions).

These concepts, like any other attitudes, need to be translated to a form of behaviour in the research context (concept indicator link). The empirical indicators of behavioural concepts are aimed to illuminate the subjective worlds of people participating in the study (Layder, 1998). Prior IQ studies can provide us with some examples of empirical indicators in relation to IQ concepts and the context of the study, and how researchers have used different methods to observe and collect data about these concepts. For example, surveys (Wand & Wang, 1996), interviews (Strong et al., 1997), and focus groups (Price & Shanks, 2005) or a combination of them, or even mere observations of the behaviours of study subjects (Rieh & Belkin, 2000).

EQPI or expected quality of meaning in the semiotic process of IQ perception is transferred to users' expectations of received text or message (EDQ) (Section 4.4). Thus, expectation of meaning (EQPI) is not directly observable through users' behaviour, but researchers can collect data that represent this concept through survey methods and interviews. For example, some studies in IQ have applied survey methods asking users to prioritise expected criteria of IQ (Wang and Strong, 1996). In most cases, expectations of meanings are

[101] Expected Quality of perceived information (EQPI), Expected Data Qualities (EDQ), Quality of Perceived Information (QPI)

represented in the form of quality dimensions of information stated by users in an interview (Rieh, 2002; Strong, et al., 1997), or rating values assigned to attributes by users in a survey (Wang & Strong, 1996; Zhu, Bernhard, & Gurevych, 2009).

Expected qualities of text or EDQ are real world attributes that users may associate with a text in relation to some aspects of EQPI. EDQ attributes are directly observable as users' behaviour in applying these criteria to the text. Survey methods have been used by researchers to derive EDQ criteria that users might apply in assessing information (Wang and Strong, 1996). Some studies such as Rieh & Belkin (2000) and Rieh (2002) have applied observation and thinking aloud methods (verbal protocol) to derive users' criteria related to representation attributes of the message.

Defining IQ perception as a semiotic process, it was argued that through dynamic interpretation of the received message, users perceive the quality of information (QPI), then through final interpretation they translate this perception to some behaviour in the context of concrete research. Thus, the final interpretation stage where users make decisions or state their ideas about the received information is associated with the concept indicator links for QPI. This is consistent with Rieh (2002), who refers to perceived quality of information as a judgment of information and makes it observable by linking it to users' choice-making behaviour. Accordingly, researchers can have access to this concept (QPI) by asking users about their perception of IQ or asking about their decisions to act or not upon received messages (Rieh, 2002). These empirical results can be presented in terms of numeric values or descriptive criteria or users' decisions to act upon perceived information.

In the case example in Appendix A, in relation to EQPI, users have been asked about their information needs from the wiki system. Data that reflects their needs and their intended use of the system is categorised as EQPI in Table A.1 Row 1, Column 2. Data related to their assessment process method and the criteria which they apply to the provided content are categorised as EDQ. In relation to QPI, their use of the system and reliance on the provided information is one of the indicators of their perceived quality. Table 6-2 presents the concept indicator links for the situated activities or IQ related concepts in an empirical situation. The first column in the table refers to the CR general meta-theory of IQ developed in Chapter 5, and positions IQ perception as an event in the actual domain relating to CR stratification (see Figure 5.4). The second column refers to the concepts defined in relation to IQ perception on the personal level (Figure 5.4). The third column refers to definitions of concept-indicator links related to behavioural concepts adapted from adaptive theory (Layder, 1998) and Layder's

(1993) research map.[102] Finally, the fourth column represents the related concept indicator links for EQPI, EDQ and QPI synthesised from current IQ studies.

Table 6-2: Concept-indicator links for situated activities

(1) CR general meta-theory of IQ (stratification)	(2) CR general meta-theory of IQ (IQ perception)	(3) Layder's (1993, 1998) framework	(4) Indicators in concrete studies
Events in the 'actual domain'	Expectation of meaning (EQPI)	Behavioural concepts/situated activity	Rating values of quality attributes in survey, interview
	Expectations of signs system and assessment of real world attributes of the text.		Verbal description of assessment process (thinking aloud methods), interview or survey results, observations of behaviour
	Perceived quality		Choice making behaviour, interview, survey

6.3.2.2 Behavioural concepts: Self and identity

This section proceeds to investigate the influence of the personal world on IQ perception. According to Figure 6-2, the personal world ('Self' according to Layder, 1993), and individual characteristics which are formed through the wider historical and social context, influence cognitive process, reasoning and IQ perception as entities in the real domain (Chapter 4, Figure 4.9). Layder (1998) states that behavioural concepts represent concept-indicator links for this category of variables.

Some aspects constitutive of an individual's behaviour, such as attitudes towards the system (formed through interaction with the social world), or experience with the system (formed through interactions with the material world), will be addressed in the upcoming sections. This section is focused on Layder's definition of 'self'. Relying on Layder's (1988) definition, Gable (2011, p.143) redefines the following indicators for behavioural concepts associated with 'self':

[102] The mapping of the first two columns of Table 6-2 to the third column has been discussed in earlier sections of this chapter.

a) What do people expect?

b) What do they do?

c) Who are they?

In relation to category (a) above, people's expertise and knowledge of the content of a communicated message (Sitkin et al., 1992), their familiarity with the content of the message (Chaiken, 1980), and their motivation to evaluate information (Petty & Cacioppo, 1986) and other possible individual characteristics (that might emerge from the context of a study) can change expectations.

In relation to category (b), past behaviour regarding the use of information (Bem, 1972) can influence a user's evaluation of IQ. Category (c) represents an individual's characteristics (such as gender, culture, age) related to their identity, and formed through a larger social context. Different theories can be used to score individual characteristics related to context. For example, individuals with a higher degree of self-monitoring (Snyder & DeBono, 1985) tend to apply more subtle criteria to evaluate information.

Another important aspect of individual behaviour, lies in their degree of familiarity with an organisation's culture and compliance to existing social norms (Sitkin et al., 1992). Sitkin et al. (1992) also mention other varieties of individual characteristics such as education level, physical ability (which is related to embodiment between individual and media), expertise in relation to the content of the message, interaction history with the communicator (mentioned in the social level) and knowledge of the communication context. It should be noted that the proposed indicators and factors do not cover all possibilities of self-representation in IQ studies, but provide a starting point for the investigation of possible mechanisms at the personal level.

In the case example in Appendix A, Table A.2 rows 26 to 31 represent 'self' characteristics in the context of studying wikis at a university. For example, students' intentions in relation to finding course materials easily and to improve their grades have been coded as their motivations in evaluating the content of wiki. Column 4 of Table A.2 shows that this motivation forms their expectation that the IQ will present the course's materials more accurately.

Table 6-3 represents the concept indicator links for personal world (self) in studying IQ, as discussed above. The first column refers to the CR general meta-theory of IQ and the personal world introduced in Chapter 5. The second column refers to the definitions of concept indicator links for behavioural concepts and ‘self’, in Layder’s (1998) adaptive theory and research map (Layder, 1993). The third column refers to Gable’s (2011) operationalisation of Layder’s concept of ’self’, adapted here by combining it with the synthesis of IQ and other relevant studies to define concept indicator links related to the IQ domain (Column (4).

Table 6-3: Concept-indictor links (typology) for personal world, 'self' and identity

(1) CR General meta-theory of IQ	(2) Layder's framework (1998, 1993)	(3) Gable (2011)	(4) concept indicator links in IQ domain	(5) Reference
Real domain structures (personal world)	Self and Identity	What do I expect?	Expertise about the content	Sitkin et al, 1992)
			Past experience with the source of information	(Chaiken, 1980)
			Motivation in evaluation	(Petty & Cacioppo, 1986)
		What do I do?	Past behaviour regarding using information	(Bem, 1972)
		Who I am?	Educational level	(Sitkin et al., 1992)
			Familiarity with the social context culture?/social group	(Sitkin et al., 1992)
			Self-monitoring degree	(Snyder & DeBono, 1985)

6.3.2.3 Systemic social concepts

In this section, Layder's (1998) definitions and conceptualisation of the social structures as systemic concepts are adapted to define concept indicator links for the social world in the domain specific meta-theory of IQ. Layder's (1998) ontological definition of the social world, consistent with CR and the IQ framework presented in this study, poses an objective and observer-dependent view of these systemic concepts. To identify systemic social concepts in relation to studying IQ and applying the CR general theory of IQ in Chapter 5, this study analyses the role of social structures in relation to text or the communicated message.

Referring to Chapter 5, Mingers & Wilcock's (2014) framework suggested that any interaction between the social world and text is based on social norms and connotative systems developed from these norms. It was also explained that the act of communicating is based on the concept of genre and discourse, and that users' expectations of the meaning and sign system can be specified according to the genre of communication. Accordingly, if researchers are able to develop a typology of different kinds of genres, then they should be in a position to explain or predict users' expectations from both meaning (EQPI) and the sign system (EDQ).

In the previous chapter (Section 5.2.2.1), a typology of the most common communication acts in the domain of IS was introduced, based on Habermas's theory (1984). This typology has been used by Lyytinen and Hirschheim (1988) to specify quality criteria that people might expect when receiving a messages. Table 6.4 shows examples and representations from the concrete world of types of communication with related expected criteria. This table shows how different kinds of messages can represent different speech acts, and how the related expectation of meaning (EQPI) could be different based on this classification.

The assertive communicative act[103] is mostly considered together with the truthfulness of the propositional content of the message. In IS studies, database theories focus on this type of validity criteria by providing various measurement methods (EDQs) and technologies such as data monitoring and cleansing (Wang & Madnick, 1990). In the case of assertive action, there could also be conscious misrepresentation, meaning that the sincerity of a message (EQPI) also needs to be assessed by considering credibility of the sender (EDQ in this example).

[103] Types of communication act where introduced in Section 5.2.2.1

Table 6-4: Habermas' types of speech and their concrete representation (Lyytinen & Hirschheim, 1988, p. 27)

Type of communicative act	Basic definition of the content	Example in concrete world	Criteria of expected meaning (EQPI)
Assertive	Tell how the world is by presenting a proposition representing actual or possible	The cost of product x is y	1-Truth (propositional content) 2- Sincerity
Commissive	Commit the speaker to do something represented by the propositional content	"We shall fulfil your order Z in two weeks"	1-Sincerity 2-appropriateness of commitment
Directive	The message is to make the receiver do some task by committing him/her to a certain course of action represented by propositional content	"order X in quantity Y"	1-appropriateness 2-sincerity 3- truth of the propositional content
Declarative	To change the world by producing a state of affairs, represented by propositional content	"we classify you as a credit customer"	1-Appropriate 2-Truth of the propositional content
Expressive	Express propositional attitudes about state of affairs represented or presupposed by the propositional content	We express our gratitude that you have not exceeded the budget limit on item X"	1-sincerity of utterance 2-truth of the propositional

With regard to an expressive communicative act, sincerity is the first criterion that needs to be assessed. In the context of routine and institutionalised communication (such as in organisational contexts), the need for this communication act is less important, but in the context of communication within social networking technologies, as more related to expressive communicative acts, sincerity and truthfulness as criteria of expected meaning could be considered. In these contexts sincerity and truthfulness of content can be assessed based on the ranking of the content provided by users of the website (EDQ for truthfulness) or the credibility of the content provider (EDQ for sincerity).

In regards to commissive and directive communicative acts, the appropriateness (EQPI) of the message to the social norms should be considered. That is, norms represented by the message should be appropriate and consistent with the norms of context (EDQ). Sincerity is also an important criteria for the validity of these two acts of communication.

Genre analysis can be used to classify types of communication act based on their forms and substances (Section 5.2.2.1). Genre could be more specific than communication acts, and a means of structuring acts of communication (Yetim, 2006). Accordingly, researchers willing to better explain or predict users' expectations of both EQPI and EDQ need to develop some kind of typology of genres as well. The concept of genre has been used by Stvilia, Twidale, Smith, and Gasser (2008) studying IQ in Wikipedia. Emigh and Herring (2005) have shown that differences in genre between two community-based encyclopaedias make users apply different criteria regarding IQ judgement (Bizzell, 1992). The genre of communication evolves over time in interaction between the social context and the individual, and the emergence of new media can introduce new forms of genre as well (for example (Herring, Scheidt, Bonus, & Wright, 2004) who developed a classification of genres on blogs.

According to proposed IQ general meta-theory in Chapter 5, it is important that researchers analyse genre and type of communication in relation to the other aspects of the model not in isolation. In the case example in Appendix A, the genre of communication is educational. Educational content is more relevant to the assertive communication act in Table 6-4, thus the content is expected to satisfy the criteria of truthfulness and sincerity as EQPI. In relation to the form of message (EDQ), using formal language is expected and the data collected from students in Appendix A confirms the above expectations. However, using wikis as a collaboration platform makes changes in traditional educational content and the genre (sub-genre) of communication. Wikis in this example are supposed to foster collaboration and knowledge development between students but not be the primary source of content (Warschauer & Grimes, 2007). Students are not supposed to rely on the wiki's content as the main source for their assignments. This example shows how inconsistency between the intended genre of the communication act and users' expected genre of communication can contribute to the perception of low quality information (Bizzell, 1992).

The review of literature showed that there is no simple classification of genre of communication that can be related to IQ studies in the context of organisations.

6.3.2.4 Systemic material concepts

It was mentioned earlier in this chapter that this study deviates from Layder’s (1998) adaptive theory by considering the material world or media of communication to be one of the structures of the real world. This is also consistent with the approaches of other researchers like Mutch (2010) and Carlsson (2003) who extended Bhaskar and Archer's (1995) CR assumptions to include information systems.

The CR general meta-theory of IQ proposed in Chapter 5 demonstrates that the material world influences the quality perception process through direct interaction with the individual (embodiment) as well as through interaction with the text. In this section, systemic material concepts are identified based on their interaction with text in the context of IQ perception.

The main roles of the material world or medium of communication defined by (Mingers & Willcocks, 2014) is to represent and transmit text in the communication process. In Chapter 5 (Section 5.2.3.1), drawing on representation theory (Wand & Weber, 1995) and communication theories (Shannon & Weaver, 1949), it was described how differences or varieties in a medium’s affordances in relation to representation and transmission can influence the perceived quality of information. Systemic concepts at this level are thus related to features or capabilities of the communication medium in relation to representing and transmitting a message. Identifying concept indicator links for the material concepts also means developing a typology of material affordances (both representation and transmission) in relation to IQ perception. For example, Wang and Wand (1996, p. 91), relying on representation theory, defined two affordances for information systems in relation to representation of the message: 1) “exhaustive mapping from real world to information system,” and 2) “no two states of real world can be presented to the same state in information system.” Then they associated the IQ perception of completeness and the perception of un-ambiguousness to these two affordances respectively.

Based on the communication theory of Shannon and Weaver (1949), three kinds of capabilities can be identified in relation to communication of the message: the capacity of the channel (bits per second); number of concurrent messages that can effectively communicated within the medium; and types of symbols which the medium allows for presentation of the message (Dennis, Fuller, & Valacich, 2008).

However, these affordances cannot be applied in all contexts and do not explain IQ perception in all situations. For example, in Appendix A, the low perception of quality of the wiki's content can be explained in relation to the social context rather than the representation and transmission affordances of the media (Table A.2, Rows 2-7).

The medium of communication can facilitate and restrict the format of presentation as well. As a result, the format of presentation of the message can influence the quality that should be explored. Batini et al. (2014) have explored how IQ criteria are different for different formats of presentation of the message. They have characterised different presentations according to different visual perceptual characteristics such as structured text (relational databases), unstructured text (natural language, images, maps, videos) and semi-structured text (laws, medical records, webserver logs and search patterns, some kinds of meta-data). They have showed how the quality criteria such as correctness and accuracy (EQPI) can have different measures (EDQ) in different forms of representation. For example, in structured text, accuracy is measured by scheme accuracy; whereas in unstructured text, accuracy is measured by the syntactic criteria of the text (for example syntactic language criteria), the semantic criteria and reference of the text, and structural similarities in the text or semantic comparison of the text with other resources. For unstructured text, Batini et al. (2014) proposed coherence as one of the expected quality criteria (EQPI) that represents how the communicated text is linked to language and existing knowledge: "coherence is defined as the result of interaction between text cohesion and reader" (Batini et al., 2014, p. 61). Cohesion, as an EDQ is defined as a real world property of the text that shows the connection between words and sentences. In the geographic maps, accuracy can measured in spatial terms which refer to bi-dimensional or tri-dimensional metric space. These examples can clarify how the form of presentation can influence EQPI, EDQ, and consequently QPI (Batini et al., 2014).

In the case example in Appendix A, the wiki system supports the presentation of the content in forms of unstructured text, diagrams, pictures and maps, and also provides meta-data related to the content. Consistently, the use of meta-data, assessment of syntactic criteria and cohesion of the text, and semantic comparison of the content with other resources are the methods of quality evaluation applied by students using wikis in this context (Row 4, Table A.2).

The medium of communication or IT artefact can also change IQ perception by its transmission capability and technological aspects. "Communication technologies have shifted from centralised and tightly coupled distributed systems to loosely coupled, distributed and peer-to-peer systems, and from controlled resources to unlimited web results" (Batini et al., p.63) and contents provided publicly. For example, Strong et al. (1997) showed that in distributed systems compared to central IS systems, one of the main IQ concerns raised by users is the consistency and interpretability of presented information. These technological changes can influence the way that information is expected and perceived.

Although traditional quality criteria such as accuracy and completeness are important criteria in centralised and controlled communication technologies and IT systems, Batini et al. (2014) argue that in open technologies such as the peer-to-peer system, where everyone have dynamic access to systems (website, network technologies), the quality criteria (EQPI) such as trustworthiness and provenance are getting more attention. Trust in the provider of information and the reputation of the source of information are both important factors influencing users' decisions in the use of information in peer-to-peer systems. Users might also refer to these criteria as credibility of information and credibility of data sources (Rieh & Belkin, 1998). In the case example in Appendix A, row 7 of Table A.2 shows that the publicity and open access of the system also allows for incorrect, imprecise and irrelevant content creation. Row 19 of the table shows that this material aspect can activate mechanisms in IQ perception; knowing wikis as distributed-open systems (not knowing the source of information) makes users give more attention to the trustworthy aspects of quality and look for credibility of authors when evaluating the quality of information.

Media studies also can be used to provide typologies of the capabilities of the media in the communication process. For example, Daft and Lengal's (1986) media richness theory identifies affordances such as speed of feedback and types of channel, and defines their relations to the perceived richness of communication process. Denis et al. (2008) based on Shannon and Weaver's (1949) communication theory, developed a typology of media types and capabilities in relation to information processing and the synchronicity of communication.

Table 6-5 shows types of media capabilities that are important in relation to the text and the study of IQ that have emerged from the discussion above.

Table 6-5 shows material-text interaction as one of the structures in the domain of real, according to the CR general meta-theory of IQ (Column 1), which can be described (Column 2) by the affordances and liabilities of the media, mainly in relation to representation and transmission, or other possible affordances. Column 3 shows examples of medium affordances from a synthesis of IQ and media studies in relation to IQ perception. However, the importance of this typology is not how capabilities can be related to quality criteria (such as in the work of

Batini et al., 2014) but more in how these capabilities can activate different mechanisms in the quality perception process.

Table 6-5: Concept-indicator links (typology) of systemic material concepts

(1) CR general meta-theory of IQ	(2) CR general meta-theory of IQ	(3) concept-indicators in IQ domain	(4) References
Material-text interaction (structures in the domain of real)	Affordances and constraints in presentation	Exhaustive mapping from the real world to information system	(Wand & Wang, 1996)
		No two states from the real world can be mapped to the same state in information system	
		Types of symbol provided by media, format of the message (structured, unstructured, semi-structured, image and geographic maps)	(Batini et al., 2014; Rieh, 2002; Shannon, 1993)
	Affordances and constraints in transmission	Transmission velocity	(Dennis et al., 2008; Shannon, 1993)
		Simultaneous transmission	
		Centralised vs distributed system	(Batini et al., 2014)
		Controlled vs opens systems	
	Other affordances	Feedback, type of channel	(Daft & Lengel, 1986)

6.3.2.5 Social world-individual

The interaction between the social world (setting or immediate social environment) and the individual is defined in this section according to the concept of typification (Layder, 1998). Layder refers to the concept indicator links for bridging concepts (social structures and agency) as typification. According to his definition, these concepts are essentially behavioural concepts which are subjectively relevant but also possess analytical, rational and formal properties (Layder 1998).

Here Layder’s (1998, p. 92) definition of the concept of typification is applied to define a concrete presentation of sociation as the interaction between social and personal worlds.

Layder (1998) defined typification could be presented in three main categories:

a) The linkage between objective and subjective concepts and related context. An example is someone's 'career' (individual's defined roles within social context), which refers to both their social position and subjective behaviour.
b) The concepts that represent the strategic role of agents in terms of authority and influence/power.
c) The concepts that characterise the nature of the relationship between structure and agency.

Gable (2011) proposed a coding system for understanding the relations between social structures and agents based on the above categories. Gable's (2011) coding system, presented below, provides a clear understanding of Layder's notion of typification in relation to each category above.

a) How people think they should behave
b) How superiors behave to others
c) How relations are characterised.

This study draws on Gable's (2011) definition to provide a simpler understanding of Layder's typification of categories. Then, relying on the IQ general meta-theory developed in Chapter 5 (Figure 5.4) and analysis of the literature, the above questions are translated to represent the social-individual interactions in the context of IQ studies:

a) According to type (a) and Gable's (2011) definition, in the context of this study, researchers need to identify the role of information users in the decision making process as well as their knowledge of the content of the message. This aspect can be further broken down to social information regarding the appropriate use of information and behaviour/attitude about a source of information (Carlson & Zmud, 1999; Fulk et al., 1987).
b) In the context of IQ and IS, researchers need to understand the forces and power structure (in organisation or social context) relating to the use of information and how it is perceived by individuals. Is the use of a system (information source) required by the management of an organisation (authority power in the context)? Is the use of a system appreciated by the manager of an organisation and the surrounding social groups? (Fulk et al., 1987; Sitkin et al., 1992). For example, in some contextual situations users might compromise their own expectation of quality to address the expectations of the authority source in their context (Rieh, 2002).
c) According to type C, in the context of IQ, two aspects are of great importance: the relation between information consumer and producer in the form of conflicts or powers,

and also the forms of an individual’s involvement in the organisational context (social context) and motivations around the task in hand, which is mainly influenced by co-workers and informal groups that individual belongs to (Gersick & Hackman, 1990; Kock, 2004).

Table 6-6 summarises the discussion in this section, presents related concept indicator links and shows how social-personal world interactions from the CR general meta-theory of IQ (Column 1) are associated with the concept of typification in Layder’s (1998) adaptive theory (Column 2). Column (3) shows that by adaptation of Layder’s (1998) and Gable’s (2011) definition of the concept of typification, the relevant definitions of this concept for studying social-personal interactions in the context of IQ have been developed. Column 4 instantiates and modifies the definitions in Column 3 by relying on existing studies in IQ and communication technologies.

Table 6-6: Concept-indicator links (typology) for the bridging concept: social-personal

<table>
<tr><th>(1) CR general meta-theory of IQ</th><th>(2) Layder’s (1998) adaptive theory</th><th>(3) Adaption of Layder’s (1998) and Gable’s (2011) definitions</th><th>(4) Concept-indicator links in IQ domain</th><th>(5) References</th></tr>
<tr><td rowspan="6">Social-personal world interaction as part of real domain structures</td><td rowspan="6">Bridging concepts (Typification definition)</td><td rowspan="3">What is the role of receiver in decision making based on the information</td><td>Individual's position in organisation (identifying position in the context’s hierarchy of power)</td><td rowspan="3">(Carlson & Zmud, 1999; Fulk et al., 1987)</td></tr>
<tr><td>Social information regarding appropriate use/evaluation of information</td></tr>
<tr><td>Task experience/ expertise about content of the message</td></tr>
<tr><td rowspan="2">What are the forces affecting use of information in decision making</td><td>Management/organisational (people’s in higher levels of hierarchy) forces in using system</td><td rowspan="2">(Fulk et al., 1987; Sitkin et al., 1992)</td></tr>
<tr><td>System use and attitude by surrounded social group</td></tr>
<tr><td>The relation between producer and receiver</td><td>In forms of conflicts and power</td><td></td></tr>
</table>

(1) CR general meta-theory of IQ	(2) Layder's (1998) adaptive theory	(3) Adaption of Layder's (1998) and Gable's (2011) definitions	(4) Concept-indicator links in IQ domain	(5) References
		The forms of people's involvement in the social context and motivations around task in hand	Social information (influential social groups) about the task in hand	(Gersick & Hackman, 1990; Kock, 2004)

The case example in Appendix A, Table A.2 rows 8 to 13 shows how the defined concept indicator links in Table 6-6 are applied in studying IQ in wikis as a guide for data collection (Column 3 of Table A.2). Column 4 of Table A.2 also shows how the defined concept indicator links can influence IQ perception. For example, students, being in the lower level of hierarchy at the university (regarding their knowledge level of the offered courses) are more influenced by the staff's and their tutors' opinions of the quality of wikis than by their own judgment of quality (Table A.2, Row 8).

6.3.2.6 Material world-individual

Layder (1998) defined the interaction between social structures and the individual as an objective-subjective relation. This study argues that his definition of concept indicator links for these bridging concepts can be adapted to define concrete representation of the material (objective)-individual (subjective) in the context of this study. However, Layder's definition of typification should be adapted carefully, considering unique features of the material world.

Chapter 5 Section 5.2.3.2 introduced three aspects of interaction between the material world and the individual based on the existing studies and theoretical lenses: 1) physical and cognitive embodiment; 2) the role of the individual within a system such as role in knowledge production (designer, producer, consumer) and their permissions in using the system; and 3) knowledge and experience of the system. In this section, relying on three kinds of typification (Layder, 1998) introduced above (section 6.3.2.5), the concrete representation of these interactions is further developed.

Physical and cognitive embodiment between the material and the individual can be associated with type (c) (the nature of relationships between structure and agency) as defined by Layder (1998) above. Accordingly, empirical representations of this aspect can be defined as:

- Identifying the type of interaction between the individual and the system (for example, O'Neil's classification of human computer interactions as electrical, symbolic, textual and graphic). The example of this type and the relevant data from the context are presented in Column 3, Row 17, Table A.2, Appendix A. How this type of interaction might influence quality perception is shown in column 4 of Table A.2.
- How appropriate an individual's physical capabilities are in relation to a given medium (good vision, reading ability, computer literacy, and so on) (Sitkin et al., 1992) (Appendix A, Table A.2, Row 18, Column 3).

An individual's role within a system, by definition, can be associated with type (a) (How people think they should behave) and (b) (the role of the individual in terms of authority and power/influence) of Layder's typification. Accordingly, concept indicator links can be defined in two groups as:

- According to type (b), an individual's control and permissions over the system: an example could be different roles such as information producer, information consumer, custodians and managers. For example, cognitive response theory (Greenwald, 1968) describes how an individual's manipulating and elaborating the communicated message can change their response to the message (Appendix A, Table A.2, Row 16, Column 3).
- According to type (a): the current use and attitude of individuals towards a system should be investigated; for example, how often a system is used by the users (Appendix A, Table A.2, Row 14, Column 3).
- According to type (a): how media are compatible with individual preferences in the style of presentation and access (Appendix A, Table A.2, Row 15).

The knowledge and experiences of individuals with systems can be associated with type (c). Individuals who possess multiple skills in working with media have more awareness of the meaning of the content of the message (Sitkin et al., 1992). Accordingly, researchers need to characterise the kind of interaction according to different levels of experience, and the subsequent influence on IQ perception. In Appendix A, Table A.2 Row 19 shows what the examples of this aspect are in relation to studying IQ in wikis (in Column 3).

Table 6-7 represents the concept indicator links for the interaction between material and personal world as defined above. The first column shows the position of this concept in relation to the CR general meta-theory of IQ developed in Chapter 5. The second column shows how Layder’s (1998) definition of typification concept is adapted in combination with definitions derived from theoretical lenses in Chapter 5; Column 3 shows the further development of the definition of concepts indicator links drawing on existing studies in the field of IQ and IS. Embodied interaction between the individual and medium of communication has been overlooked in IQ studies and the even broader IS context. More empirical studies are required to provide better explanations for categories identified in the following table.

Table 6-7: Concept-indicator-links for the relation between material world and individual

(1) CR general meta-theory of IQ	(2) Adaptation of Layder’s (1998) Typification	(3) Concept indicator link for material-individual in the IQ domain	Reference
Material-individual interaction as a structure in the real domain	Type (a): How individuals think they should behave (individual’s attitudes towards the system)	How often system (communication media) is being used?	(Fulk et al., 1987)
		Degree of being comfortable with the system (compatible with users’ preferences)	(Sitkin et al., 1992)
	Type (b) Individual’s role in terms of authority	What are individual’s controls/permissions over the system?	Layder (1998), Greenwald (1968)
	Type (c) Physical-cognitive interaction between the system and the individual	Human computer interaction type	O’Neil (2008)
		How physical capabilities of the individual are consistent with their use of the system	(Sitkin et al., 1992)
		Experience with the system	(Sitkin et al., 1992)

6.3.2.7 Material world-social world

As was discussed in the previous chapter (Section 5.2.3.3), an important aspect of material and social interaction is how social understanding and use of a system can alter an individual’s understanding and use of information and thus IQ perception. Two approaches are proposed here to characterise this type of interaction: first, identifying the symbolic meaning of the system within the immediate or broader social context; second, if such a symbolic meaning is not easy to define, through analysis of the socio-material interaction it is possible to identify what a system means within a social context.

The concept of symbolic meaning of the media suggests that the media itself can change the meaning and quality perceived by users. According to Sitkin et al. (1992) in some organisations, media can be considered as symbol of power and expertise, while in others they can symbolise the difference between professional and clerical positions. In some particular contexts, the use of media is not associated with productivity but with procrastination. Some symbolic meanings of media are widely shared through different organisational contexts, but at the same time researchers need to keep in mind that there are diverse sets of factors that can influence the understanding of the meaning of particular media. Therefore, although relying on a typology of media symbolic meaning within various organisational cultures may provide a great explanatory power, researchers also need to understand the influence of the social context in forming this symbolic meaning.

The symbolic meaning can be characterised according to the frequently cited cultural values in organisations or the context of use (Sitkin et al., 1992); these terms have been summarised in relation to the perception of IQ as below:

- Meaning of the media in terms of being efficient (in relation to the kind of task the user is intended to perform);
- Meaning of the media in terms of being innovative;
- Meaning of the media in terms of respecting the information user.

For example, Strong et al.'s (1997) study on IQ in three different contexts shows how a system can be perceived differently in terms of efficiency, and how this perception can alter a user’s expectations of the quality of the information provided by the system.

Another example of socio-material interaction can be found in the study of knowledge production in TripAdvisor by Scott and Orlikowski (2009). Scott and Orlikowski in this study showed how content produced in TripAdvisor websites can change the hotelier business process and their engagement and perceptions. Although this thesis does not follow the socio-materiality principle of entanglement between the social and material worlds, the exploratory study by Scott and Orlikowski (2009) can help to characterise the interactions between the social and material worlds in the study of IQ based on the framework proposed in this study (Mingers and Willcocks, 2014).

Table 6-8 shows the two main aspects in material-social interaction in the proposed IQ model: symbolic meaning of the media and role of systems within the social context. In the case example in Appendix A, Table A.2 (Rows 20 to 25), interaction between wikis and social context is investigated in relation to IQ perception. Column 3 of Table 6-8 guides the data collection process (required empirical data to represent the material-social concept). Table A.2, Column 3 shows the collected data which represent the defined concept indicator links in a hypothetical example.

Table 6-8: Concept-indicator links for bridging concepts (material interaction with social world)

(1) CR general meta-theory of IQ	(2) Sub-concepts	(3) Concept indicator links for material-social interaction in the IQ domain	(4) Reference
Material-social interaction as the structure in the real domain	Symbolic meaning of the media	Being efficient	(Sitkin et al., 1992)
		Being innovative	
		Respecting employees	
	Role of system within the social context	Role of system in knowledge production within the use context (between users)	(Scott and Orlikowski, 2009)
		Control over modification and change of the content within information users	
		Existing conflicts between the content generation context and the information use context	

6.4 HOW TO ANALYSE THE COLLECTED AND CODED DATA?

The above sections proposed a domain specific meta-theory as a middle range theory that helps researchers studying IQ to design their methods and research approach in the empirical context. This domain specific meta-theory (as the case example in Appendix A shows) guides the data collection and coding process (Table A.1 and Table A.2 columns 1, 2 and 3). However, the main goal of studying IQ as stated in this thesis is to answer the research questions arising from CR general meta-theory of IQ; that is, to explain how personal, social and material structures can change IQ perception (Section 5.1.4). Accordingly, this section further clarifies how researchers studying IQ and using the proposed guidelines in this thesis can analyse the collected and coded data to answer their research questions.

In relation to CR terms, this means that researchers need to look for the mechanisms that can explain how IQ is perceived in a certain way and with certain criteria in the specific context of research. Retroduction is introduced as the mode of analysis to identify mechanisms of data analysis (Archer, 1995). Retroduction was defined in Chapter 3 Section 3.2.5.2 as an attempt to attain knowledge about the structures and their relations in the real world. The main question that researchers need to answer when analysing data by a retroductive mode of analysis is: "what are the structures and their characteristics that make the phenomenon (or observed events) possible as they are?" In order to answer these questions, researchers need to specify events and structures of the domain of real[104] in the context of their study (Pawson and Tilley, 1997).

Events are akin to tools in the CR explanation of causation, and constitute entry points from concrete observations that lead to the identification of underlying structures. Thus identifying events is the first step in starting a CR-based analysis and then mechanisms are identified from the researcher's interpretations of events (Collier, 1994). In a concrete research context, empirical experiences, observations, interview results, survey results, and various outcomes identified and measured, could represent events in the domain of the empirical (Wynn and William, 2012). In this study, IQ and IQ-related concepts (EQPI, EDQ and QPI) were defined as events in the actual domain, where researchers have access to them in the empirical domain through different methods of data collection (Section 4.5, Figure 4.9). Figure 5.4 in Chapter 5 then showed how IQ perception is the result of interactions between different structures (refers to the personal, social and material worlds) in the real domain with an individual's cognitive process. Thus, to study IQ in an empirical situation, events are defined as the outcomes of a data collection process in relation to any of the concepts EQPI, EDQ and QPI (Table A.1 in Appendix A shows these concepts in the case example on wikis).

The complex-open system context of a study may include countless structures which influence the events happening in the empirical domain. Structural elements belong to the domain of real, thus are not directly observable or accessible by researchers in the empirical domain. The domain specific meta-theory suggested in this chapter provides empirical representations of the contextual structures (structures in the domain of real and their

[104] Referring to depth ontology in CR assumptions; see further details in Section 3.2.3.

interactions) involved in the formation of IQ phenomena. In the case example in Appendix A, Table A.2, Column 2 and 3 shows empirical representations of structures and their interactions in IQ studies and in the context of the case example respectively.

After identifying events and structures, researchers need to identify how these structures are contributing to observed events or what are the casual mechanisms that can describe the events by inferring their structures and properties. Mechanisms are causal powers or tendencies. Mechanisms derived (by retroduction) can then represent the link between inherent powers within the structures and the particular events that researchers seek to explain (Wynn and William, 2012). “The workings of such mechanisms are always contingent and conditional, and hypotheses will also be constructed in respect of which local, institutional and historical contextual structures are conducive to the action of the mechanism” (Pawson and Tilley, 1997, p.161).

Thus, in order to discover how structures identified in the context of study are conducive to observed events, researchers can also rely on existing theoretical lenses (such as using the taxonomy of theories in Chapter 5) which help to hypothesise mechanisms about what has happened in the context of the study. Column 4 in Table A.2 in Appendix A, shows explanations or mechanisms which are derived by hypothesising the relation between structures and data collected on IQ concepts in Table A.1. Column 5 shows whether the theoretical lenses (from Chapter 5) can support hypothesises about the work of mechanisms and explanations provided in Column 4. The existing theoretical lenses (such as the taxonomy of theories proposed in Section 5.2.4), in addition to providing the starting point for hypothesising the mechanisms in the context, can be examined and modified in relation to the context of the study.

After analysing each row of Table A.2 (Appendix A), researchers need to re-analyse the overall data and discovered mechanisms in each row of Table A.2 to identify which mechanism are working more strongly in the context. For example, in this case (Appendix A), considering the age of subjects of the study and their hierarchical position at university, the social group’s influence and the perception of staff about wikis is more powerful than other mechanisms in forming expectations and perceptions of the content provided in the wikis. When conducting an empirical study, it is important to note that some structural components and mechanisms might be activated and other ones might not. In the case example in Appendix A, Table A.2, Row 16, an individual’s (information user’s) control over the system could activate the trust mechanism and perception of a higher level of quality, but other contextual factors may not let this mechanism activate. In this example, mechanisms on the individual and material levels are not working because of the dominance of the mechanisms at the social level; students mainly perceive information of high quality if it is aligned with their assignments (authority and reward mechanisms). Consequently, it is the researcher's job to identify which mechanisms are working in the context of their study.

Comparative analysis between different contexts using typologies can be useful to identify the activated mechanisms (Danermark et al., 2001; Layder, 1998). The typology proposed in this study, by pointing out to the inherent powers of the contextual structures in relation to IQ perception, provides guideline and hints for many possible mechanisms as well. For example, the distributed, open access nature of wikis can work as a mechanism to lower expectations of the quality of the content in terms of correctness and preciseness. Or an individual's position in the hierarchy of the social context can work as a mechanism to change their expectations and perceptions of the source of information.

6.5 CONCLUSION

Chapter 5 of this thesis proposed a CR general meta-theory of IQ, and based on this theory, proposed research questions for future empirical studies of this phenomenon.

Chapter 6 focuses on developing a mid-range or domain-specific meta-theory based on a CR general meta-theory of IQ that works as a framework to assist researchers in studying IQ empirically and address the research questions proposed in Chapter 5.

The domain specific meta-theory in this thesis is developed following Layder's approach to developing adaptive theory as a mid-range theory in sociology. Consistent with Layder's approach, the proposed domain specific meta-theory consists of 1) concepts, 2) clustering of concepts, and 3) definition of concept indicator links as a typology of contextual (systemic) concepts. The proposed typology is developed through a review of current studies on IQ and other relevant fields of research. This typology gives direction for proposed research questions on data collection and required data in the context of an empirical study. This typology also provides a provisional coding system as a means of data analysis. It should also be noted that this typology gives directions for designing an empirical study on IQ by defining contingent factors (Section 3.4.1) and specifying requirements for data collection and data analysis.

Table 6-9 presents the overall typology or domain specific meta-theory proposed in this chapter. The first column positions the concepts according to the CR ontology. The second column refers to the CR general meta-theory introduced in Chapter 5. Column 3 and 4 present the hierarchy of concept-indicator links for the elements of CR general meta-theory of IQ (in column 2). In column 5, the main related references for each row are presented. Then column 6 shows how the defined concepts and their concept indicator have been mapped to Layder's categories of concept indicator links, as discussed in Section 6.3.1. Table 6-9 is an aggregation of Tables 6-2 to Table 6-8 presented earlier in this chapter. The implications of Table 6-9 in guiding empirical studies are shown in Appendix A and through Table A.2.

Table 6-9: Domain-specific meta-theory of IQ (coding system +typology)

Typology of concepts in the Domain Specific Meta-theory of IQ					
(1) CR Ontology	**(2) CR General Meta-Theory of IQ**	**(3) Theoretical concepts**	**(4) Concept-Indicator Links in IQ Domain**	**(5) Sources**	**(6) Types of Concept-Indicator links based on Layder**
Structures	**Social structure-text**	Types of argument-speech act by Habermas	Genre of communication (substance)	Yates and Orlikowski (1992) , Lyytinen & Hirschheim (1988)	**systemic concepts**
			Genre of communication (form)	Yates and Orlikowski (1992) , Lyytinen & Hirschheim (1988)	
			Shared genre of communication	Bizzel (1992)	
	Material structure - Text	Affordance constraints in presentation	Exhaustive mapping from real world to information system	Mingers (2014), Wand and Wang (1996)	
			No two states from real world can be mapped to the same state in information system	Mingers (2014), Wand and Wang (1996)	
			Types of symbol provided by media, format of the message (structured, unstructured, semi-structured, image and geographic maps)	Batini, et al., (2014), Shannon (1949)	
		Affordance constraints in transmission	Transmission velocity	Mingers (2014), Dennis, et al., 2008), Shannon, (1949)	
			Simultaneous transmission		
			Centralised vs distributed system	Batini et al., (2014)	
			Controlled vs open systems		
Interactions between structures	**Social (immediate context) -personal**	What is the role of receiver in decision making based on the information?	Individual's position in the social context	Layder (1998), Sheriff, Sheriff (1967), (Carlson & Zmud, 1999), Fulk, et al., (1987)	**Bridging concepts**
			Social influence regarding appropriate use/evaluation of information		
			Task experience/ expertise about content of the message		
		What are the forces in using information in decision making?	Management/organizational forces in using the information source	Fulk et al., (1987), Sitkin et al., (1992)	
			System's (information source or communication media) use and attitudes towards it, encouraged by social groups		
		The relation between producer and receiver	Forms of conflicts and power	Gersick & Hackman, (1990), Kock (2004)	
		The forms of people involvement is the social context and motivations with task in hand	Social information (influential social groups' opinions) about the task in hand		
	Material-personal	How people think they should behave? (Gable, 2011, Layder, 1998)	How often system is being used and trusted by individual?	Fulk et al., (1987) , Layder (1998) Bem (1972), Chaiken (1980)	
			Degree of being comfortable with the system	Sitkin et al., (1992)	
		How superiors behave to others? (Gable, 2011, Layder, 1998)	What are individual's controls/ permissions over system?	O'Neil (2008)	
		How relations are characterised (Gable, 2011, Layder, 1998)	kind of physical-cognitive interaction between the system and information users	Sitkin et al., (1992)	
			How physical capability of individual are consistent with their use of the system?	Sitkin et al., (1992)	
			Experience with the system	O'Neil (2008), Fulk et al., (1987)	
	Material-social-personal	Culture toward use of system (symbolic meaning of media)	Being efficient	Sitkin et al., (1992)	
			Being innovative		
			Respecting employees		
		Role of the communication system within social context	Role of the system in knowledge production within the use context	Scott and Orlikowski (2009)	
			Control over modification and change of the content within the social context		
			Existing conflicts between the content generation context and the information use context		

Table 6-9 Cont. Domain-specific meta-theory of IQ (Coding system +typology)

Typology of concepts in the Domain Specific Meta-theory of IQ					
(1) CR Ontology	**(2) CR General Meta-Theory of IQ**	**(3) Theoretical concepts**	**(4) Concept-Indicator Links in IQ Domain**	**(5) Sources**	**(6) Types of Concept-Indicator links based on Layder**
Interactions between structures	**Self**	What do I expect? (Gable, 2011)	Expertise about the content of message	Sitkin et al., (1992)	**Behavioral concepts**
			Past experience /perception of the system	Carlsson (2003), Chaiken (1980)	
			Motivation to evaluate information	Petty & Cacioppo (1986)	
		What do I do? (Gable,2011), Layder, 1998)	Past behavior regarding using information	Bem (1972)	
		Who am I? (Gable, 2011, Layder,1998)	Educational level	Sitkin et al., (1992)	
			Degree of familiarity with organisation culture	Sitkin et al., (1992)	
			Self-monitoring degree	Snyder (1974)	
Event	**Personal related**	Expectations of the meaning (EQPI)	Rating values to quality attributes in survey, interview, observations	Wang and Strong (1996), Price and Shanks (2005), Davidson (2004)	
		Expectations of objective characteristics of sign system (EDQ)	Verbal description of assessment process (thinking loud methods), observations, interview or survey results	Rieh (1998) Rieh and Belkin (2000) Rieh (2002), Davidson (2004)	
		Perceived Quality of Information (QPI)	Choice making behavior, interview, survey	Lee et al., (2002), Davidson (2004)	

Chapter 7: **Discussion and Conclusions**

This study was initiated in response to shortcomings identified in information quality (IQ) research which take the form of an undisciplined diversity in the conceptualisation of this phenomenon. The preceding chapters described in an evolutionary way how IQ could be conceptualised and studied to avoid undisciplined diversity. This study develops a framework that enables researchers to justify their choice of research methods and approaches in conceptualising and studying IQ, and to position their research in relation to other studies in the IQ field.

In this chapter, the contributions of this thesis are discussed, firstly in relation to the study's main goal of achieving disciplined diversity in IQ research. Then I report on how the outcomes of this thesis can be positioned in IQ studies. I also discuss how the findings can more broadly contribute to information systems (IS) research and to critical realist methodological guidelines as well.

7.1 ACHIEVING DISCIPLINED DIVERSITY IN IQ RESEARCH

In Chapter 2 it is argued that diversity in research, especially in the multi-disciplinary field of information systems studies, is desirable and beneficial if it is disciplined, meaning that the choice of research problem, research methods and theoretical choices should be justified in a coherent way (Robey, 1996). Weber's (2003) principles in reflexive research are introduced as the basis for achieving disciplined diversity in research and also as a basis for tackling current problems identified in IQ studies.

To satisfy these principles of disciplined diversity (as a means to address the current problems in IQ research), this study relies on the philosophical and meta-theoretical assumptions of critical realism (CR). CR's philosophical and scientific ontology works as an "under-labourer" in the research process to chart research choices about scientific epistemology, data collection and data analysis. CR ontology offers a reflective device that helps researchers to choose a research approach based on some sound principles and to avoid applying unexamined and restrictive research methodologies.

The outcome of this study can be illustrated according to Cruickshank's (2003) hierarchy of theories (Figure 7-1). This study firstly develops CR ontology or a "CR general meta-theory" of IQ (Cruickshank, 2003, P.114) (see Chapters 4 and 5); then, relying on existing studies of IQ, develops a domain specific meta-theory that can guide the conduct of empirical studies in the IQ field (see Chapter 6). This domain specific meta-theory can also be referred to as a conceptualization framework,[105] as defined by Sayer (1992), since it explains entities, structures and mechanisms with the help of theories and in abstract language.

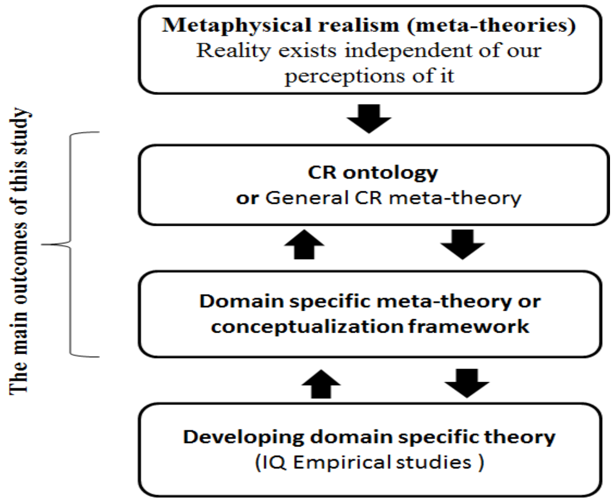

Figure 7-1: Positioning this thesis's outcomes according to Cruickshank's (2003) levels of theories

In the following sections, I explain how these outcomes can facilitate appropriate choice of theories and research methodology in conducting empirical IQ studies and how these outcomes satisfy Weber's (2003) criteria by achieving disciplined diversity, consisting in meta-theoretical reflexivity, theoretical reflexivity, methodological reflexivity and interpretation reflexivity.

7.1.1 Principle 1: Meta-theoretical reflexivity

Meta-theoretical reflexivity, as defined by Weber (2003), means that the researcher should be aware of their meta-theoretical assumptions; they also need to choose these meta-theories in relation to the phenomena and research problems, meaning that they should not adhere to either extreme idiographic or nomothetic views of the world.

[105] "To conceptualise events, mechanisms and internal relationships with the help of theories" (Sayer, 1992, p. 50).

This study argues that CR as a philosophy can provide the basis for applying meta-theoretical assumptions which are consistent with Weber's (2003) principles for achieving disciplined diversity. CR does not adhere to any dogmatic meta-theoretical assumptions, either nomothetic or idiographic (Section 3.1.1). Ontological assumptions of CR are not restrictive and could be inclusive of other positions as well. Thus, CR as the research philosophy satisfies Weber's (2003) first criterion for achieving disciplined diversity.

CR philosophy works as an under-labourer, meaning that it provides meta-theoretical assumptions as a toolkit to help the research process to move towards achieving disciplined diversity.

7.1.2 Principle 2: Theoretical reflexivity

Weber (2003) emphasises the role of theories, especially reference theories,[106] in the development of the IS discipline, warning about the constraining nature of theories and how they can limit the creativity of the researcher. He suggests that in order to be reflexive in the research process, researchers should understand that all theories can only provide a limited view of the world and the researcher must "juxtapose" (Weber, 2003, p.viii) alternative and even competing theories to create new knowledge.

This study, consistent with Danermark et al.'s (2001) approach, proposes two stages in applying theoretical lenses in the research process: first, in the definition of the research problem, and second, in the analysis of empirical data. Based on this approach, theories in the research process should be treated as sources of explanations that can be revised, not as master devices for ordering empirical data (Layder, 1998).

In Chapter 4 of this study, IQ is defined as a stratified phenomenon,[107] formed as a result of interactions between the information user (individual), communicated message, the medium of communication and the social context, and is positioned across domains of reality defined by CR. Then, in Chapter 5, Mingers and Willcocks' (2014) semiotic framework is applied to define in more detail the characteristics of the entities in the stratified conceptual definition of IQ. The result of this process is a CR general meta-theory of IQ which helps to position different theoretical lenses in relation to different aspects of the phenomenon.

[106] Theories applied in IS but have their origin in other disciplines such as sociology, economic, psychology and etc.
[107] Section 3.2.3 defines the assumptions of stratified ontology in CR.

According to the developed CR general meta-theory, different theoretical lenses can be positioned across different levels of IQ as a stratified phenomenon to explain different aspects of it. Based on this understanding, this study has developed a taxonomy of theoretical lenses (Table 5.4) in terms of their power in explaining different aspects of the model. This taxonomy can be used as an analytical tool for analysing empirical data and hypothesising generative mechanisms, without forcing data into any specific pattern or categories.

The domain-specific meta-theory developed in Chapter 6 also aims to provide the links between theories, abstract concepts and empirical data. The domain specific meta-theory in this study proposes a provisional coding system for studying IQ which can guide data collection, data organisation and data analysis (More details in Section 7.2).

This approach can be positioned in relation to two current, dominant approaches to using theories in the research process: grounded theory (GT) (Glaser & Strauss, 2009) and the middle range theory (MRT) approach (Merton, 1967). This study, drawing on Layder's (1998) adaptive theory and advantageous features of both the GT and MRT approaches, leverages existing theoretical knowledge in studying IQ, and also avoids generating middle range scripts and testable hypotheses from reference theories. Theoretical concepts are used to inform the research and theoretical lenses are open to be modified according to the findings of the study.

7.1.3 Principles 3 and 4: Methodological and interpretative reflexivity

This study argues that the interpretation of data is not separated from epistemological and methodological choices. Therefore, being reflexive in the choice of methodologies means being reflexive in the choice of data collection methods and also data analysis. The interpretative reflexivity covered by Weber's definition refers mainly to epistemological questions and is also associated with reflexivity in methodology and data collection, as well as reflexivity in choosing theoretical lenses in the analysis process.

Weber's (2003) main argument is that the choice of research methods should be based on the phenomenon under study. He admits that different research methods can be used to acquire knowledge about different aspects of the phenomenon and advocates a multi-method approach. Weber's (2003) main solution to the problem of anarchy in the application of multiple research methods is to conceptualise the research phenomenon in a consistent way with applied methods. However, he does not provide more specific guidelines.

In IS research, multi-method approaches and the combining of qualitative and quantitative methods have been advocated by many researchers. In Chapter 2, it is argued that these approaches mostly ignore the main assumptions and ontological principles of different methodologies and never engage in discussion on how inconsistencies between different paradigms can be resolved. This study, also advocating the multi-method strategy in research, addresses the problems regarding use of multi-method approaches (discussed in Section 2.4.3) by drawing on CR ontological and epistemological assumptions.

Although CR has a strong commitment to the significance of a systematic research methodology, it doesn't prescribe a methodology per se, but rather determines how objects of research should be conceptualised and theorised (Sayer, 1992). CR proposes ontological and epistemological guidelines that help researchers to avoid reductionist approaches in their choice of research methodology by acknowledging and representing the complexity of research phenomenon as a stratified phenomenon. Accordingly, this study suggests that researchers need to answer the following questions in order to strive for disciplined diversity in the choice of their research methodology:

1. What is the phenomenon under study? (the question of ontology);
2. What kind of knowledge can we acquire about this phenomenon? (the question of epistemology);
3. How can we study the phenomenon? (the question of methodology).

This study, following Danermark et al.'s (2001) explanatory guidelines, first develops a CR general meta-theory of IQ; Chapter 4 develops a stratified conceptualisation of IQ, and in Chapter 5 the CR ontology of IQ is developed by defining the entities in a conceptual model with more details. Then, relying on the epistemological assumptions of CR and other methodological guidelines (Layder, 1998), the thesis develops a domain specific meta-theory for IQ (Chapter 6). Next, the methodological contributions of this thesis to IQ studies (by addressing the above questions), is discussed in more detail.

7.2 METHODOLOGICAL CONTRIBUTIONS FOR STUDYING IQ

To understand how CR general meta-theory and domain specific meta-theory underpin different stages of the research process in the study of IQ, I position their roles according to a general, conventional research process proposed by Layder (1998).

Figure 7-2 (solid boxes) shows the stages of a conventional research process which are common to research of all kinds (Layder, 1998). Layder argues that these stages do not necessarily happen in a fixed sequence in all research, but they can happen hand-in-hand, and each stage can even be revised through the research process.[108] Figure 7-2 (dashed boxes) shows how the outcomes of this thesis can be positioned according to research elements. The CR general meta-theory of IQ developed in Chapter 5 can be positioned in relation to the choice of topic/definition of the problem. As discussed in this thesis, it strongly informs other stages as well. The taxonomy of theories developed in Chapter 5 provides the theoretical deliberation which is both informed by and informs the analytical process. The domain specific meta-theory can be positioned as a coding framework which informs the data inquiry process and guides data analysis and theorising. This study does not specify methods of data collection or how coded data can be synthesised, but provides guidelines through the proposed domain-specific meta-theory. Different qualitative and quantitative methods or a combination of them can be used for data collection as long as they are able to provide the spectrum of required data specified by the domain specific meta-theory.

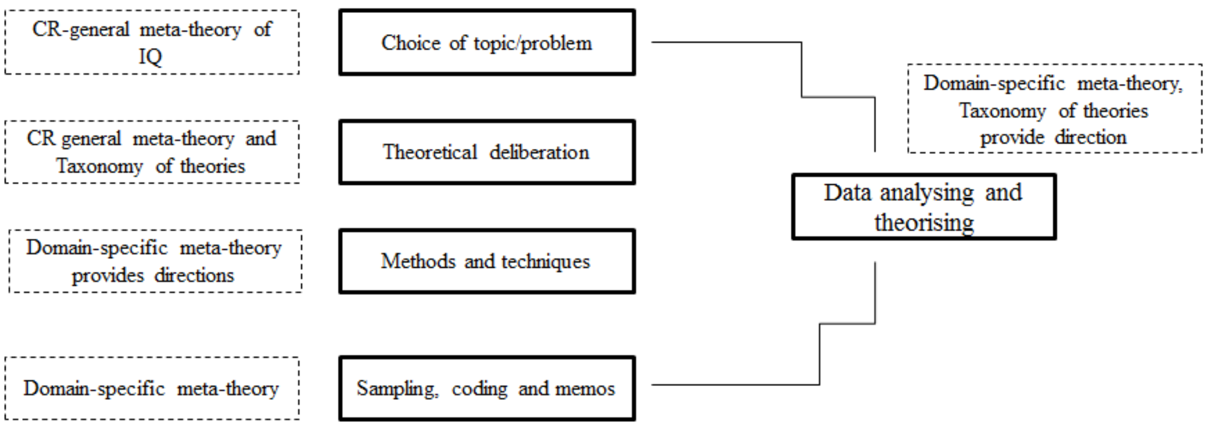

Figure 7-2: Positioning the role of this study's outcomes through the elements of a conventional research, adapted from Layder (1998, p. 29)

Researchers studying IQ with different goals and within different disciplines can use the CR general meta-theory of IQ to position and define the research problems and their research goals according to the entities in the real world; researchers do not really need to be familiar with concepts such as depth ontology or even the definition of mechanisms and CR causation. The general CR meta-theory introduced in Chapter 5 can be the starting point for the research process. Researchers can then adopt the domain specific meta-theory to collect and analyse relevant data according to their study's context. The taxonomy of theoretical lenses also provides the entry point to the related theoretical space, and depending on the research requirements, it can be extended or not.

[108] For example, according to Layder (1998), theorising can happen with problem definition and continues with analysis of data.

The proposed methodological principles discussed below if applied by IQ researchers facilitate research outcomes which are applicable in wider contexts.

In the following section I describe how the definition of the CR general meta-theory in this study influences the design of IQ research by bringing some examples from current studies. Then I describe how the domain specific meta-theory can help researchers studying IQ in different stages of their research design (Figure 7-2).

7.2.1 Contributions of CR-general meta-theory to methodological choices

The CR general meta-theory of IQ and its methodological contribution will be discussed in relation to three main aspects of this model: the stratified conceptualisation of IQ and the assumption of ontological depth in CR (empirical, actual and real) discussed in Chapter 4; the existence of different entities involved in the formation of IQ as a laminated system (discussed in Chapters 4 and 5); and the definition of IQ perception in the user's mind as a semiotic process (discussed in Chapters 4 and 5).

7.2.1.1 Stratified reality and methodological choices in IQ research

Figure 4.9 (Section 4.5) shows that researchers in the domain of the empirical do not have direct access to the IQ perceptions in information users' minds, which happen in the domain of the actual. There is no empirical observation or research method that is able to represent the research phenomenon in an empirical domain, as it is in an actual or real stratum of reality. Accordingly, researchers need to accept that, regardless of choice of method, there are always some aspects of reality hidden and not accessible to them. Thus, researchers should be aware of how their choice of methods and involvement in research can activate mechanisms and alter the findings. For example, using focus groups sessions to derive IQ criteria rather than surveys or interviews can enact different mechanisms and thus might alter research findings from those that researchers are expecting (Gerjets, Kammerer, & Werner, 2011).

The question of how each data collection method and the researcher's involvement in the research process can activate mechanisms that deviate research findings from what is expected by researchers (as defined in the actual domain in Figure 4.8) can be a topic for future research.

Following CR meta-theoretical assumptions and the framework proposed in this study, the bias in the data collection methods can be decreased in the research process by: (1) applying different methods of data collection depending on the stratified definition of the research phenomenon (for example, researchers can validate the data collected through a survey by conducting a post interview); and (2) interpreting and validating behavioural data collected from the study's subjects (behavioural concepts) in relation to systemic concepts (related to social and material aspects of the study's context).[109]

7.2.1.2 Laminated system of IQ and implications for methodological choices

This study identifies the entities involved in IQ formation as: the individual or information user; the text or message medium of communication; and the social context of information use. Chapter 5 then defines the interactions between these entities based on Mingers and Willcocks's (2014) semiotic framework.

Defining the IQ concept in the interaction between different entities which are stratified in the form of a laminated system has the following methodological implications:

1- Different theoretical lenses can be used and positioned according to different levels of the laminated system and in defining interactions between entities. For example, in IQ studies, several theoretical lenses have been applied to define the concept of IQ: representation theory (Wand & Wang, 1996); the communication theory of Shannon and Weaver (Mason, 1978); semiotic theory (Price & Shanks, 2005); and Grice's maxim of conversation (Mai, 2013), to name a few. The stratified definition of IQ as a laminated system provides the basis for justifying the application of each theory in IQ research in a complementary way. Chapter 5 of this study describes the position of each theory and its explanatory power in relation to the stratified definition of IQ.

2- The definition of IQ as a laminated system helps to articulate research questions more accurately, thus providing an epistemological basis for the choice of research methods and the source of data in IQ studies. In Chapter 5, this study suggests a research agenda for the study of IQ by proposing research questions. Later in this chapter, how these research questions can change IQ research directions will be explained (see also Appendix C).

3- Another contribution of this definition of IQ is in positioning technology or the media of communication in relation to the social and personal worlds as entities involved in

[109] Behavioural and systematic concepts are defined in Chapter 6 in relation to different aspects of the proposed general theory of IQ in Chapter 5.

the process of understanding IQ. This ontological separation between these three entities (technology, social and personal) is useful, especially in the research process and in relation to data collection and data analysis. In IQ studies, two main approaches can be distinguished in this respect: the most common view in IS and CS disciplines, which focuses on the design of the systems and communication media (Zhu, et al., 2012); and the view associated with information science studies, which defines IQ in relation to meaningful conversation (Blair, 2003; Mai, 2013). The former view ignores the role of social and personal aspects in the IQ evaluation process, while the latter does not adequately describe meaning and interpretation in relation to material aspects of the technology, and thus fails to link the research results effectively to material aspects of the communication system (Mutch, 1999).

7.2.1.3 IQ understanding as a semiotic process and implications for methodological choices

This study defines IQ and IQ related concepts based on the understanding of the IQ evaluation process in the information user's mind; in Chapter 5 this process was defined as a semiotic process based on Peirce (1933). This process-based understanding clarifies concepts related to IQ. In this study, I argue that a process-based definition of IQ which considers the user's cognitive process can clarify the real world referent of IQ concepts, and thus support better design of IQ research approaches and more effective application of the research results in practice.

The definition of IQ in relation to the information evaluator's cognitive process puts more emphasis on the subjective nature of IQ in any definition of this concept. This study argues that even when IQ is defined based on objective design-related criteria, the concept is still subjective according to the point of view of specific groups of users (such as system designers). On the other hand, while some lines of IQ research define IQ as fitness for use, these researchers rarely specify the real world referent of this concept, such as perceptions or expectations of the quality of the information, or point of view of the users, designers or researchers.

All these mis-definitions make the validity of research methods and research results problematic. For example, one of the most cited papers in IQ research is a study by Wang and Strong (1996) who proposed four main dimensions for IQ based on some survey results. Although their study provides a comprehensive list of quality measures and makes the initial point that the information user's needs include more than just accurate information, neither users nor the context of these quality expectations are specified in this study (Floridi & Illari, 2014). Wang and Strong's (1996) approach to conducting a survey to derive IQ criteria from a mixed group of users[110] is not consistent with the definition of IQ as 'fitness for use' and does not help to identify the information users' needs in relation to the context and the users' characteristics. By applying a process-based definition of IQ, research design needs to demonstrate more careful attention to the characteristics of the subjects of the study and their interaction with the context of the study.

An example of applying semiotics in IQ research can be seen in the work of Price and Shanks (2005). They propose an IQ framework based on semiotics (Peirce et al., 1933); (Morris, 1938) and define three different dimensions in relation to IQ criteria: syntactic, semantic and pragmatic. This thesis argues that Price and Shanks' (2005) use of semiotics is problematic because it is not consistent with the definition of semiosis as the "process in which the sign has a cognitive effect on an interpreter" (Nöth, 1995, p. 42) or the meaning generation process in an addressee's mind.[111] Morris's definition of the syntactic, semantic and pragmatic cannot be separated from the definition of semiosis and should not be applied to different groups of interpretants. However, the three dimensions — syntactic, semantic and pragmatic — in Price and Shanks's (2005) study reflect the perspectives of different groups of information users. For example, syntactic quality criteria are defined in relation to the design of the system and thus from the designers' point of view, and pragmatic criteria are defined using mixed views of different groups of users (system designers, managers and end users). These inconsistencies between research assumptions (theoretical basis) and research design make the findings of the study less applicable in other contexts and also in practice.

In this thesis, a process-based definition of IQ which relies on semiosis results in the differentiation of three concepts (EQPI, EDQ, QPI), and proposes that research methodology should reflect the semiosis process in both data collection and data analysis. These concepts represent an epistemological understanding of IQ which is ontologically defined through a semiosis process, and thus are able to inform methodological choices in an empirical study. The three concepts in this study are defined as: user's (or information evaluator's)[112]

[110] The subjects of the study in Wang and Strong (1996) comprised practitioners and MBA students.
[111] Morris's definition of semiosis includes any organisms as the interpretants.
[112] It should be noted that the framework suggested in this thesis can be applied to study information perceptions of the information user, designers or even researchers. I have mostly applied the term information user since it is in the interests of both designers and researchers to share users' understandings.

expectations of the meaning (EQPI); user's expectation of the sign system (EDQ); and the quality of the perceived meaning (QPI). Differentiating between these three concepts provides the following methodological insights in relation to the design of the empirical study:

1. EQPI can be described as the user's information needs. In practice, identification of these expectations helps to design and implement systems more effectively. In research, it is important to differentiate expectations from perceptions in data collection and analysis. For example, the design of Wang and Strong's (1996) study enables researchers to collect data about expectations of quality from different groups of users by conducting a survey and asking different users to rank the quality criteria.[113]

2. EDQ is defined as measurable criteria related to real world attributes, applied by users to judge the quality of the received message. These criteria, consistent with the semiotic definition (Pierce, 1933), are associated to communicated text or sign system attributes (text could be a picture or video). The results of EDQs assessment then are translated by users to perceived quality of meaning through a semiosis process (Section 4.4, Section 5.1.3.2). The understanding of these criteria applied by users to judge the attributes of received message (EDQ), then can be linked to design features and objective criteria defined by system designers, and thus helps to better design system interfaces and representation of the content, and provide access for relevant meta-data. Data collection approaches in the empirical domain with regard to this concept (EDQ) could include users thinking aloud during the process of information judgment (Rieh, 2002); alternatively, different methods of eye tracking combined with interviews (Gerjets et al., 2011; Kammerer & Gerjets, 2012) can be applied to identify the user's measurable criteria in deciding about IQ.

3. The quality of perceived information (QPI) or quality of perceived meaning is formed as a result of quality evaluation or a semiotic process in the user's mind, and in the interaction of users with a specific medium of communication and the received message. QPI can represent the success of the system in satisfying the user's information needs. Empirical data which represent this concept should be collected from users if they already have used or have been using the information source. Both survey and interview methods after use of any information or

[113] This does not mean that Wang and Strong's (1996) approach can precisely identify expectations of the users.

information source can provide the related empirical data that represent QPI (Rieh, 2002; Strong et al., 1997).

The IQ model proposed in this study also provides a new perspective to bridge different IQ studies from different disciplines. The three concepts introduced above (EQPI, EDQ, QPI) can help to clarify how this bridging can happen. It is a common perspective in the IQ literature to attribute studies in computer science (CS) discipline to system designers' and developers'[114] perspectives and the design aspects of systems (Mai, 2013; Price & Shanks, 2005) and to attribute studies from information system (IS) and information science disciplines to the end users' perspective (Lee, et al., 2002; Mai, 2013; Price & Shanks, 2004).

Since we assume the final goal of system designers and developers is to satisfy end-users' requirements, this can be considered as the high level EQPI for them. Thus, the EQPI criteria from end-users' point of view can also be considered as EQPI for the technical practitioners we well. Since EDQ is presenting the expected attributes of the text and sign system (related to presentation of the information), by defining EDQ criteria from end-users' point of view it is possible to link the users' requirements on the higher levels to design (deep structures) aspects of the system and fill the existing gap between end-users and system designers and developers. For example, knowing that users value syntactic criteria of language (EDQ) as an important factor in judgment of accuracy and validity of the content of wikis, means that on the design side of the system, more tools (modules) to controls this aspect can be predicted.

7.2.2 Methodological guidelines for empirical study

In the above sections, it was described how in the problem definition stage of the research process (Figure 7-2), developing the CR general meta-theory of IQ defines the concept of IQ and its real world referents, and also influences the choice and design of research methods. In this section, I will elaborate on the other elements of the research process, in particular, the role of domain-specific meta-theory in guiding the research process of IQ study.

The domain-specific meta-theory proposed in this thesis draws on Layder's (1998) adaptive theory to link the theoretical and abstract concepts to the empirical study of IQ. Consistent with Layder's (1998) approach, the proposed domain specific meta-theory consists in: 1) concepts; 2) clustering of concepts as a coding system; and 3) typology of contextual

[114] Mainly any technical job in relation to providing information for end-users.

(systemic) concepts, which also links theoretical concepts to empirical representations of them. The domain specific meta-theory can help the research process by:

1) guiding data collection methods and identifying appropriate sources of data;
2) proposing a coding system to organise collected data;
3) guiding the analysis and theorising process by providing a typology of the IQ concepts, contextual concepts and taxonomy of theories proposed in Chapter 5.

These contributions are discussed in detail below.

Providing guidance on data collection

This study does not propose any specific method for data collection, but the proposed conceptual framework introduces behavioural and systemic concepts (both social structure and material structure) and the concepts representing interactions between them, along with their representation in empirical data. This variety of concepts requires access to different sources of data in the context of the study. Thus, the domain specific meta-theory leads researchers through the data collection process and then, based on the findings, new sources of data can be investigated. The following are some directions drawn from the domain specific meta-theory to guide data collection:

1. The domain specific meta-theory proposed in Chapter 6 introduced different concepts. To collect data relevant to all of these concepts, different sources of data are required. Data about structural concepts such as social and material aspects should be collected based on different data sources; for example, researchers' observations, existing documents within the study's context, or interviews with people involved, and so on (Carlsson, 2003; Layder, 1998).
2. The domain specific meta-theory defines representation of the concepts in the empirical data, and thus guides the researcher in data collection and design of their study. It defines contingent factors (Section 3.4.1) that can change the perception of IQ in the context of the study and specifies kinds of data that should be collected in relation to each aspect of the model. For example in relation to the social world, researchers need to specify the genre of communication within the context. Researchers interested in studying one part of the model (e.g. medium of communication) and its effect on IQ need to make sure that their study is designed in such a way that, the contingent factors related to other structures of the model and their effect on IQ, are known and controlled.

In relation to behavioural concepts, the domain specific meta-theory also helps in designing data collection instruments such as interview questions. This does not mean that researchers are limited to collecting the specified data in relation to defined data fields, but the proposed model provides the initial guidelines that can further be extended by researchers.

Providing a coding system to organize data

The coding system in this study is developed based on Layder's adaptive theory (1998) and is the result of defining the empirical representations (concept indicator links) of the proposed conceptual clustering. The coding system helps researchers to organise and manage empirical data in order to be able to move towards the data analysis stage.

The guidelines suggested in this study combine a grounded theory and a middle-range theoretical approach (see Merton's (1967) approach to middle-range theorizing) in using theoretical concepts and in order to propose a new coding system for IQ research. Thus, the coding system mainly provides an orienting device and is open to changes during the analysis of data. The proposed coding system is informed by theoretical views but it does not force any hypothesis or explanation of the collected data. This approach has a middle range nature itself; it defines empirical representation of the theoretical concepts but it is also open-ended, which allows for emergence of new codes from empirical data. This approach can respond to critiques of Merton's middle-range approach and grounded theory approaches to theorising.

Guiding the analytical process in identifying mechanisms

The goal of the analysis stage is to identify the mechanisms that explain how and why IQ is perceived in a certain way and to address the research questions proposed in Section 5.1.4.

According to CR methodological directives, identification of generative mechanisms and data analysis should happen in the constant movement between abstract concepts and empirical data (retroduction). The proposed domain-specific meta-theory in this study helps researchers with the retroductive process for identifying generative mechanisms and thus provides guidelines for the empirical implementation of Stage 4 (retroduction) and Stage 5 (comparison) of Danermark et al.'s (2001) explanatory methodology.

The proposed domain specific meta-theory can be regarded as an analytical approach to managing empirical data and generating hypotheses about mechanisms. Section 6.4 describes how the derived data can be analysed by differentiating between structures and events. Appendix A, Table A.2 shows an example of how the domain specific meta-theory can help in the analysis stage of the study and with identification of mechanisms.

The developed IQ conceptualisation framework (domain specific meta-theory) also proposes a typology of contextual elements and IQ related concepts in the study of IQ. The need to define the links between theoretical and philosophical concepts with empirical data as part of developing a domain specific-meta theory (explained above) has led this thesis to develop a typology of contextual concepts. Then, relying on existing studies in information and IQ studies, this typology was developed to get closer to the IQ phenomenon in a concrete situation.

Typology building can stimulate and give direction to theoretical thinking. Layder (1998) emphasises the important role of typologies in studying a phenomenon such as IQ, where researchers are required to understand the interactions between systemic elements and individual behaviour (in this study the relation between the social, material and personal worlds and IQ perception). One of the advantages of developing typologies is that they facilitate comparative analysis (Layder, 1998). Typology building in this study is associated with stage 5 of Danermark et al.'s (2001) explanatory methodology as a means of comparison and to provide access to the generative mechanism. The process forces researchers to ask questions such as how and why these phenomena are the same or different, thus stimulating the generation of ideas and explanations.

The proposed typology can be used as the basis of comparative IQ studies in order to identify mechanisms related to the contextual structure more effectively. It helps IQ researchers to develop typological theories[115] by mapping different types of contexts (social and material) to the information user's quality perceptions. For example, consider using the example in Appendix A; one kind of comparative analysis can be defined as studying IQ perception of other communication systems (such as internal social networks, or the university portal) in the same context as Appendix A. This kind of study allows the researcher to more clearly identify and validate the mechanisms on the material level, and to identify how they are related to IQ perception. Another example of comparative analysis could be studying the perception of content provided by Wikis in the same university but within different groups of users (such as postgraduate students or staff). This time the comparative analysis will result in identifying mechanisms related to social structures (in both the immediate and wider social context). This effort helps to identify how different contextual mechanisms can influence IQ evaluation and perception for the information user.

[115] Typological theories are domain specific theories which identify contingent generalisation on how and under what conditions different mechanisms can be enacted and produce different research outcomes (Bennett, 2013).

Since typologies can make comparative analysis possible and can be considered as the access to choices and rationales, this study argues that typologies of contextual systemic concepts provide the basis for achieving disciplined diversity in studying IQ.

Guiding the theorising process

After coding data, in order to find explanations that answer research questions, researchers can also draw on the classification of theoretical lenses described in Chapter 5 as a means of supporting their findings and theorising.

Different theoretical lenses were examined regarding different aspects of the proposed conceptual IQ framework and the IQ related concepts (EQPI, EDQ, and QPI). This effort resulted in a taxonomy of theoretical views that can be applied as a tool in the analysis of empirical data. This taxonomy helps IQ researchers to develop domain specific theories (Figure 7-1) by providing them with possible explanations and mechanisms, and also the possibility of considering different theoretical lenses within different disciplines in a complementary way. The proposed taxonomy enables researchers to more deeply analyse each category of theories and refine theories and their scope in relation to studying IQ. Finally, this taxonomy helps researchers to develop typological theories on how different mechanisms can be enacted in different contexts in relation to the IQ phenomenon (Bennett, 2013).

Although the proposed set of theoretical lenses is not complete, it is open-ended and gives initial guidelines for inclusion of more theoretical lenses and positioning of them regarding the IQ phenomenon.

7.3 CONTRIBUTIONS TO THEORISING

7.3.1 Development of existing theoretical lenses

To be able to adapt the adaptive theory proposed by Layder (1998), this study had to modify and extend this theory and the related concepts to be suitable to study a socio-technical phenomenon such as IQ. Adaptive theory, as a sociological theory, focuses on clarifying the relation between social structure and agency, or in this study, the relation between the social world and personal world (information user) as defined by Mingers and Willcocks (2014). However, in addition to the social context and information user, the material of communication and communicated message (text) (material world and semiotics in Mingers and Willcocks' framework) are defined as entities involved in the formation of the IQ phenomenon. Accordingly, to apply the adaptive theory (Layder, 1998) to the study of IQ, the guidelines proposed by this theory should be extended to include the material world and semiotic concepts. Thus, this study defines the material world as part of the systemic concepts but distinct from social structures (consistent with CR assumptions and other seminal works such as (Mutch, 2010). To define concept indicator links that represent the material structure and its relation with social structures and agency (personal world), this study adapted guidelines from the adaptive theory (Layder, 1998) and Mingers' semiotic methodology (2014). Existing theoretical lenses and studies on IQ were also synthesised to modify concepts from adaptive theory in relation to IQ in concrete situation and to define concept indicator links.

Another contribution of this study is the elaboration of Mingers and Willcocks' (2014) semiotic framework and operationalising it in the study of IQ. Mingers and Willcocks' semiotic framework is defined on an abstract level and they do not specify how it can be applied in the context of IS studies. This study provides an example of how this framework can guide empirical studies of IQ.

This study also translates the meta-theoretical and ontological assumptions of CR to the context of IQ studies and the definition of IQ phenomena and IQ as a research concept. It then provides research guidelines for the study of IQ based on these principles. This approach to conceptualising the phenomenon based on meta-theoretical and ontological assumptions can also be used to conceptualise other multi-disciplinary IS phenomena to move toward a rigorous choice of research methodology and achieve disciplined diversity within the research space.

7.3.2 Positioning according to IS theorising

Chapter 2 discussed how, despite the value of reference theories in IS, application of these theories in the research process is still an issue of debate. The IS research community has been increasingly concerned about the nature of knowledge production and theory development in this field (Straub, 2012; Grover & Lyytinen, 2015). This is mainly because drawing on reference theories (from sociology, economics and other disciplines) has been the dominant way of knowledge production in the IS field. The main critique of this approach is that IS theories stay in the middle range (referring to Merton's (1967) notion of middle-range theories) and IS is treated only as an independent, mediator or moderator variable. IS scholars are concerned whether the use of these reference theories and trying to fit data to a middle-range hypothesis makes IS research blind to what is happening in practice, and to a true understand of the IS environment. Enactment of middle-range theories or development of ordering frameworks[116] is a common approach in most PhD courses in IS. Students find a reference theory and build their research model by adding constructs to capture the IT artefact. The reference theory is extended by inclusion of the IT artefact as an external variable, and the researcher moves to testing the hypothesis derived from this model.

However, this thesis seeks to change this common direction and to avoid this "conformity game" (Grover & Lyytinen, 2015, p. 275) and thus follows a different approach. The approach applied by this thesis can be positioned in relation to Grover and Lyytinen's recent paper (2015) on improving theorising in IS research. Grover & Lyytinen (2015) have classified types of theory building in IS research as instantiation, modifying and extending. They have argued that most of the theories defined by Straub (2012) as native IS theories[117] belong to the extended category.

However, in IS studies few theories[118] fall into the third category; thus, the main question is how the IS community can move towards theory extension. This thesis puts forward the argument that by re-considering the conceptualisation of the research phenomenon based on sound meta-theoretical assumptions and reflexive choices of research methods, researchers in the IS discipline can move towards extending theories rather than instantiating or modifying them. Critical realism as a philosophy for science can provide this possibility by providing ontological tools and epistemological directions, such as stratified reality and the concept of laminated systems that help to avoid reductionist approaches in research.

There is no doubt that general (reference) theories are valuable sources of ideas for researchers. The IS field, being entangled with human and social structures, can benefit from these reference theories (Whetten, Felin, & King, 2009). IS researchers need to reconsider the way that they are drawing on reference theories in order to benefit from the advantages of these theories, but also to avoid the biases mentioned above. Grover and Lyytinen (2015) suggest three main strategies for better use of reference theories and improving theorising in IS: (1) sensitising established constructs to the IS context, such as the re-conceptualisation of the concept of user as social actor in the work of Lamb and Kling (2003); (2) reconfiguration of existing constructs into new configuration logic, such as the work of Ragu-Nathan, Tarafdar,

[116] Ordering frameworks are defined by Sayer as "ways of ordering the relationships between observations (or data) whose meaning has been taken as unproblematic" (Sayer, 1992, p. 50).
[117] Straub (2012, p. v) defines a native theory as on that "must be in some fashion IS specific, perhaps even including IS artefact among its key variables".
[118] Grover and Lyytinen analysed sets of articles from MISQ and JSR journals from 1988 to 2012 and categorised them in the three mentioned categories.

Ragu-Nathan, and Tu (2008); (3) theorising the nature of IT constructs on higher levels and in relation to well-established dependent variables, such as in the work of Dennis, et al. (2008), who reconceptualise communication technologies in a taxonomic way in relation to different contexts.

In relation to the three strategies discussed above, this thesis shares elements of the first and third one. Consistent with the first strategy above, IQ is re-conceptualised as a socially formed phenomenon. This new conceptualisation is different from the common definition of IQ as a context-dependent concept. Defining IQ as a socially formed phenomenon allows investigation of the relation between social structures and users' understanding of information in a systematic way.

This thesis also shares the aspects of the third strategy, which is defining and positioning the IT artefact on a higher level of conceptualisation. Drawing on the semiotic framework developed by Mingers and Willcocks (2014), the material of communication or IT artefact is positioned in relation to the individual social world and text in the IQ perception process. Mingers & Willcocks's framework positions technology as ontologically distinct from the social world and the individual experience of it. This positioning helps the researcher to study different ways in which technology influences perceptions of the information received from the communication medium. According to Grover and Lyytinen (2015), this study can be positioned as a movement towards theorising in IS research because it provides solutions to address problems such as inadequate treatment of the IT artefact and inadequacies in relating theory and empirical data.

7.3.3 New directions in IQ research

The main focus and initial motivation of this study was to address the gap in IQ conceptualisation. Although in IS research conceptualisation is mostly considered as a pre-step for developing measurement models (MacKenzie, 2003), the conceptual framework suggested in this study deviates from this dominant view (mainly found in information system and computer science studies) towards estimating and explaining IQ (Embury & Missier, 2014).

IQ has been widely defined in IQ studies by using sets of dimensions and measures and with the goal of developing measurement frameworks. While this approach has been helpful, there is still a gap in how IQ dimensions can be translated to objective metrics (Embury and Missier, 2014). On the other hand, this kind of definition of the concept of IQ has created constant debate within the research community with regard to agreed sets of measures, which, in practice, are domain specific and cannot be agreed on naturally (Embury & Missier, 2014). According to Carlsson (2005), the current approach to evaluation of IQ can be characterised as pragmatic evaluation. He remarks on two main problems with a pragmatic approach to evaluation: first, ignorance of contextual mechanisms and influences, and secondly dependence on stakeholders' opinions, which can be biased about methods of data collection (Carlsson, 2005, p. 9).

The framework suggested in this study does not provide a measurement or evaluation guideline but provides grounds for estimating and explaining information users' expectations and perceptions of information. The framework proposed in this study requires researchers to shift their view from measurement and pragmatic evaluation to realistic evaluation (Carlsson, 2005). Section 5.1.4 of this study, adapting Mingers and Willcocks's (2014) framework, proposes new research questions in relation to the study of IQ. These research questions are consistent with Pawson and Tilley's (1997) definition of a realist evaluation approach. Carlsson (2005), relying on this definition, proposed that a realist view of the evaluation of an information system should answer the questions "why and how an IS initiative works, for whom, and in what circumstances", through understanding the action of mechanisms (Pawson and Tilley, 1997). Thus, the research questions derived from the CR general meta-theory in Chapter 5 propose a shift in IQ research from the focus on information quality measurement (pragmatic approach) to a realist evaluation of information and an understanding of how the information users' perceptions of IQ are changed through contextual mechanisms.[119]

To better understand how current IQ studies' approaches can be altered, in Appendix C, the proposed framework is applied to two IQ studies one each from both Information System and information science disciplines. This mapping provides the opportunity; first, to position these works in relation to the IQ concept, and second, to criticise and propose extension for these studies. These two examples show how IQ researchers can better define their study approach and position their findings.

[119] It should be noted that many studies in the information science discipline (Rieh 2000, 2002) try to approach IQ by answering questions why and how, but as discussed, the main problem with these approaches is lack of a realistic ontology (Section 3.1.1).

7.4 CONTRIBUTION TO PRACTICE

Information and quality of information have a critical role in the effectiveness of all decision making tasks in organisations and broader social activities. Thus, IQ research should be able to contribute to the relevant practical fields efficiently.

In Chapter 2, the challenges related to IQ practice and research were discussed. The point was made that the research related problems can never be tackled without attention to their implementation in practice (Illari, 2014). These challenges are mainly related to the nature of IQ as being context- and use-dependent, which causes practitioners to start developing IQ measures from scratch when evaluating IQ in their specific context of use. This problem also makes IQ management and IQ improvement programs limited in use. IQ researchers have reacted to this problem by trying to define unified IQ frameworks and testing the frameworks in different contexts (Stvilia, et al., 2007) or focusing on defining only intrinsic IQ attributes (Batini, et al., 2014).

However, this thesis is built on the argument that diversity in research is required and there is no way to avoid it. But this diversity needs to be disciplined in order to provide consistent and practical research outcomes. This study, consistent with IS researchers (Robey, 1996; Weber, 2003), advocates the view that following principles of disciplined diversity in research can make better contributions to practice and produce research that is domain specific but identifies similarities between different contexts and mechanisms (Section 3.2.4) (Wynn & Williams, 2012). The concept of generative mechanisms and the existence of similarities in the contextual structures means that, despite the context dependency of IQ, researchers are able to explain and justify the variety of definitions and dimensions of IQ in different contexts. The typology of social and material structures proposed in this study provides the basis for this justification thus helps to define IQ and IQ attributes in the new contexts of use.

One of the focal points for social research and thus for enabling IS research to be effectively applicable in practice is the philosophical stance that the research is built on. The assumptions held by researchers about reality and the relation between the human, social and material worlds impact on the practical contributions of their research. In IQ research, positivism is the dominant research philosophy. These positivist studies are mostly confused between defining IQ as fitness for use and developing IQ measures based on their nomothetic ontological views (Bhaskar, 2013; Cruickshank, 2003; Danermark, et al., 2001). Interpretivists, on the other hand, while explaining IQ from the users' point of view more precisely, fail to go beyond narratives in defining information qualities (Mai, 2013). Thus, these studies have limited applicability to the specific context of their study. Critical realism, taking a moderate position between both positivist and interpretivist philosophical assumptions (Mingers, 2001a), considers technological, social and cognitive aspects of IS and IQ studies, and has been argued (Section 3.1.1) to suit studying IQ in a pragmatic way.

This thesis also argues that a mechanism-based view in IQ research and the move toward realist evaluation guide IQ researchers to better identify users' information needs and expectations in relation to both social and technical contexts. Thus, the proposed approach contributes indirectly to more efficient IQ management and improvement programs (as was mentioned in Section 1.5).

7.5 LIMITATIONS AND FUTURE RESEARCH

As was discussed, the domain specific meta-theory suggested in this thesis is a conceptual framework based on philosophical assumptions and theoretical guidelines, thus is fallible and possibly biased by the researcher's background and philosophical knowledge. Furthermore, the process of conceptualisation and design of this framework involved many iterative phases which led to an evolution of the researcher's knowledge and consequently the development of the research concepts.

Accordingly, the limitations of this study are discussed below; first, in regard to the scope and nature of the outcome of the thesis and second, in regard to the conceptualisation process.

7.5.1 Nature and scope of the thesis

This study constructs a domain-specific meta-theory in the field of IQ. This domain-specific meta-theory works as an under-labourer to inform empirical research (Cruickshank, 2003). Although using a domain specific meta-theory in an empirical study helps to avoid tautological outcomes (Section 3.4.2), the precepts proposed by this study are not meant to be infallible; they are fallible guiding principles which are open to be revised during future empirical studies.

The domain specific meta-theory, as the main outcome of this study, is a holistic representation of the structures, their interactions and the mechanisms involved in understanding IQ. Regarding the application of this framework in future empirical studies, it should be noted that not all structures and mechanisms defined in this thesis are working and are important in a research context. Future empirical studies need to identify which structures are more important and which mechanisms are working in the specific context of their study. The proposed framework in this thesis is hypothetical at this stage of the retroductive process and by conducting future empirical studies, it may require revisions of proposed structures, concept indicator links and mechanisms. Nevertheless, the framework provides the possibility for identifying different levels of structures and examining a wide range of mechanisms.

This study also does not give researchers a detailed procedure for how to conduct an empirical study, but provides analytical tools to guide data collection and the analysis process, and helps researchers to justify their choices in the research process.

This study, based on CR, relies on philosophical ontology to unify the research on IQ. This approach has been criticised by researchers as not being connected to empirical research. Kemp (2005) argues that convincing ontology can be only established when research in a domain has been successful and a degree of unity exists in the domain of the study. He argues that CR ontology cannot be used to regulate the research process but can only be used as one of the possible ways of thinking. However, the belief that philosophy can guide the research process is not disconnected from the belief that philosophy learns from that process in return (Elder-Vass, 2007). In fact, this is the very spirit of Bhaskar's (2013) work and Danermark et al.'s (2001) methodology that emphasise iteration and movement between abstraction and the concrete process. The main promise of CR is to provide a toolbox to develop an abstract definition of the phenomenon prior to empirical study. However, this thesis does not go beyond an abstract conceptualisation of IQ (because of the time limits and dealing with complexity on an abstract level). Future empirical studies informed by this framework can provide feedback to revise the proposed conceptualisation framework and ontology.

7.5.2 Limitations in research design and methodology

This study is built based on the rigorous philosophical and methodological principles of CR established by Bhaskar (1978-2010) and also semiotic principles established by Peirce (1933). Some of the limitations of this manuscript relate to different interpretations and existing debates on these philosophical principles.

In relation to Bhaskar's philosophy, he has never clarified his philosophical terms and ontological principles and their implications. Researchers in the philosophy of social science have been trying to remedy these deficiencies through their interpretations and philosophical discussions (Collier, 1994). Thus, this study also had to make some choices regarding these interpretations in relation to the study goals, context and also the researcher's understanding of these concepts. For example, in Chapter 4 of this study, in developing a stratified conceptualisation of IQ, entities and their structures are assigned to the domain of the real in Bhaskar's stratified reality. This approach is consistent with Fleetwood (2001) who believes entities and their powers and structures belong to the domain of the real. Elder-Vass (2007) argues against this positioning but also acknowledges that either position (the former, or assigning entities to the actual domain) has its own inconsistencies. Defining an IQ phenomenon as an event in the empirical domain, this thesis argues that positioning entities in the real domain can provide better and less complicated methodological perspectives;[120] this positioning, in this study, also does not violate Bhaskar's (2013) conceptualisations of the empirical and the actual as sub-domains of the real domain. However, this argument is open for debate.

Another point of debate in this thesis is the use of Peircian semiotics and the definitions of information, sign, text and the IQ perception process based on this theory. This thesis has mainly relied on seminal works by other researchers such as Mingers and Willcocks (2014), Mingers (1995), Nellhaus (1998) and Noth (1995), to build the conceptual model and also define the links between CR and semiotics.[121] However, these studies and their interpretations of semiosis and CR could be discussed and debated by other scholars.

This study mainly draws on an explanatory conceptualisation methodology proposed by Danermark et al. (2001) to develop an abstract conceptual definition of IQ and propose guidelines for empirical studies. This methodology does not provide the details of the abstraction process for IQ as a socio-technical phenomenon. Thus, this study had to rely on several methodological approaches complementary to Danermark et al.'s approach; for example, Cruickshank's (2003) work on developing domain-specific meta-theory, Mingers and Willcocks's (2014) semiotic framework to define the IT artefact, and Layder's adaptive theory (1998) as guidelines to translate theoretical concepts to empirical research. Although the choices and application of these approaches are justified through this thesis, they are inevitably constrained by the researcher's knowledge and experience.

[120] My own argument against the critique of Elder-Vass about positioning entities in the real domain is that, entities are defined and considered in relation to the event experienced in the empirical domain. For example when a pen falls, in this event (if we don't know about the gravity) we would not necessarily see the earth (although earth is not invisible) as an involved entity in the formation of the event. Earth is not experienced by falling the pen thus doesn't belong to domain of empirical in this case. For example, in IQ perception as a research concept (in empirical domain), social context is not experienced directly thus belongs to domain of real.

[121] And of course my own understanding of these works.

The same case also applies to the development of a taxonomy of theoretical lenses in Chapter 5 of this study. Different theoretical lenses have been introduced and positioned according to a general CR meta-theory of IQ. Although this process is informed by many other scholars, it still involves the researcher's interpretations.

7.5.3 Future research

Different research ideas can be suggested in relation to this thesis either to instantiate the proposed framework or to extend it, or even use the ideas in other fields of studies.

The value of the proposed conceptualisation framework in this study can be instantiated in future research by applying two approaches. Firstly, this domain-specific meta-theory can be used as an under-labourer to study IQ empirically in a specific context [122]Secondly, this framework can be used as a unifying framework to position prior studies or as a criticising framework to identify the inconsistencies between research assumptions, goals and methodologies applied in prior studies (See Appendix C).

The proposed domain specific meta-theory or conceptualisation framework can be further developed and kept up-to-date through two main approaches: firstly, the coding system proposed for contextual concepts in this study can be revised and improved by conducting empirical studies (specifically several case studies) (Layder, 1998); subsequently, this revision can lead to a revision of ontological aspects of the model if necessary. The proposed typology in this study also can be completed by extending the literature review analysis beyond IQ studies and to other areas of research, such as information behaviour and information retrieval studies.

Beyond instantiating and completing the proposed framework, future studies can focus on methodological aspects of the model in general. For example, "how different methodologies or how different data collection methods can convey knowledge about generative mechanisms in the study's context?" (Danermark et al., 2001. p.163). In chapter 4 of this thesis (Figure 4.9), it was argued that research related structures and mechanisms are important in forming the IQ as a research concepts. How the research related structures and mechanisms interact with other structures in the context of a study, can the topic of future studies.

The other crucial aspect of the proposed framework in this thesis, is introducing three concepts in relation to the IQ perception; EQPI, EDQ and QPI. Future research can focus on

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[122] One possible future study can be defined as studying the perception of IQ from Yammer, a private social networking website used for communications within an organization, at QUT as the university context.

better positioning these three concepts and how they are related to each other. Ontologically these three concepts can be discussed in their relations to the transitive and intransitive objects of science. This discussion provides more insights on the methodological choices in studying these phenomena. The relation between these three concepts specially identifying how EDQ criteria are related to EQPI criteria (according to the context) is an important step in further development of the proposed framework and also an important contribution to IQ research. Different approaches can be used to identify this relationship; such as comparative empirical studies in different contexts, or an extensive literature review on different kinds of genres used in the IS context (see Section 6.3.2.3).

Since many IS phenomena are multi-disciplinary (can be studied across different disciplines) and also domain specific (can be defined differently according to their context of the study), the proposed approach to conceptualisation of IQ in Chapters 4 and 5 can also be adapted beyond IQ studies to conceptualise other research phenomena with non-disciplined diversity in conceptualisation as well.

Other areas of future studies can be defined in relation to basic principles of this study, such as the use of Peircian semiotics or CR principles. Future complementary studies with more philosophical focus on CR and Bhaskar's (1978-2010) definitions might be able to debate and further complete the proposed conceptualisation of IQ in this study. Future theoretical studies following up this thesis can be conducted in relation to semiosis and how CR assumption can strengthen (or not) the application of semiosis in information system studies.

Reference List

Aakhus, M., Ågerfalk, P. J., Lyytinen, K., & Te'eni, D. (2014). *Symbolic Action Research in Information Systems: Introduction to the Special Issue*. MIS Quarterly, 38(4), 1187-1200.

Agarwal, N., & Yiliyasi, Y. (2010). *Information quality challenges in social media. In International Conference on Information Quality* (ICIQ). Arkansas at Little Rock, USA

Agichtein, E., Castillo, C., Donato, D., Gionis, A., & Mishne, G. (2008). Finding high-quality content in social media. In 2008 International Conference on Web Search and Data Mining (pp. 183-194): Palo Alto.

Ajzen, I. (1985). *From intentions to actions: A theory of planned behavior*. In Action control (pp. 11-39).Berlin Heidelberg: Springer.

Almeida, J., Goncalves, M. A., Figueiredo, F., Pinto, H., & Belem, F. (2010). *On the Quality of Information for Web 2.0 Services*. IEEE Internet Computing, 14(6), 47-55.

Anderka, M. (2013). *Analyzing and Predicting Quality Flaws in User-generated Content: The Case of Wikipedia*. Doctor of Philosophy, Bauhaus-Universität Weimar Germany.

Anderson, N. H. (1981). *Integration theory applied to cognitive responses and attitudes*. Cognitive responses in persuasion, 361-397.

Arazy, O., & Kopak, R. (2011). *On the measurability of information quality*. Journal of the American society for information science and technology, 62(1), 89-99.

Archer, M., Sharp, R., Stones, R., & Woodiwiss, T. (1999). *Critical realism and research methodology*. Alethia, 2(1), 12-16

Archer, M. S. (1995). *Realist social theory: The morphogenetic approach*: Cambridge University press.

Archer, M. S. (2006). *Persons and ultimate concerns: Who we are is what we care about*. Paper presented at The proceeding of the 11th Plenary Session of the Pontificial Academy of Social Science, Vatican City

Avgerou, C. (2001). T*he significance of context in information systems and organizational change*. Information Systems Journal, 11(1), 43-63. doi:10.1046/j.1365-2575.2001.00095.x

Baeza-Yates, R. (2009). *User generated content: how good is it?* Paper presented at 3rd Workshop on Information Credibility on the Web, Madrid, Spain.

Bakhtin, M. M. (2010). *Speech genres and other late essays*: University of Texas Press.

Ballou, D., Wang, R., Pazer, H., & Tayi, G. K. (1998). *Modeling information manufacturing systems to determine information product quality*. Management Science, 44(4), 462-484.

Ballou, D. P., Chengalur-Smith, I. N., & Wang, R. Y. (2006). *Sample-based quality estimation of query results in relational database environments*. IEEE Transactions on Knowledge & Data Engineering(5), 639-650.

Barad, K. (2003). *Post humanist performativity: Toward an understanding of how matter comes to matter*. Signs, *28*(3), 801-831.

Barki, H. (2008). *Thar's gold in them thar constructs*. ACM SIGMIS Database, 39(3), 9-20.

Bandara, W., Miskon, S., & Fielt, E. (2011). *A systematic, tool-supported method for conducting literature reviews in information systems*. In Proceedings of the19th European Conference on Information Systems (ECIS 2011), Helsinki, Finland.

Bateson, G. (1972). *Steps to an ecology of mind: Collected essays in anthropology, psychiatry, evolution, and epistemology*: University of Chicago Press.

Batini, C., Palmonari, M., & Viscusi, G. (2014). *Opening the closed world: A survey of information quality research in the wild*. In The Philosophy of Information Quality (pp. 43-73): Springer.

Batini, C., & Scannapieca, M. (2006). *Data quality: concepts, methodologies and techniques*. Berlin: Springer.

Bawden, D. (2001). *Information and digital literacies: a review of concepts*. Journal of documentation, 57(2), 218-259.

Belardo, S., & Pazer, H. L. (1995). *A framework for analyzing the information monitoring and decision support system investment tradeoff dilemma: an application to crisis management*. Engineering Management, IEEE Transactions on, 42(4), 352-359.

Belkin, N. J. (1975). *Towards a definition of information for informatics*. In Informatics (Vol. 2, pp. 50-56).

Belkin, N. J. (1996). *Intelligent information retrieval: whose intelligence?*. In J. Krause, M. Herfurth,J.Marx (Eds.). ISI '96: Hearausfordurungen an die InformationswirtschaftInformationsverdichtung, Informationsbewertung and Datenvisualisierung. Konstanz, Germany, University of Konstanz. 25-31.

Bem, D. J. (1972). *Self-perception theory*. In: Leonard Berkowitz, Editor(s), Advances in Experimental Social Psychology, Volume 6, Pages 1-62, NewYork, London: Academic Press

Benbasat, I., & Barki, H. (2007). *Quo vadis TAM?*. Journal of the association for information systems, 8(4), 7, 211-218.

Benbasat, I., & Weber, R. (1996). *Research Commentary: Rethinking "Diversity" in Information Systems Research.* Information systems research, 7(4), 389-399. Retrieved from bsh.Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsh&AN=4430769&site=ehost-live&scope=site.

Bennett, A. (2013). *The Mother of all isms: Causal Mechanisms and Structured Pluralism in Internationals RelationsTheories*. European Journal of Interantional Relations 19(3), 459-481.

Berthon, P., Pitt, L., Ewing, M., & Carr, C. L. (2002). *Potential research space in MIS: A framework for envisioning and evaluating research replication, extension, and generation*. Information Systems Research, 13(4), 416-427.

Bertin, J. (1983). *Semiology of graphics: diagrams, networks, maps*. Madison, WI: The University of Wisconsin Press.

Bertino, E., Maurino, A., & Scannapieco, M. (2010). *Guest Editors' Introduction: Data Quality in the Internet Era*. IEEE Internet Computing, 14(4), 11.

Best, S., & Kellner, D. (1991). *Postmodern theory: Critical interrogations*. New York: Guilford Press.

Bettman, J. R., Johnson, E. J., & Payne, J. W. (1986). *Cognitive Effort and Decision Making Strategies: A Componential Analysis of Choice*. Retrieved from

Beynon-Davies, P. (2009). *Neolithic informatics: The nature of information*. International journal of information management, 29(1), 3-14. Retrieved from http://www.sciencedirect.com/science/article/pii/S0268401208001564. doi:http://dx.doi.org/10.1016/j.ijinfomgt.2008.11.001

Bhaskar, R. (1986). *Scientific realism and human emancipation*. London: Verso.

Bhaskar, R. (1989). *Reclaiming Reality: A Critical Introduction to Contemporary Philosophy*. London Verso.

Bhaskar, R. (1993). *Dialectic: The Pulse of Freedom*. Verso London-New York, 94.

Bhaskar, R. (1998). *The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences* (Critical Realism--Interventions): New York: Routledge.

Bhaskar, R. (2010). *Interdisciplinarity and climate change: Transforming knowledge and practice for our global future*. e-libraray Taylor & Francis.

Bhaskar, R. (2013). *A realist theory of science*. Lodnon, New York Routledge.

Bhaskar, R., & Danermark, B. (2006). *Metatheory, Interdisciplinarity and Disability Research: A Critical Realist Perspective*. Scandinavian Journal of Disability Research, 8(4), 278-297. Retrieved from http://dx.doi.org/10.1080/15017410600914329. doi:10.1080/15017410600914329

Biermann, J., Golladay, G. J., Greenfield, M. L. V., & Baker, L. H. (1999). *Evaluation of cancer information on the Internet*. Cancer, 86(3), 381-390.

Bizzell, P. (1992). *Academic discourse and critical consciousness*. Pittsburg and London University of Pittsburgh Press.

Bjørn-Andersen, N. (1988). *Are 'human factors' human?*. The Computer Journal, 31(5), 386-390.

Blair, D. C. (2003). *Information retrieval and the philosophy of language*. Annual review of information science and technology, 37(1), 3-50.

Blaylock, B. K., & Rees, L. P. (1984). *Cognitive Style and the Usefulness of Information*. Decision Sciences, 15(1), 74-91.

Boell, S., & Cecez-Kecmanovic, D. (2011). *Theorizing information–From signs to sociomaterial practices*. In Australian Conference on Information System 2011 Proceedings (pp. Paper 53).

Boell, S., & Cezec-Kecmanovic, D. (2011). *Are systematic reviews better, less biased and of higher quality?* Paper presented at European conference on Information System Helsinki, Finland.

Boell, S. K., & Cecez-Kecmanovic, D. (2010). *Literature reviews and the hermeneutic circle*. Australian Academic & Research Libraries, 41(2), 129-144.

Boland Jr, R. J. (1986). *Phenomenology: a preferred approach to research on information systems*. In Trends in information systems (pp. 341-349): North-Holland Publishing Co.

Bovee, M., Srivastava, R. P., & Mak, B. (2003). *A conceptual framework and belief-function approach to assessing overall information quality*. International journal of intelligent systems, 18(1), 51-74.

Brier, S. (2004). *Cybersemiotics and the Problems of the Information-Processing Paradigm as a candidate for a unified Science of information behind library information science*. Library Trends, 52(3), 629.

Brier, S. (2005). *The construction of information and communication: A cyber semiotic re-entry into Heinz von Foerster's metaphysical construction of second-order cybernetics*. Semiotica, 2005(154-1/4), 355-399.

Burel, G., He, Y., & Alani, H. (2012). *Automatic identification of best answers in online enquiry communities*. In The Semantic Web: Research and Applications (Vol. 7295, pp. 514-529). Heidelberg: Springer.

Burgess, M. S., Gray, W. A., & Fiddian, N. J. (2007). *Using quality criteria to assist in information searching*. International Journal of Information Quality, 1(1), 83-99.

Burton-Jones, A. (2005). *New perspectives on the system usage construct* Doctor of Philosophy. Georgia State University.

Burton-Jones, A., & Grange, C. (2012). *From use to effective use: A representation theory perspective*. Information Systems Research, 24(3), 632-658.

Burton-Jones, A., & Straub Jr, D. W. (2006). *Reconceptualizing system usage: An approach and empirical test*. Information systems research, 17(3), 228-246.

Bygstad, B., & Munkvold, B. E. (2011). *In search of mechanisms*. Conducting a critical realist data analysis.

Callon, M. (1990). *Techno‐economic networks and irreversibility*. The Sociological Review, 38(S1), 132-161.

Capurro, R., & Hjørland, B. (2003). *The concept of information*. Annual review of information science and technology, 37(1), 343-411.

Carlson, J. R., & Zmud, R. W. (1999). *Channel expansion theory and the experiential nature of media richness perceptions*. Academy of management journal, 42(2), 153-170.

Carlsson, S. (2005). *A critical realist perspective on IS evaluation research*. In Proceeding of European Conference on Information System (ECIS) 2005 Proceedings, 125, Regensburg, Germany

Carlsson, S. A. (2003). *Critical realism: a way forward in IS research*. In Proceeding of European Conference on Information System ECIS (pp. 348-362): Naples, Italy.

Carlsson, S. A. (2009). *Critical realist Information Systems research*. Encyclopaedia of Information Science and Technology, (2nd ed, pp. 811-817). Pennsylvania USA: Information Science Reference

Caro, A., Calero, C., Caballero, I., & Piattini, M. (2008). *A proposal for a set of attributes relevant for Web portal data quality*. Software Quality Journal, 16(4), 513-542.

Carr, A. J., Gibson, B., & Robinson, P. G. (2001). *Is quality of life determined by expectations or experience?*. British medical journal, 322(7296), 1240.

Cecez-kecmanovic, D. (2011). *Doing critical information systems research arguments for a critical research methodology*. European Journal of Information Systems, 20(44), 440-455. doi:doi:http://dx.doi.org/10.1057/ejis.2010.6

Chai, K., Hayati, P., Potdar, V., Wu, C., & Talevski, A. (2010). *Assessing post usage for measuring the quality of forum posts*. 4th IEEE International Conference on Digital Ecosystems and Technologies, Dubai, United Arab Emirates, 233-238

Chaiken, S. (1980). *Heuristic versus systematic information processing and the use of source versus message cues in persuasion*. Journal of Personality and Social Psychology, 39(5), 752-766. Retrieved from pdh.Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=pdh&AN=1981-28035-001&site=ehost-live&scope=site. doi:10.1037/0022-3514.39.5.752.

Chalmers, M. (2004). *Hermeneutics, information and representation. European Journal of Information Systems*, 13(3), 210-220. Retrieved from ProQuest Central.

Chandler, D. (2002). *Semiotics: the basics* (Vol. 1). New York; London: Routledge.

Checkland, P., & Holwell, S. (1997). *Information, Systems and Information Systems: Making Sense of the Field*. West Sussex, England Wiley.

Chen, C. C., & Tseng, Y.-D. (2011). *Quality evaluation of product reviews using an information quality framework*. Decision Support Systems, 50(4), 755-768. Retrieved from http://www.sciencedirect.com/science/article/pii/S0167923610001478. doi:http://dx.doi.org/10.1016/j.dss.2010.08.023

Chen, S., Duckworth, K., & Chaiken, S. (1999). *Motivated heuristic and systematic processing*. Psychological Inquiry, 10(1), 44-49.

Chengalur-Smith, I. N., Ballou, D. P., & Pazer, H. L. (1999). *The impact of data quality information on decision making: an exploratory analysis*. Knowledge and Data Engineering, IEEE Transactions on, 11(6), 853-864.

Cheung, C. M.-Y., Sia, C.-L., & Kuan, K. K. (2012). *Is this review believable? A study of factors affecting the credibility of online consumer reviews from an ELM perspective*. Journal of the Association for Information Systems, 13(8), 618.

Chuenchom, S. (2011). *User-cantered Evaluation of the Quality of Blogs*. Doctor of Philosophy, University of North Texas.

Ciborra, C. U. (1998). *Crisis and foundations: an inquiry into the nature and limits of models and methods in the information systems discipline*. The Journal of Strategic Information Systems, 7(1), 5-16.

Cicourel, A. (1978). *Language and society: Cognitive, cultural and linguistic aspects of language use*. Sozialwissenschaftliche Annalen, 2, 325-359.

Clements, M., De Vries, A. P., & Reinders, M. J. (2010). *The task-dependent effect of tags and ratings on social media access*. ACM Transactions on Information Systems (TOIS), 28(4), 21.

Collier, A. (1989). *Scientific realism and socialist thought*. Hemel Hempstead: Harvester Wheatsheaf.

Collier, A. (1994). *Critical realism: an introduction to Roy Bhaskar's philosophy*. London Veso.

Coyne, R. (1995). *Designing information technology in the postmodern age*. Canbridge MIT Press.

Crinson, I. (2007). *Nursing practice and organisational change within the NHS: a critical realist methodological approach to the analysis of discursive data*. Methodological Innovations Online, 2(2), 32-43.

Cruickshank, J. (2003). *Underlabouring and unemployment: notes for developing a critical realist approach to the agency of the chronically unemployed*. Critical Realism: The Difference it Makes, 111-127.

Daft, R. L., & Lengel, R. H. (1986). *Organizational information requirements, media richness and structural design*. Management science, 32(5), 554-571.

Dai, Y., Kakkonen, T., & Sutinen, E. (2011). *SoMEST: a model for detecting competitive intelligence from social media*. Paper presented at Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, Tampere, Finland

Danermark, B., Ekstrom, M., & Jakobsen, L. (2001). *Explaining society: an introduction to critical realism in the social sciences*. New York and London: Routledge.

Davis, F. D. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology*. MIS quarterly, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). *User acceptance of computer technology: a comparison of two theoretical models*. Management science, 35(8), 982-1003.

Davis, G., & Olson, M. (1985). *Management information systems: Conceptual foundations, methods and development*. McGraw-Hill, New York.

De Saussure, F. (1916). *Course in general linguistics.* Literary theory: An anthology, 59-71.

Delanty, G., & Strydom, P. (2003). *Philosophies of Social Science: The Classic and Contemporary Readings*, Maidenhead: Open University Press.

DeLone, W. H., & McLean, E. R. (1992). *Information systems success: The quest for the dependent variable*. Information systems research, 3(1), 60-95.

Delone, W. H., & McLean, E. R. (2003). *The DeLone and McLean model of information systems success: a ten-year update*. Journal of management information systems, 19(4), 9-30.

Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). *Media, Tasks, and Communication Processes: A Theory of Media Synchronicity*. MIS quarterly, 32(3), 575-600. Retrieved from http://www.jstor.org/stable/25148857. doi:10.2307/25148857

Detmar, S. (2012). *Editor's comments: Does MIS have native theories?* Management Information Systems Quarterly, 36(2).

Dobson, P. J. (2001). *The philosophy of critical realism—an opportunity for information systems research*. Information Systems Frontiers, 3(2), 199-210.

Doolin, B. (1998). *Information technology as disciplinary technology: being critical in interpretive research on information systems*. Journal of Information Technology, 13(4), 301-311.

Doolin, B. (2004). *Power and resistance in the implementation of a medical management information system*. Information Systems Journal, 14(4), 343-362.

Dourish, P. (2004). *Where the action is: the foundations of embodied interaction*. Cambridge: MIT press.

Dretske, F. (1981). *Knowledge and the Flow of Information* (Vol. 92), Cambridge: MIT Press.

Dretske, F. I. (1983). *Précis of Knowledge and the Flow of Information*. Behavioral and Brain Sciences, 6(01), 55-63.

Eagly, A. H., & Chaiken, S. (2007). *The advantages of an inclusive definition of attitude*. Social Cognition, 25(5), 582-602.

Easton, G. (2010). *Critical realism in case study research*. Industrial Marketing Management, 39(1), 118-128.

Edwards, P. K., O'Mahoney, J., & Vincent, S. (2014). *Studying Organizations Using Critical Realism: A Practical Guide* (Vol. 17): Oxford University Press.

Eisenberg, E. M., & Riley, P. (1988). *Organizational symbols and sense-making*. Handbook of organizational communication, 131, 150.

Elder-Vass, D. (2007). *A method for social ontology: Iterating ontology and social research*. Journal of Critical Realism, 6(2), 226-249.

Embury, S. M., & Missier, P. (2014). *Forget Dimensions: Define Your Information Quality Using Quality View Patterns*. In The Philosophy of Information Quality (pp. 25-41), Switzerland: Springer.

Emigh, W., & Herring, S. C. (2005). *Collaborative authoring on the web: A genre analysis of online encyclopaedias*. In System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii International Conference on (pp. 99a-99a): IEEE.

English, L. P. (1999). *Improving data warehouse and business information quality: methods for reducing costs and increasing profits*. Hoboken: John Wiley & Sons, Inc.

English, L. P. (2009). *Information quality applied: Best practices for improving business information, processes and systems*: Wiley Publishing.

Eppler, M. J., & Wittig, D. (2000). *Conceptualizing information quality: a review of information quality frameworks from the last ten years*. Paper presented at 5th International Conference on Information Quality (ICIQ 2000), Cambridge, MA.

Evans, J. R., & Lindsay, W. M. (2002). *The management and control of quality*. South-Western Cincinnati: West Publishing Company

Fairclough, N. (2005). *Peripheral vision discourse analysis in organization studies: The case for critical realism*. Organization studies, 26(6), 915-939.

Fairclough, N., Jessop, B. & Sayer, A. (2004). *Critical realism and semologic*. London Routledge.

Falkenberg, E. D., Hesse, W., Lindgreen, P., Nilsson, B. E., Oei, J. H., Rolland, C., . . . Voss, K. (1998). *A framework of information systems concepts* (Vol 8). IFIP WG.

Fay, B. (1994). *General laws and explaining human behavior*. Readings in the philosophy of social science, 54-110.

Feldman, M. S., & March, J. G. (1981). *Information in Organizations as Signal and Symbol*. Administrative Science Quarterly, 26(2), 171.

Fichman, P. (2011). *A comparative assessment of answer quality on four question answering sites*. Journal of Information Science, 37(5), 476-486.

Figueiredo, F., Belém, F., Pinto, H., Almeida, J., Gonçalves, M., Fernandes, D., Cristo, M. (2009). *Evidence of quality of textual features on the web 2.0*. Proceedings of the 18th ACM Conference on Information and Knowledge Management, Hong Kong, China

Figueiredo, F., Pinto, H., Belém, F., Jussara., A., Gonçalves, M., David., F., & Moura, E. (2013). *Assessing the quality of textual features in social media. Information processing and management*, 49(1), 222-247.

Fink-Shamit, N., & Bar-Ilan, J. (2008). *Information quality assessment on the Web-an expression of behaviour*. Information Research, 13(4), 22-22.

Fisher, C. W., Chengalur-Smith, I., & Ballou, D. P. (2003). *The impact of experience and time on the use of data quality information in decision making*. Information Systems Research, 14(2), 170-188.

Fisher, C. W., & Kingma, B. R. (2001). *Criticality of data quality as exemplified in two disasters*. Information & Management, 39(2), 109-116.

Fleetwood, S. (2001). *Causal laws, functional relations and tendencies*. Review of Political Economy, 13(2), 201-220.

Fleetwood, S., & Ackroyd, S. (2004). *Critical realist applications in organisation and management studies (*Vol. 11) Oxford: Psychology Press.

Floridi, L. (2006). Information quality. In *International Conference on Information Quality was organised in* (Vol. 1996).

Floridi, L. (2009). *Philosophical conceptions of information*. In Formal theories of information (pp. 13-53): Springer.

Floridi, L. (2012). *Big data and their epistemological challenge*. Philosophy & Technology, 25(4), 435-437.

Floridi, L. (2013). *Information quality*. Philosophy & Technology, 26(1), 1-6.

Floridi, L., & Illari, P. (2014). *The Philosophy of Information Quality*. Dordrecht Springer.

Fogg, B. J. (2003). *Prominence-interpretation theory: Explaining how people assess credibility online*. In CHI'03 extended abstracts on Human factors in computing systems (pp. 722-723): ACM.

Foucault, M. (1980). *Power/knowledge: Selected interviews and other writings*, 1972-1977: Pantheon.

Fox, C., Levitin, A., & Redman, T. (1994). *The notion of data and its quality dimensions*. Information processing & management, 30(1), 9-19.

Fulk, J., Steinfield, C. W., Schmitz, J., & Power, J. G. (1987). *A social information processing model of media use in organizations*. Communication research, 14(5), 529-552.

Gable, A. (2011). *Disability and challenging behaviour: An exploration of social relations in a school environment through critical realism*. Doctor of Philosophy The University of Queensland Australia

Gable, A. S. (2014). *Disability theorising and real-world educational practice: a framework for understanding*. Disability & Society, 29(1), 86-100.

Gable, G. G. (1994). *Integrating case study and survey research methods: an example in information systems*. European journal of information systems, 3(2), 112-126.

Garcia, L., & Quek, F. (1997). *Qualitative research in information systems: time to be subjective?* In Information systems and qualitative research (pp. 444-465): Springer US.

Garvin, D. A. (1984). *What does "product quality" really mean*? Sloan management review, 26(1), 25-43.

Ge, M., & Helfert, M. (2007). *A review of information quality research-develop a research agenda*. Paper presented at 12th International Conference on Information Quality, Cambrdige, USA.

George, A. L., & Bennett, A. (2005). *Case studies and theory development in the social sciences*, Cambridge: MIT Press.

Gerjets, P., Kammerer, Y., & Werner, B. (2011). *Measuring spontaneous and instructed evaluation processes during Web search: Integrating concurrent thinking-aloud protocols and eye-tracking data*. Learning and Instruction, 21(2), 220-231.

Gersick, C. J., & Hackman, J. R. (1990). *Habitual routines in task-performing groups*. Organizational behavior and human decision processes, 47(1), 65-97.

Gibbons, H. A. (2015). *An Introduction to World Politics,* Oxford: Routledge.

Giddens, A. (1984). *The constitution of society:* Outline of the theory of structuration: University of California Press.

Glaser, B. G., & Strauss, A. L. (2009). *The discovery of grounded theory:* Strategies for qualitative research, Herndon: Transaction Publishers.

Goertz, G. (2006). *Social science concepts: a user's guide*: Princeton University Press.

Goertz, G., & Mahoney, J. (2012). *Concepts and measurement: Ontology and epistemology. Social Science Information*, 51(2), 205-216. Retrieved from http://ssi.sagepub.com/content/51/2/205.abstract. doi:10.1177/0539018412437108

Gorski, P. S. (2013). *What is critical realism? And why should you care?* Contemporary Sociology: A Journal of Reviews, 42(5), 658-670.

Grace, J. B., & Bollen, K. A. (2005). *Interpreting the results from multiple regression and structural equation models*. Bulletin of the Ecological Society of America, 86(4), 283-295

Greenhalgh, T., & Peacock, R. (2005). *Effectiveness and Efficiency of Search Methods in Systematic Reviews of Complex Evidence*: Audit of Primary Sources doi/10.1136/bmj.38636.593461.68. BMJ: British Medical Journal, 331(7524), 1064-1065. Retrieved from http://www.jstor.org.ezp01.library.qut.edu.au/stable/25161195. doi:10.2307/25161195

Greenhill, A. (2001). *Managerial subjectivity and information systems: a discussion paper*. American Conference on Information System (AMCIS) 2001 Proceedings, 412. Boston, USA.

Greenwald, A. G. (1982). *Ego task analysis: An integration of research on ego-involvement and self-awareness*. Cognitive social psychology, 109-147.

Gregor, S. (2006). *The Nature of the Theory in Information System*. MIS quarterly, 30(3), 611-642. Retrieved from bsh.Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsh&AN=21940323&site=ehost-live.

Grice, H. P. (1991). *Studies in the Way of Words,* Cambridge: Harvard University Press.

Griffin, R. W. (1983). *Objective and social sources of information in task redesign: A field experiment*. Administrative Science Quarterly, 184-200.

Grover, V., & Lyytinen, K. (2015). *New State of Play in Information Systems Research: The Push to the Edges*. MIS Quarterly, 39(2), 271-296.

Grudin, J. (1990). *Interface.* In Proceedings of the 1990 ACM conference on Computer-supported cooperative work (pp. 269-278): ACM.

Gryc, W., & Moilanen, K. (2014). *Leveraging textual sentiment analysis with social network modelling. From Text to Political Positions: Text analysis across disciplines*. Amsterdam: John Benjamin.

Gunn, R. (1989). *Marxism and philosophy: a critique of critical realism*. Capital & Class, 13(1), 87-116.

Guy, I., Zwerdling, N., Ronen, I., Carmel, D., & Uziel, E. (2010). *Social media recommendation based on people and tags*. In Proceedings of the 33rd international ACM SIGIR Conference on Research and Development in Information Retrieval (pp. 194-201): ACM. Geneva, Switzerland

Habermas, J. (Singer-songwriter). (1984). *The Theory of Communicative Action: Reason and Rationalisation of Society*,(Vol. I) Cambridge. London: Heinmann.

Habermas, J. (1987). *The Theory of Communicative Action: Lifeworld and System*, T. McCarthy. Trans. Boston, MA: Beacon, 2.

Harvey, L. J., & Myers, M. D. (1995). *Scholarship and practice: the contribution of ethnographic research methods to bridging the gap*. Information technology & people, 8(3), 13-27.

Healy, S. (2005). *Toward a vocabulary for speaking of the engagement of things into discourse*. Journal of Environmental Policy & Planning, 7(3), 239-256. Retrieved from http://dx.doi.org/10.1080/15239080500339745. doi:10.1080/15239080500339745

Hedström, P., & Swedberg, R. (1998). *Social mechanisms: An analytical approach to social theory*. Cambridge: Cambridge University Press.

Heidegger, M., Macquarrie, J., & Robinson, E. (2008). *Being and time*. New York: HarperPerennial/Modern Thought.

Heidorn, P. B. (2011). *The Emerging Role of Libraries in Data Curation and E-science*. Journal of Library Administration, 51(7-8), 662-672. Retrieved from http://dx.doi.org/10.1080/01930826.2011.601269. doi:10.1080/01930826.2011.601269

Hempel, C. G. (1970). *Methods of concept formation in science. Formations of the Unity of Science*. University of Chicago Press, Chicago, IL.

Herring, S. C., Scheidt, L. A., Bonus, S., & Wright, E. (2004). *Bridging the gap: A genre analysis of weblogs*. In System Sciences, 2004. Proceedings of the 37th Annual Hawaii International Conference on (pp. 11 pp.): IEEE.

Hesse, M. B. (1974). *The structure of scientific inference*: University of California Press.

Hilligoss, B., & Rieh, S. Y. (2008). *Developing a unifying framework of credibility assessment: Construct, heuristics, and interaction in context*. Information Processing & Management, 44(4), 1467-1484.

Hiltz, S. R., & Turoff, M. (1993). *The network nation: Human communication via computer,* Cambridge: MIT Press.

Hjørland, B. (2007). *Information: objective or subjective/situational?* Journal of the American society for information science and technology, 58(10), 1448-1456.

Hogarth, Robin M. (1987). *Judgement and choice: The psychology of decision*. New York: John Wiley & Sons.

Howcroft, D., Mitev, N., & Wilson, M. (2004). *What we may learn from the social shaping of technology approach*. Social theory and philosophy for information systems, 329-371.

Huang, K.-T., Lee, Y. W., & Wang, R. Y. (1999). *Quality information and knowledge management*. Upper Saddle River: Prentice Hall.

Hume, D. (1748). *Philosophical essays concerning human understanding*. London: A. Millar.

Hume, R., & Roberts, G. H. (1967). *Hypophysis and hypopituitarism: report of a case*. Br Med J, 2(5551), 548-550.

Illari, P. (2014). IQ: Purpose and dimensions. In *The Philosophy of Information Quality* (pp. 281-301),Switzerland: Springer.

Jensen, K. B. (1995). *The social semiotics of mass communication*: Sage London.

Johannsen, C. G. (1995). *Quality management principles and methods in library and information science theory and practice*. In Encyclopedia of Library and Information Science, Vol. 56, Supplement 19: Marcel Dekker Incorporated.

Johansen, J. D. (1986). *The place of semiotics in the study of literature. In Semiotics and International Scholarship: Towards a Language of Theory* (pp. 101-126). Netherland: Springer.

Jones, J. W., & McLeod, R. (1986). *The structure of executive information systems: An exploratory analysis*. Decision Sciences, 17(2), 220-249.

Jones, M., Orlikowski, W., & Munir, K. (2004). *Structuration theory and information systems: A critical reappraisal*. Social theory and philosophy for information systems, 297-328.

Jones, M. R., & Karsten, H. (2008). *Giddens's Structuration Theory and Information Systems Research*. MIS Quarterly, 32(1), 127-157. Retrieved from http://www.jstor.org.ezp01.library.qut.edu.au/stable/25148831.

Joseph, J. (1998). *In defence of critical realism*. Capital & Class, 22(2), 73-106.

Jung, W., Olfman, L., Ryan, T., & Park, Y.-T. (2005). *An experimental study of the effects of contextual data quality and task complexity on decision performance*. In Information

Reuse and Integration, Conf, 2005. IRI-2005 IEEE International Conference on. (pp. 149-154): IEEE.

Juran, J. M. (1992). *Juran on quality by design: the new steps for planning quality into goods and services,* USA: Simon and Schuster.

Kammerer, Y., & Gerjets, P. (2012). *Effects of search interface and Internet-specific epistemic beliefs on source evaluations during Web search for medical information: An eye-tracking study*. Behaviour & Information Technology, 31(1), 83-97.

Kane, G., & Ransbotham, S. (2012). *Codification and Collaboration: Information Quality in Social Media*. Paper presented at Thirty Third International Conference on Information Systems, Orlando.

Kaplan, B., & Duchon, D. (1988). *Combining qualitative and quantitative methods in information systems research: a case study*. MIS quarterly, 571-586.

Karvounarakis, G., Ives, Z. G., & Tannen, V. (2010). Q*uerying data provenance*. In Proceedings of the 2010 ACM SIGMOD International Conference on Management of data (pp. 951-962): ACM.

Keller, K. L., & Staelin, R. (1987). *Effects of quality and quantity of information on decision effectiveness*. Journal of consumer research, 14(2), 200-213.

Kellner, D. (1995). *Media Culture: Cultural Studies*. London Routledge.

Kemp, S. (2005). *Critical realism and the limits of philosophy*. European Journal of Social Theory, 8(2), 171-191.

Kerr, K. (2006). *The institutionalisation of data quality*. in the New Zealand health sector. The University of Auckland.

Kettinger, W. J., & Li, Y. (2010). *The infological equation extended: towards conceptual clarity in the relationship between data, information and knowledge*. European Journal of Information Systems, 19(4), 409-421. Retrieved from ProQuest Central. doi:http://dx.doi.org/10.1057/ejis.2010.25

Kling, R., & Gerson, E. M. (1977). *The social dynamics of technical innovation in the computing worl*d. Symbolic interaction, 1(1), 132-146.

Knight, S.-a., & Burn, J. M. (2005). *Developing a framework for assessing information quality on the World Wide Web*. Informing Science: International Journal of an Emerging Transdiscipline, 8(5), 159-172.

Kock, N. (2004). *The psychobiological model: Towards a new theory of computer-mediated communication based on Darwinian evolution*. Organization Science, 15(3), 327-348.

Kolari, P., Java, A., Finin, T., Oates, T., & Joshi, A. (2006). *Detecting spam blogs: A machine learning approach. In Proceedings of the National Conference on Artificial Intelligence* (Vol. 21, pp. 1351): Menlo Park, CA; Cambridge, MA; London; AAAI Press; MIT Press; 1999.

Kuhn, T. S. (2012). *The structure of scientific revolutions*, Chicago and London: University of Chicago press.

Kurki, M. (2008). *Causation in international relations: reclaiming causal analysis* (Vol. 108): Cambridge University Press.

Lamb, R., & Kling, R. (2003). *Reconceptualizing users as social actors in information systems research*. MIS quarterly, 27(2), 197-236.

Landry, M., & Banville, C. (1992). *A disciplined methodological pluralism for MIS research. Accounting, Management and Information Technologies*. 2(2), 77-97. Retrieved from http://www.sciencedirect.com/science/article/pii/095980229290002A. doi:http://dx.doi.org/10.1016/0959-8022(92)90002-A

Langer, E. J., Blank, A., & Chanowitz, B. (1978). *The mindlessness of ostensibly thoughtful action: The role of 'placebic' information in interpersonal interaction*. Journal of Personality and Social Psychology, 36(6), 635-642.

Laudan, L. (1986). *Science and Values: The Aims of Science and Their Role in Scientific Debate* (Pittsburgh Series in Philosophy & History of Science, 11). Berkeley University of California Press.

Lawson, T. (1998). *Economic science without experimentation*. In M. S. Archer (Ed.), Critical Realism: Essential Readings (pp. 144--169): Routledge.

Lawson, T. (2003). *Reorienting economics* (Vol. 20). London Routledge.

Lawson, T. (2006). *Economics and reality*, London & New York: Routledge.

Layder, D. (1993). *New strategies in social research: An introduction and guide*. United Kingdom: Polity Press.

Layder, D. (1998). *Sociological practice: linking theory and social research*. Thousand Oaks, Calif;London: Sage.

Lee, A. S. (1991). *Integrating Positivist and Interpretive Approaches to Organizational research*. Organization Science, 2(4), 342-365.

Lee, A. S. (2004). *Thinking about social theory and philosophy for information systems*. Social theory and philosophy for Information Systems, 1-26.

Lee, A. S. (2010). *Retrospect and prospect: information systems research in the last and next 25 years*. Journal of Information Technology, 25(4), 336-348.

Lee, A. S., & Baskerville, R. L. (2003). *Generalizing generalizability in information systems research*. Information systems research, 14(3), 221-243.

Lee, Y. W., Strong, D. M., Kahn, B. K., & Wang, R. Y. (2002). *AIMQ: a methodology for information quality assessment*. Information & Management, 40(2), 133-146.

Leonardi, P. M. (2013). *Theoretical foundations for the study of sociomaterialit*y. Information and Organization, 23(2), 59-76.

Leonardi, P. M., & Barley, S. R. (2008). *Materiality and change: Challenges to building better theory about technology and organizing*. Information and Organization, 18(3), 159-176.

Leveson, N. G., & Turner, C. S. (1993). *An investigation of the Therac-25 accidents*. Computer, 26(7), 18-41.

Levy, Y., & Ellis, T. J. (2006). *A systems approach to conduct an effective literature review in support of information systems research*. Informing Science: International Journal of an Emerging Transdiscipline, 9, 181-212.

Lewins, A. (2001). *Computer Assisted Qualitative Data Analysis*. In N. Gilbert, Researching & -. Social life (Eds.), Researching social life (pp. 302), UK: sage.

Lillrank, P. (2003). *The quality of information*. International Journal of Quality & Reliability Management, 20(6), 691-703.

Loshin, D. (2011). *8 - Dimensions of Data Quality*. In The Practitioner's Guide to Data Quality Improvement (pp. 129-146). Boston: Morgan Kaufmann.

Lu, Y., Tsaparas, P., Ntoulas, A., & Polanyi, L. (2010). *Exploiting social context for review quality prediction*. In Proceedings of the 19th international conference on World Wide Web, ACM, Raleigh, NC, USA (pp. 691-700).

Lyytinen, K., & Hirschheim, R. (1988). *Information systems as rational discourse: An application of Habermas's theory of communicative action*. Scandinavian Journal of Management, 4(1), 19-30.

Lyytinen, K., & King, J. L. (2004). *Nothing at the center? Academic legitimacy in the information systems field*. Journal of the Association for Information Systems, 5(6), 8.

MacKenzie, S. B. (2003). *The dangers of poor construct conceptualization*. Journal of the Academy of Marketing Science, 31(3), 323-326.

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct Measurement and Validation Procedures in MIS and Behavioural Research*: Integrating new and Existing Techniques.* MIS Quarterly, 35(2), 293-A295.

MacLure, M. (2005). '*Clarity bordering on stupidity': where's the quality in systematic review?*. Journal of Education Policy, 20(4), 393-416. Retrieved from http://dx.doi.org/10.1080/02680930500131801. doi:10.1080/02680930500131801

Madnick, S. E., Wang, R. Y., Lee, Y. W., & Zhu, H. (2009). *Overview and framework for data and information quality research*. Journal of Data and Information Quality (JDIQ), 1(1), 2-22.

Mai, J. E. (2013). *The quality and qualities of information*. Journal of the American society for information science and technology, 64(4), 675-688.

Manis, M., Fichman, M., & Platt, M. B. (1978). *Cognitive integration and referential communication: Effects of information quality and quantity in message decoding*. Organizational Behavior and Human Performance, 22(3), 417-430.

Mason, R. O. (1978). *Measuring information output: A communication systems approach*. Information & Management, 1(4), 219-234.

Mayeh, M., Scheepers, R., & Valos, M. (2012). *Understanding the role of social media monitoring in generating external intelligence*. In Proceedings of the 23rd Australasian Conference on Information Systems 2012, Geelong Australia (pp. 1-10).

McKinney Jr, E. H., Yoos, I., & Charles, J. (2010). *Information About Information: A Taxonomy of Views*. MIS quarterly, 34(2).

McKlin, T., Harmon, S., Evans, W., & Jones, M. (2001). *Cognitive presence in web-based learning: A content analysis of students' online discussions*. Paper presented at the National Convention of the Association for Educational Communications and Technology 24th, Atlanta, GA, November 8-12.

McLuhan, M. (1994). *Understanding media: The extensions of man,* Cambridge: MIT press.

Merleau-Ponty, M., & Smith, C. (1996). *Phenomenology of perception*: Motilal Banarsidass, USA & Canada: USA & Canada

Merton, R. K. (1967). *On theoretical sociology: Five essays, old and new*: Free Press New York.

Mick, D. G., & Oswald, L. R. (2006). *The semiotic paradigm on meaning in the marketplace*. Northampton, MA: Edward Elgar Publishing Ltd.

Mikkelsen, G., & Aasly, J. (2005). *Consequences of impaired data quality on information retrieval in electronic patient records*. International journal of medical informatics, 74(5), 387-394.

Miller, G. A. (1956). *The magical number seven, plus or minus two: some limits on our capacity for processing information*. Psychological review, 63(2), 81-97.

Mingers, J. (2001a). *Combining IS research methods: towards a pluralist methodology*. Information systems research, 12(3), 240-259.

Mingers, J. (2001b). *Embodying information systems: the contribution of phenomenology*. Information and organization, 11(2), 103-128.

Mingers, J. (2003). *The paucity of multimethod research: a review of the information systems literature*. Information Systems Journal, 13(3), 233-249.

Mingers, J. (2004). *Real-izing information systems: critical realism as an underpinning philosophy for information systems*. Information and Organization, 14(2), 87-103.

Mingers, J. (2013). *Prefiguring Floridi's theory of semantic information. Triple C: Communication, Capitalism & Critique*. Open Access Journal for a Global Sustainable Information Society, 11(2), 388-401.

Mingers, J. (2014). *Guidelines for Conducting Semiotic Research in Information Systems, Working paper* No.303. University of Kent, Business School.

Mingers, J., & Willcocks, L. (2014). *An integrative semiotic framework for information systems: The social, personal and material worlds*. Information and Organization, 24(1), 48-70. Retrieved from http://www.sciencedirect.com/science/article/pii/S1471772714000037. doi:http://dx.doi.org/10.1016/j.infoandorg.2014.01.002

Mingers, J., & Willcocks, L. (2015). *Guidelines for conducting semiotic research in information systems*. Paper presented at the 290-XII. Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.proquest.com/docview/1721001684?accountid=13380

Mingers, J. C. (1995). *Information and meaning: foundations for an intersubjective account.* Information Systems Journal, 5(4), 285-306.

Mingers, J. C. (1996). *An evaluation of theories of information with regard to the semantic and pragmatic aspects of information systems*. Systems Practice, 9(3), 187-209.

Morgan, G. (1990). *Paradigm diversity in organizational research*. The theory and philosophy of organizations: Critical issues and new perspectives,(Vol. 13, pp. 29). USA and Canada: Routledge.

Morris, C. W. (1938). *Foundations of the Theory of Signs* (Vol. 1): University of Chicago Press.

Morrow, R. A., & Brown, D. D. (1994). *Critical theory and methodology* (Vol. 3), USA: Sage Publications.

Mutch, A. (1999). *Critical Realism, Managers and Information.* British Journal of Management, 10(4), 323-333. Retrieved from http://dx.doi.org/10.1111/1467-8551.00142. doi:10.1111/1467-8551.00142

Mutch, A. (2010). *Technology, Organization, and Structure—A Morphogenetic Approach*. Organization Science, 21(2), 507-520. Retrieved from http://pubsonline.informs.org/doi/abs/10.1287/orsc.1090.0441. doi:doi:10.1287/orsc.1090.0441

Mutch, A. (2013). *Sociomateriality — Taking the wrong turning?* Information and Organization, 23(1), 28-40.

Neely, M. P., & Cook, J. S. (2011). *Fifteen Years of Data and Information Quality Literature: Developing a Research Agenda for Accounting.* Journal of Information Systems, 25(1), 79-108. Retrieved from ProQuest Central.

Nellhaus, T. (1998). *Signs, social ontology, and critical realism.* Journal for the Theory of Social Behaviour, 28(1), 1-24.

Newman, J. (2001). *Some observation on the semantic of information.* Information System Frontier, 3(2), 155-167.

Nissen, H.-E. (1985). *Acquiring knowledge of information systems research in a methodological quagmire*. Research methods in information systems, 39-51.

Nöth, W. (1995). *Handbook of semiotics*. Bloomington, USA: Indiana University Press.Indiana University Press.

O'Neill, S. (2008). *Interactive Media: The Semiotics of Embodied Interaction.* London: Springer.

O'Keefe, D. J. (2004). *Trends and prospects in persuasion theory and research*. Perspectives on persuasion, social influence and compliance gaining, 31-43.

Oliver, R. L. (1977). *Effect of expectation and disconfirmation on postexposure product evaluations: An alternative interpretation*. Journal of applied psychology, 62(4), 480-486.

Oliver, R. L. (1980). *A cognitive model of the antecedents and consequences of satisfaction decisions*. Journal of marketing research, 17(3), 460-469.

Olsen, W. (2010). *Editor's Introduction: Realist Methodology: A Review*. Realist Methodology, 1, xix-xlvi.

Olsina, L., Sassano, R., & Mich, L. (2008). *Specifying quality requirements for the web 2.0 applications*. In Proc. of IWWOST, Moraco, France (Vol. 8, pp. 56-62).

Orehovački, T., Granić, A., & Kermek, D. (2013). *Evaluating the perceived and estimated quality in use of Web 2.0 applications*. Journal of Systems and Software, 86(12) [page range]. Retrieved from http://www.sciencedirect.com/science/article/pii/S0164121213001362.doi:http://dx.doi.org/10.1016/j.jss.2013.05.071

Orlikowski, W., & Scott, S. (2008). *Sociomateriality: Challenging the Separation of Technology, Work and Organization*. London: London School of Economics.

Orlikowski, W. J. (2000). *Using technology and constituting structures: A practice lens for studying technology in organizations*. Organization science, 11(4), 404-428.

Orlikowski, W. J. (2007). *Sociomaterial practices: Exploring technology at work*. Organization studies, 28(9), 1435-1448.

Orlikowski, W. J., & Baroudi, J. J. (1991). *Studying Information Technology in Organizations: Research Approaches and Assumptions*. [Article]. Information systems research, 2(1), 1-28. Retrieved from bsh.Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsh&AN=4431364&site=ehost-live&scope=site.

Orlikowski, W. J., & Iacono, C. S. (2001). *Research commentary: Desperately seeking the "IT" in IT research—A call to theorizing the IT artifact*. Information systems research, 12(2), 121-134.

Otto, B., & Weber, K. (2011). *Data governance*. In K. Hildebrand, M. Gebauer, H. Hinrichs & M. Mielke (Eds.), Daten- und Informationsqualität: Auf dem Weg zur Information Excellence (pp. 269-286). Wiesbaden: Springer Fachmedien Wiesbaden.

Outhwaite, W. (1987). *New philosophies of social science: Realism, hermeneutics, and critical theory*. Macmillan Education

Parker, E. B. (1973). *Information and society*. Annual Review of Information Science and Technology, 8, 345-373.

Pawson, R., & Tilley, N. (1997). *An introduction to scientific realist evaluation*. USA: Sage

Peirce, C. S. (1931-1958). *Collected Papers of Charles Sanders Peirce, ed. C. Hartshorne and P. Weiss*. On: C. Hartshorne & P. Weiss). Harvard University Press, Cambridge, Mass.

Peirce, C. S. (1932). *Collected Papers*, vol. 2, eds. C. Hartshorne & P. Weiss. Cambridge (MA): Harvard University.

Peirce, C. S., Hartshorne, C., & Weiss, P. (1933). *Collected papers of Charles Sanders Pierce: Exact logic:(published papers).* Cambridge: Harvard University Press.

Pepper, S. C. (1942). *World hypotheses: A study in evidence*: Univ of California Press.

Peters, T. J. (1978). *Symbols, patterns, and settings: An optimistic case for getting things done*. Organizational Dynamics, 7(2), 3-23.

Petter, S., DeLone, W., & McLean, E. R. (2013). *Information Systems Success: the quest for the independent variables*. Journal of Management Information Systems, 29(4), 7-62.

Petty, R. E., & Brinol, P. (2010). *Attitude change. Advanced social psychology: The state of the science*, 217-259.

Petty, R. E., & Cacioppo, J. T. (1986). *The elaboration likelihood model of persuasion.* NewYork: Springer.

Pierce, C. S. (1955). *Philosophical writings of Pierce*. NewYork Dover.

Pinch, T. J., & Bijker, W. E. (1984). *The social construction of facts and artefacts: Or how the sociology of science and the sociology of technology might benefit each other*. Social studies of science, 399-441.

Pipino, L. L., Lee, Y. W., & Wang, R. Y. (2002). *Data quality assessment*. Commun. ACM, 45(4), 211-218. doi:10.1145/505248.506010

Price, R., & Shanks, G. (2004). *A semiotic information quality framework*. In Proceedings of the International Conference on Decision Support Systems DSS04 (pp. 658-672), Prato, Italy: Citeseer.

Price, R., & Shanks, G. (2005). *A semiotic information quality framework: development and comparative analysis*. Journal of Information Technology, 20(2), 88-102.

Ragu-Nathan, T., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). *The consequences of technostress for end users in organizations: Conceptual development and empirical validation*. Information Systems Research, 19(4), 417-433.

Redman, T. C. (1998). *The impact of poor data quality on the typical enterprise*. Communications of the ACM, 41(2), 79-82.

Redman, T. C., (1996). *Data quality for the information age*, Norwood, MA, USA: Artech House, Inc.

Redman, T. C. (2001). Data quality the field guide, The Digital Press.

Reeves, C. A., & Bednar, D. A. (1994). *Defining quality: alternatives and implications*. Academy of management Review, 19(3), 419-445.

Rice, R. E., McCreadie, M., & Chang, S.-J. L. (2001). *Accessing and browsing information and communication*: Mit Press.

Rieh, S. Y. (2002). *Judgment of Information Quality and Cognitive Authority in the Web*. Journal of the American society for information science and technology, 53(2), 145-161.

Rieh, S. Y., & Belkin, N. (2000). *Interaction on the Web: Scholars' judgement of information quality and cognitive authority*. In Proceedings of the annual meeting-american society for information science (Vol. 37, pp. 25-38), Chicago, USA

Rieh, S. Y., & Belkin, N. J. (1998). *Understanding judgment of information quality and cognitive authority in the WWW*. In Proceedings of the 61st annual meeting of the american society for information science (Vol. 35, pp. 279-289). Pittsburgh, USA

Rivard, S. (2014). *Editor's comments: the ions of theory construction*. MIS Quarterly, 38(2), iii-xiv.

Roberts, J. M. (2001). *Realistic spatial abstraction? Marxist observations of a claim within critical realist geography*. Progress in Human Geography, 25(4), 545-567.

Robey, D. (1996). *Research Commentary: Diversity in Information Systems Research: Threat, Promise, and Responsibility*. [Article]. Information Systems Research, 7(4), 400-408. Retrieved from bsh.

Robinson, H., Hall, P., Hovenden, F., & Rachel, J. (1998). *Postmodern software development*. The Computer Journal, 41(6), 363-375.

Sabherwal, R., Jeyaraj, A., & Chowa, C. (2006). *Information system success: individual and organizational determinants*. Management Science, 52(12), 1849-1864.

Sadiq, S., Yeganeh, N. K., & Indulska, M. (2011). *20 years of data quality research: themes, trends and synergies*. In Proceedings of the Twenty-Second Australasian Database Conference-Volume 115 (pp. 153-162): Australian Computer Society, Inc.

Salancik, G. R., & Pfeffer, J. (1978). *A Social Information Processing Approach to Job Attitudes and Task Design*. Administrative Science Quarterly, 23(2), 224-253. Retrieved from http://www.jstor.org/stable/2392563. doi:10.2307/2392563

Sayer, A. (1992). *Method in social science: A realist approach*. USA and Canada: Routledge.

Sayer, A. (2000). *Realism and social science*. London: Sage.

Schaal, M., Smyth, B., Mueller, R. M., & MacLean, R. (2012). *Information quality dimensions for the social web*. In Proceedings of the International Conference on Management of Emergent Digital Eco Systems (pp. 53-58): ACM.

Schaffert, S. (2006). IkeWiki: *A semantic wiki for collaborative knowledge management*. In 15th IEEE International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE'06) (pp. 388-396): IEEE.

Schech, S. (2002). *Wired for change: The links between ICTs and development discourses*. Journal of International Development, 14(1), 13-23.

Schultze, U., & Orlikowski, W. J. (2010). *Research commentary-virtual worlds: A performative perspective on globally distributed, immersive work*. Information Systems Research, 21(4), 810-821.

Scott, Susan V. and Orlikowski, Wanda J. (2009) *'Getting the truth': exploring the material grounds of institutional dynamics in social media*. Working paper series, 177. Information Systems Group, London School of Economics and Political Science, London, UK

Searle, J. R. (2004). *Mind: a brief introduction*. New York: Oxford University Press.

Searle, J. R., & Vanderveken, D. (1985). *Foundations of illocutionary logic*. Cambridge: CUP Archive.

Shannon, C. E. (1993). *Collected Papers: Claude Elmwood Shannon, NJA Sloane and AD Wyner*. New York: IEEE Press.

Shannon, C. E., & Weaver, W. (1949). *The Mathematical Theory of Communication*. Illinois: University of Illinois Press.

Shazia Sadiq, Naiem Khodabandehloo Yeganeh, & Indulska, M. (2011). *20 Years of Data Quality Research: Themes, Trends and Synergies*. Paper presented at 22nd Australasian Database Conference, Perth,Australia.

Shepherd, D. A., & Sutcliffe, K. M. (2011). *Inductive top-down theorizing: A source of new theories of organization*. Academy of Management Review, 36(2), 361-380.

Sherif, C. W., Sherif, M., & Nebergall, R. E. (1981). *Attitude and attitude change: The social judgment-involvement approach*. Connecticut, USA: Greenwood Press Westport.

Silberg, W. M., Lundberg, G. D., & Musacchio, R. A. (1997). *Assessing, controlling, and assuring the quality of medical information on the Internet: Caveant lector et viewor—Let the reader and viewer beware*. Jama, 277(15), 1244-1245.

Silverman, D. (2006). *Interpreting qualitative data: Methods for analyzing talk, text and interaction*. London, UK: Sage.

Simons, H. W. (1978). *Genre-alizing" about rhetoric: A scientific approach. Form and genre: Shaping rhetorical action*, (Vol. 33, pp.50). Falls Church, VA (USA): Speech Communication Association.

Sitkin, S. B., Sutcliffe, K. M., & Barrios_Choplin, J. R. (1992). *A dual‐capacity model of communication media choice in organizations*. Human Communication Research, 18(4), 563-598.

Smith, M. L. (2006). *Overcoming theory-practice inconsistencies: Critical realism and information systems research. Information and Organization*, 16(3), 191-211. Retrieved from http://www.sciencedirect.com/science/article/pii/S147177270600011X. doi:http://dx.doi.org/10.1016/j.infoandorg.2005.10.003

Smith, M. L. (2008). *Testable theory development for small-N studies: critical realism and middle-range theory*. In Proceeding of Conference on Information Resource Management Niagara Falls, Canada.

Snyder, M., & DeBono, K. G. (1985). *Appeals to image and claims about quality: Understanding the psychology of advertising*. Journal of Personality and Social Psychology, 49(3), 586.

Stamper, R. (1991). *The semiotic framework for information systems research*. Information systems research: Contemporary approaches and emergent traditions, 515-528.

Stamper, R. (2001). *Organisational Semiotics: Informatics without the Computer?* In K. Liu, R. Clarke, P. Andersen & R. Stamper (Eds.), Information, Organisation and Technology (Vol. 1, pp. 115-171): Springer US.

Stamper, R., Liu, K., Hafkamp, M., & Ades, Y. (2000). *Understanding the roles of signs and norms in organizations - a semiotic approach to information systems design*. Behaviour & Information Technology, 19(1), 15-27.

Stonier, T. (1990). *Information and the Internal Structure of the Universe: An Exploration into Information Physics*. London: Springer-Verlag.

Strong, D. M., Lee, Y. W., & Wang, R. Y. (1997). *Data quality in context*. Communications of the ACM, 40(5), 103-110.

Stvilia, B., Gasser, L., Twidale, M. B., & Smith, L. C. (2007). *A framework for information quality assessment*. Journal of the American society for information science and technology, 58(12), 1720-1733. Retrieved from http://dx.doi.org/10.1002/asi.20652. doi:10.1002/asi.20652

Stvilia, B., Twidale, M. B., Smith, L. C., & Gasser, L. (2008). *Information quality work organization in Wikipedia*. Journal of the American society for information science and technology, 59(6), 983-1001.

Tate, M., Evermann, J., & Gable, G. (2015). *An integrated framework for theories of individual attitudes toward technology*. Information & Management, 52(6), 710-727.

Thagard, P. (1990). *Comment: Concepts of information. In Philip P. Hanson (ed.),* Information, Language and Cognition. University of British Columbia Press

Thomas, J., & Griffin, R. (1983). *The social information processing model of task design: A review of the literature*. Academy of Management Review, 8(4), 672-682.

Töllinen, A., Järvinen, J., & Karjaluoto, H. (2012). *Opportunities and Challenges of Social Media Monitoring in the Business to Business Sector*. In The 4th International Business and Social Science Research Conference, Dubai, United Arab Emirates (pp. 1-14).

Toulmin, S. E. (2003). *The uses of argument*. NewYork Cambridge University Press.

Trist, E., & Murray, H. (1990). *The Social Engagement of Social Science, A Tavistock Anthology: The Socio-technical Perspective* (Vol. 2). Pennsylvania: University of Pennsylvania Press.

Tsang, E. W. (2014). *Case studies and generalization in information systems research: A critical realist perspective*. The Journal of Strategic Information Systems, 23(2), 174-186.

van Hoek, R., Aronsson, H., Kovács, G., & Spens, K. M. (2005). *Abductive reasoning in logistics research*. International Journal of Physical Distribution & Logistics Management, 35(2), 132-144.

Volkoff, O., & Strong, D. M. (2013). *Critical realism and affordances: theorizing IT-associated organizational change processes*. MIS Q., 37(3), 819-834.

Wacker, J. G. (2004). *A theory of formal conceptual definitions: developing theory-building measurement instruments*. Journal of Operations Management, 22(6), 629-650.

Wacker, J. G. (2008). *A conceptual understanding of requirements for theory-building research: guidelines for scientific theory building*. Journal of Supply Chain Management, 44(3), 5-15. Retrieved from ProQuest Central.

Walsham, G. (1997). *Actor-network theory and IS research: current status and future prospects*. In Information systems and qualitative research (pp. 466-480): Springer.

Wang, G., Liu, X., & Fan, W. (2011). *A Knowledge Adoption Model Based Framework for Finding Helpful User-Generated Contents in Online Communities*. Thirty Second International Conference on Information Systems, Shanghai

Wand, Y., & Wang, R. Y. (1996). *Anchoring data quality dimensions in ontological foundations*. Communications of the ACM, 39(11), 86-95.

Wand, Y., & Weber, R. (1995). *On the deep structure of information systems*. Information Systems Journal, 5(3), 203-223.

Wang, R. Y., Reddy, M. P., & Kon, H. B. (1995). *Toward quality data: An attribute-based approach*. Decision Support Systems, 13(3), 349-372.

Wang, R. Y., & Strong, D. M. (1996). *Beyond accuracy: What data quality means to data consumers*. Journal of management information systems, 5-33.

Wang, Y. R., & Madnick, S. E. (1989). *The inter-database instance identification problem in integrating autonomous systems*. In Data Engineering, 1989. Proceedings. Fifth International Conference on (pp. 46-55): IEEE.

Wang, Y. R., & Madnick, S. E. (1990). *A polygen model for heterogeneous database systems: The source tagging perspective.* In *VLDB* (Vol. 90, pp. 519-538).

Warschauer, M., & Grimes, D. (2007). *Audience, authorship, and artifact: the emergent semiotics of web 2.0*. Annual Review of Applied Linguistics, 27, 1-23. Retrieved from http://dx.doi.org/10.1017/S0267190508070013. doi:doi:10.1017/S0267190508070013

Watts, S., Shankaranarayanan, G., & Even, A. (2009). *Data quality assessment in context: A cognitive perspective*. Decision Support Systems, 48(1), 202-211.

Weber, R. (1997). *Ontological foundations of information systems*: Coopers & Lybrand and the Accounting Association of Australia and New Zealand Melbourne.

Weber, R. (2003). *Editor's comments*. MIS quarterly, 27(4), v-xiv. Retrieved from bshhttp://gateway.library.qut.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsh&AN=11925836&site=ehost-live&scope=site.

Weber, R. (2012). *Evaluating and developing theories in the information systems discipline*. Journal of the Association for Information Systems, 13(1), 1.

Webster, J., & Watson, R. T. (2002). *Analysing the Past to Prepare the Future: Writing a Literature Review*. MIS Quarterly, 26(2), 13-23.

Weick, K. E. (1995). *What theory is not, theorizing is*. Administrative Science Quarterly, 40(3), 385-390.

Whetten, D. A., Felin, T., & King, B. G. (2009). *The practice of theory borrowing in organizational studies: Current issues and future directions*. Journal of Management.

Wittgenstein, L., Anscombe, G. E. M., & Anscombe, G. E. M. (1958). *Philosophical investigations* (Vol. 255): Blackwell Oxford.

Wolfswinkel, J. F., Furtmueller, E., & Wilderom, C. P. (2013). *Using grounded theory as a method for rigorously reviewing literature*. European Journal of Information Systems, 22(45-55).

Wynn, J. D., & Williams, C. K. (2012). *Principles for conducting critical realist case study research in information systems*. MIS quarterly, 36(3), 787-810..

Yates, J., & Orlikowski, W. J. (1992). *Genres of Organizational Communication: A Structurational Approach to Studying Communication and Media*. The Academy of Management Review, 17(2), 299-326. Retrieved from http://www.jstor.org.ezp01.library.qut.edu.au/stable/258774. doi:10.2307/258774

Yetim, F. (2006). *Acting with genres: discursive-ethical concepts for reflecting on and legitimating genres*. European Journal of Information Systems, 15(1), 54-69.

Zhu, H., Madnick, S., Lee, Y., & Wang, R. (2014). *Data and Information Quality Research: Its Evolution and Future*. In Computing Handbook, no. 2, pp. 1-20

Zhu, Z., Bernhard, D., & Gurevych, I. (2009). *A multi-dimensional model for assessing the quality of answers in social Q&A sites*. Technical Report TUD-CS-2009-0158. Technische Universitat Darmstad

Zuboff, S. (1988). *In the age of the smart machine: The future of work and power*. New York Basic books.

Appendices

Appendix A: Example case on how to apply the framework in IQ empirical research: Studying information quality in Wikis

The following hypothesised case provides an example of how the proposed framework in this study can be applied in studying IQ. First a narrative is provided describing the general context of the study and the related IQ problem. Then more details are provided from the context of the study through data collection methods which are guided by the proposed framework in Chapter 6. Finally, the method of coding and analysing the collected data has been described in relation to the analytical framework proposed in this study.

Study Context

Many traditional publishers and information intensive organisations have opened their content creation processes to the general public by adding wikis and blogs to their regular channels of information creation and distribution. Wikis are collaborative web spaces and also part of web 2.0 technologies, where anyone can add content and anyone can edit the content. Although wikis can provide valuable information services to the users, these new technologies also pose new and significant challenges in many areas of information organisation including information quality (IQ) (Stvilia et al, 2008).

In education contexts, wikis can serve as a knowledge platform for a community of practice where members of the community can share their knowledge with the group, put up interesting pieces of information, work together, discuss issues, and so on (Schaffert, 2006).

University X in Australia is currently trying to encourage the use of wikis by students (especially new students in the first semesters) as an educational tool. Wikis are supposed to provide the following services for students to assist them in their education:

1. Students can use a wiki to develop research projects, with the wiki serving as ongoing documentation of their work.
2. Students can add summaries of their thoughts from the prescribed readings, building a collaborative annotated bibliography on a wiki.
3. A wiki can be used for publishing course resources like syllabi and handouts, and students can edit and comment on these directly for all to see.

4. Teachers can use wikis as a knowledge base, enabling them to share reflections and thoughts regarding teaching practices, and allowing for versioning and documentation.
5. Wikis can be used to map concepts. They are useful for brainstorming, and editing a given wiki topic can produce a linked network of resources.
6. A wiki can be used as a presentation tool in the place of conventional software, and students are able to directly comment on and revise the presentation content.

University X is interested in understanding to what extent students rely on information provided by wikis or how much they find the provided content useful for their study. The university is aiming to improve the perception of information provided from wikis for students and consequently improve effective use of these technologies as educational tools.

With this backdrop, the main goal of the case study is defined as:

How to improve the quality of information provided by wikis for students?

Considering the framework and research questions proposed in chapter 5 of this thesis, this goal can be achieved through answering the following research questions:

- RQ^E.1: How do users (students) perceive IQ from the wikis?
  - RQ^E.1.1: What are their expectations of information provided by wikis, and what criteria represent their expectations? (EQPI).
  - RQ^E 1.2: What is the process of quality assessment conducted by the individual user? (EDQ).
  - RQ^E 1.3: What are their current perceptions (assessment) of the quality of information provided by the wikis? (QPI).
- RQ^E.2: What are the factors influencing IQ perception for students?

The proposed research questions here in fact reflect the research agenda for IQ studies in Section 5.1.4 in the context of this hypothetical case study.

Collected data and details of the context

Data related to the context of the study is collected through reviewing relevant documents, observations and interviews with people in different roles. The proposed framework in Chapter 6 (Table 6.9) shows the main required area of data collection in relation to IQ (it is not limited to this area and in a real case, new areas might emerge from the data).

Below, the collected data is presented in a narrative form.

University X is embedding wiki technologies in their traditional form of education as part of their policy of enhancing innovative methods of education, but they are still struggling to use these technologies in the most effective way. Students are asked to use wikis as a source of educational content and also to contribute to content generation. They are also encouraged to use wikis as a collaboration platform for their team work tasks. The contents of wikis can be created by either students or university staff. A few staff contribute to content on the Wiki by providing syllabuses and resources related to the courses. Students can contribute and edit any post directly, and it is accessible to the public immediately. Students can also add content or brainstorm their ideas using wikis. Everyone (student and staff) has the same level of access to the system. Initial access to the system is provided to anyone using the university domain email. However, there are other systems (such as BlackBoard, a web-based learning management system) than wikis for sharing the course's resources and syllabuses which have restricted access for students. Wikis normally are not used by staff as the main system to share relevant resources, assignments and course information.

In order to address the main research problem presented above, firstly, data should be collected in relation the research questions RQ^E.1.1, RQ^E.1.2 and RQ^E.1.3. Different data collection methods such as survey, interview, and thinking-aloud methods can be used to collect data from students. In this case, data has been mainly collected via interviews with students.

IT students between the ages of 18 and 21 in their first year of study and also staff members who are teaching and providing course materials for this group of students, have been interviewed. The group of students being interviewed are (according to grade point average (GPA)) high achieving, motivated and competitive students. Since they are in their first year of study, their knowledge about the content of their courses and related issues is at a low level.

Students are interviewed in relation to their expectation of wikis as an educational tool and their information needs regarding (RQ^E 1.1). They are also asked about the process of their interaction with wikis and how they find useful and relevant information there (RQ^E 1.2). Finally, they are asked to rate the quality of information of wikis in general, based on their expectations (RQ^E 1.3).

Interview results regarding information needs and expectations mainly showed that the students expect wikis to provide them with easy and quick access to the information relevant to their study, and precise enough for their assignments. They mentioned that information should be correct according to the materials used in their curriculum and also match the expectations of their lecturers and tutors. Apart from being useful and relevant for assignments, a few students mentioned that they read posts that are relevant to their area of interest, such as discussions of games and new technologies.

They mentioned that in most cases they trust information that is directly published by staff and their tutors, but still they feel that they need to compare it with the published content on the Blackboard sites.

They mentioned that they don't go through long posts and discussions published by students; that if a post has more pictures and diagrams it is easier to follow, and that pure texts are rarely read by students. They also mentioned that really interesting posts normally have some positive votes, and there are only a few known students that publish popular posts related to their area of interest. Students mentioned that posts with a larger amount of edits are always confusing, but in some cases interesting as well. In terms of collaboration, many students believe that other platforms such as Facebook and Google Docs provide more flexible and user friendly interfaces, and they prefer to use the other platforms for their teamwork tasks.

Most students said that they prefer to use other sources directly managed by university staff in relation to their courses. The interviews with staff also revealed that some of them prefer to just work with existing systems and don't see the advantages of using wikis. They referred to wikis as a redundant platform. Some of the staff members, on the other hand, mentioned that students' contributions to materials for the courses are beneficial for them in designing the course and syllabus.

Analysis of collected data using the proposed framework in this study

The above brief description of the context of the study (using wikis at University X) can be mapped to the framework developed in this study as a coding system; this coding also shows in what areas more detailed data is needed.

First the interview results from the students in relation to RQE.1 are coded to the three concepts in relation to IQ; EQPI, EDQ and QPI as presented in Table A.1

Table A.1: Coding collected data in relation to IQ related concepts (Chapter 6, Section 6.3.2.1)

(1) IQ concepts	(2) Collected data	(3) Relevant section in the thesis
EQPI (users expectations and information needs	Relevant information, easy access to relevant information, correct, precise for assignments, interesting	Chapter 6 Section 6.3.2.1
EDQ (assessment criteria)	Credibility of the author (correctness), number of positive votes on the post (relevance, correctness), the amount of conversation about topic (importance, interesting), length of the post	Chapter 6 Section 6.3.2.1
QPI (perceived quality)	They prefer to use other sources of information, lack of trust in the content, lack of relevance to their assignments, sometimes interesting topic discussions	Chapter 6 Section 6.3.2.1

After coding data related to the situated activities or events (referring to CR ontological terms) to the defined concepts in the IQ framework, collected data from the context of the study should also be mapped to the real world structures and their interactions as defined in CR general meta-theory of IQ (in Chapter 5).

Table A.2 shows how collected data from the context of this case study (column 3) is mapped (coded) to the CR general meta-theory of IQ developed in Chapter 5 (column 1) through using concept indicator links defined in Chapter 6 (column 2). However, to be able to answer RQ^E.2 above, the coded data in Table A.2 should be analysed in relation to Table A.1's data derived in relation to IQ perception.

In Table A.2, column 4 is related to analysing of coded data (Chapter 6, Section 6.4) in column 3 and to IQ perception concepts in table A.1 (RQ^E.2). The researcher at this stage needs to ask: what could be the inherent characteristics of the identified structures that influence IQ perception? Then the relation between column 3 and the concepts in Table A.1 have been hypothesised as possible generative mechanisms in column 4. These mechanisms are presented in italic font. Column 5 of the table then shows if the hypothesised mechanisms in column 4 can be supported or not by theoretical lenses (identified in Section 5.2). Column 6 of the table links each row to Chapter 6, where the related concept indicators are defined.

After identifying all the mechanisms related to each row of Table A.2, the researcher should identify which mechanisms are more influential in the context of this study, and if they are inhibiting mechanisms from other rows from being activated (Section 6.4). In the context of this case example, the most important mechanism influencing IQ perception is the influence of social groups and the degree of influence they are deemed to have on students' perceptions and expectations. Low perception of quality of the wikis in this example is not solely related to the content provided.

Table A.2: Coding data in relation to the structural contexts and analysis of the data

	(1) **CR General Theory of IQ**	**(2)** **Concept indicator links**	**(3)** **Collected data from context**	**(4)** **How it might change IQ perception (mechanisms)**	**(5)** **Relevant theoretical lenses from Chapter 5**	**(6)** **Relevant section in chapter**
1	**Social structure-text**	Genre of communication	The genre of content is defined as educational (students perceive that educational content is in line with their courses and assignments (sub-genre). The intended genre of communication however is educational but collaborative which specifies other criteria for both form and substance.	*Understanding the genre of communication* in this way works as a mechanism that specifies some sort of EQPI similar to presenting facts or assertive speech (truth, sincerity of the message are the main expected criteria). In this case the congruence between the content of wikis and more formal course sources or approval of teaching staff can be considered as EDQ. *Wikis are still formal communication platforms* that require use of formal language.	Habermas's theory of communication act, Section 5.2.2.1	Section 6.3.2.3
2	**Material structure-text**	Exhaustive mapping from real world to information system	Information about the course resources are rarely complete on wikis. Wikis are not supposed to present complete information.	Information is perceived (QPI) as incomplete because users (students) *are not aware of the main goal of the system* (cell 17-3); Thus consistent with representation theory 'completeness' is one of their expected quality criteria.	Representation theory (Section 5.2.3.1)	Section 6.3.2.4
3		No two states from real world can be mapped to the same state in information system.	The nature of data production lets this happen because anyone can produce content.	Information is perceived (QPI) of low preciseness	Representation theory (Section 5.2.3.1)	Section 6.3.2.4

	(1) CR General Theory of IQ	(2) Concept indicator links	(3) Collected data from context	(4) How it might change IQ perception (mechanisms)	(5) Relevant theoretical lenses from Chapter 5	(6) Relevant section in chapter
4		Types of symbol provided by media, format of the message (structured, unstructured, semi-structured, image and geographic maps)	Wikis support all kind of content format such as text, diagrams, pictures, maps (un structured), Wikis' related meta data is also available in relation to produced content.	Students perceive higher quality of content *when the text includes pictures and diagrams* as well. *Provided meta data by the platform*, The EDQ used are mainly related to meta-data and semantic comparison. between content and other references		Section 5.2.3.1 Section 6.3.2.4
5		Transmission velocity				section 5.2.3.1 Section 6.3.2.4
6		Simultaneous transmission	Wikis support Simultaneous transmission.	*No control or editing* on information can lead to low quality information (QPI).	(communication theory)	Section 5.2.3.1 Section 6.3.2.4
7		Centralised vs distributed system; Controlled vs opens systems	Wikis are distributed systems with open access.	*The system allows the production of content with low quality* in terms of correctness, relevance and precision (QPI).	(communication theory)	section 5.2.3.1 Section 6.3.2.4
8	**Social (immediate context)-personal**	Individual's position in organization	Students are considered as the lower level of hierarchy (they can be forced and motivated by staff and teachers).	The expectation and even perception could be *influenced by higher levels of authority* in both directions (low or high); here there is perception of low quality (QPI) because use of the system is not encouraged by tutors and staff directly in touch with students (in relation to row 13).	Information processing theory (social judgement theory (Sheriff and Sheriff , 1970) can be also related to this section but it is not related in this case example).	section 5.2.2.2 section 6.3.2.5
9		Social influence regarding appropriate use/evaluation of information/system use	In general between different groups of students, using university resources is mainly considered as a method to pass the courses rather than acquiring	*Social group influence* works as a mechanism in forming both	Social information processing theory	Section 5.2.2.2 Section 6.3.2.5

	(1) CR General Theory of IQ	(2) Concept indicator links	(3) Collected data from context	(4) How it might change IQ perception (mechanisms)	(5) Relevant theoretical lenses from Chapter 5	(6) Relevant section in chapter
		and attitude of surrounding social group	knowledge actively. Collaboration in the wikis is not acceptable behaviour between students' groups	expectations and perceptions. (expectation: supporting their assignments led to formation of low QPI); contribution to content creation is not encouraged .		
10		Task experience/expertise about content of the message	Low experience and knowledge about content	*Low knowledge about the communicated content* leads to relying on meta-data and votes in quality evaluation (EDQ). Preferring easy language and graphical representation.		Section 5.2.1. 5.2.2.1 section 6.3.2.5
11		Management/organisational forces in using system	Use of system is encouraged strongly by university and sometimes discouraged by some staff. It differs within different courses.	There exist *conflict between authorities* in the context. However, the *lecturers and tutors have more influence* on the student's expectation (EQPI) of low quality	Social information processing theory	Section 5.2.2.2 section 6.3.2.5
12		Relation between information producer and users in forms of conflicts and power	Information producers are both students and staff; there are power relations between staff and students; there is no obvious conflict between producers and information users; in a few cases users are producers themselves.	Students perceive (QPI) the *information produced by staff* members of higher quality; less content generation from students' side. *Content generators as information users* perceive information of higher quality.	Heuristic model of persuasion (Chaiken, 1980_)	section 5.2.2.2 section 6.3.2.5
13		Social information (salient social groups) about the task in hand,	Staff's opinion on the wikis; Students' beliefs about the role of the system	*Staff's and other students' opinions*; effects on QPI and forms also EQPI	Social information processing theory	section 5.2.2.2 section 6.3.2.5
14	**Material-personal**	How often the system is used and trusted by individuals	It varies from a once only visit to weekly use; level of contribution in content generation is low; wikis are not used as a source of trustable information.	*Lack of trust* in the system (which is the result of other mechanisms such as in row 19) can lead to low level of use and	Information processing theories	section 6.3.2.6, section 5.2.3.2

	(1) CR General Theory of IQ	(2) Concept indicator links	(3) Collected data from context	(4) How it might change IQ perception (mechanisms)	(5) Relevant theoretical lenses from Chapter 5	(6) Relevant section in chapter
				low expectations of quality.		
15		Degree of comfort in working with system.	Students are not comfortable or positive in sharing information or using collaborative tools at Uni; they don't see collaboration in content generation in line with learning.	This has resulted in them *expecting something else from the system rather than what is intended*. Thus changing their expectation of quality attributes	------	Section 6.3.2.6 section 5.2.3.2
16		What is individual control/permission over the system?	The permission is similar for everyone using the system; they can produce content, put comments and vote.	*Having control over the system* can contribute to higher perceptions of quality (in this case, because students are not contributing and using the system in the way that is supposed to this mechanism cannot be activated).	Cognitive response theory (Greenwald, 1968)	Section 6.3.2.6 section 5.2.3.2
17		Human computer interaction type.	Low knowledge of content; students are not appreciating the objective of the use of wikis as is intended in design of the system as a collaborative platform; they are mainly acting as information consumers; they can use the system both on desktop and mobile devices.	Since students have *low level of knowledge of the content* the pure txt posts are more difficult to read and either ignored or perceived as irrelevant; the difference between intended design interaction and actual interaction can contribute to low quality perception (QPI). Working from desktops resulted in perception of lower level of quality for the information (QPI) (*possibility of more precise evaluation of the content*).	-----	Section 6.3.2.6
18		Physical capability of individual and interaction with system.	Generally it is assumed that all students are able to use either desktop or mobile easily.	-------	----	Section 5.2.3.2, section 6.3.2.6
19		Experience with system	Students are knowledgeable about wikis, the representation, transmission	*Being knowledgeable about the system* can change expectations;	Information processing theory,	Section 5.2.3.2

	(1) CR General Theory of IQ	(2) Concept indicator links	(3) Collected data from context	(4) How it might change IQ perception (mechanisms)	(5) Relevant theoretical lenses from Chapter 5	(6) Relevant section in chapter
			and control mechanisms, but not totally familiar with details of the specific system used at the university.	*knowing about transmission capability of the system as being distributed*); *not knowing the source of information makes users* to expect less trustworthiness (EQPI) and look for the credibility of content producer as EDQ ; students apply their prior experiences (in terms of kind of use and use of meta-data etc.) in the current system. Thus *inconsistencies between prior experiences and current system* can lead to perception of low quality for wikis content.	Heuristic model of persuasion (Chaiken, 1980)	section 6.3.2.6
20	**Material-social-personal**	Being efficient	Most students and some of the staff members think system is redundant.	This aspect works through mechanism identified in rows 8 to 13.	Social information processing theory	Section 5.2.3.3 and 6.3.2.7
21		Being innovative	Some of the staff members believe that system is innovative.	According to row 11, it makes some groups of students contribute more and perceive system to be of higher quality.	Social information processing theory	Section 5.2.3.3 and 6.3.2.7
22		Respecting information users	Wikis aim to give more value to users and collaborative knowledge production. Neither students nor staff had any comment regarding system not respecting them.	The mechanisms on other levels do not let the mechanism related to this aspect be activated.	Social information processing theory	Section 5.2.3.3 and 6.3.2.7
23		Role of system in knowledge production within context (from information users' perspective)	Wikis aim to give more value to collaborative knowledge production for students but they are not perceived as such. Students see wikis as source of information mainly. Many staffs also don't believe that system is successful in achieving this goal.	This perspective *of the system only as source of information*, influences both IQ expectation and students' collaboration within wikis.	Socio-materiality	Section 5.2.3.3 and 6.3.2.7

	(1) CR General Theory of IQ	(2) Concept indicator links	(3) Collected data from context	(4) How it might change IQ perception (mechanisms)	(5) Relevant theoretical lenses from Chapter 5	(6) Relevant section in chapter
24		Control over modification and change of the content for information users	Both students and staff group have this power and they are aware of it	Another mechanism in the context is not letting this power work and activate related mechanisms.	Socio-materiality	Section 5.2.3.3 and 6.3.2.7
25		Social context of content generation and the existing conflicts with information use context	The social context of content generation and use is supposed to be the same. In this case a low level of contribution does not enable this. Content is mainly generated by a few students or staff.	No real conflict can be observed.	Socio-materiality	Section 5.2.3.3 and 6.3.2.7
26	**Self**	Expertise about content of the message	Students have low to average level of knowledge of the content of Wikipedia (not totally confident).	They are not able judge the quality semantically based on their knowledge thus need to use other criteria or compare its resources to assess quality (EDQ).		Section 5.2.1 and 6.3.2.1
27		Motivation to evaluate information	Students are keen to achieve good marks and are willing to develop their knowledge.	They *expect the provided information to facilitate this goal* in terms of being complete and accurate (EQPI).	Integration theory (Anderson, 1981)	Section 5.2.1 and 6.3.2.1
28		Past behaviour regarding using information	No experience of using wikis' information in their prior education.	*Not being familiar with the wikis' role as educational platforms* makes for different expectations of quality from what is intended.	Self-perception theory (Bem, 1967)	Section 5.2.1 and 6.3.2.1
29		Educational level	They are mostly high achieving students with high GPA.	No mechanism can be identified in relation to this example.	Information processing theories	Section 5.2.1 and 6.3.2.1
30		Degree of familiarity with organisational culture	Students are new to university. They are not yet adapted to the culture and mode of learning and self-learning at university	no being familiar with learning culture influence their use and expectation of content provided by wikis		Section 5.2.1 and 6.3.2.1
31		Self-monitoring degree	Interviewed students were mainly High achieving students, recently graduated from high school.	They would consider information provided by staff or approved by them as high quality (EDQ and QPI).	Self-monitoring theory (Snyder Debono, 1985); social judgement theory (Sherif	Section 5.2.1 and 6.3.2.1

	(1) CR General Theory of IQ	(2) Concept indicator links	(3) Collected data from context	(4) How it might change IQ perception (mechanisms)	(5) Relevant theoretical lenses from Chapter 5	(6) Relevant section in chapter
					and Sherif, 1970)	

Appendix B: Further clarifying the concept of EQPI, EDQ and QPI

In Chapter 4, three concepts in relation to IQ judgment in information user's mind were introduced; EQPI was defined as the reference of quality assessment, EDQ refers to expected criteria related to real world attributes of the message and QPI is defined as the final perception of quality.

The purpose of this appendix is to further clarify the differences between the three concepts of EQPI, EDQ and QPI. This is done through two parts here. In Part I, a new example related to IQ perception in relation to an entity relationship diagram (ERD) is presented and explained. In Part II, the examples used in Chapter 4 are revisited and summarized.

Part I: An example related to an entity relationships diagram (ERD)

Here an example (adapted from Batini et al., 2014, p.61) related to quality of entity relationship diagrams (ERD) is presented to better show how EQPI is different to EDQ criteria and how they all relate to final perception of IQ (QPI).

Readability or comprehensiveness (EQPI) of an ERD diagrams can be evaluated based on several syntactic and also semantic criteria (EDQs):

Syntactic criteria:

(a) Minimize crossing
(b) Use only horizontal and vertical lines
(c) Minimize bends in lines
(d) Minimize the area of the diagram

Semantic criteria:

(e) Place most important concept in the middle
(f) Place parent objects in generalization above child objects (Batini et al., 2014).

Figure B.1 shows two ERD diagram which both are representing the same structure and both are semantically corrects. Applying the above criteria on the ERD diagram in Figure B.1, to assess the comprehensibility of the diagrams, might result in the conclusion that the diagram on the top is more comprehensive than the one on the bottom (QPI). However, it is not the same conclusion for all readers of the diagram. Batini et al. (2014), gives the example of a Chinese professor that preferred the model on the bottom, because of its asymmetry and sense of movement. This example shows that even when there exist clear objective criteria for a diagram as semi-structured representation of information, still subjective judgment of human being changes the final perception of quality.

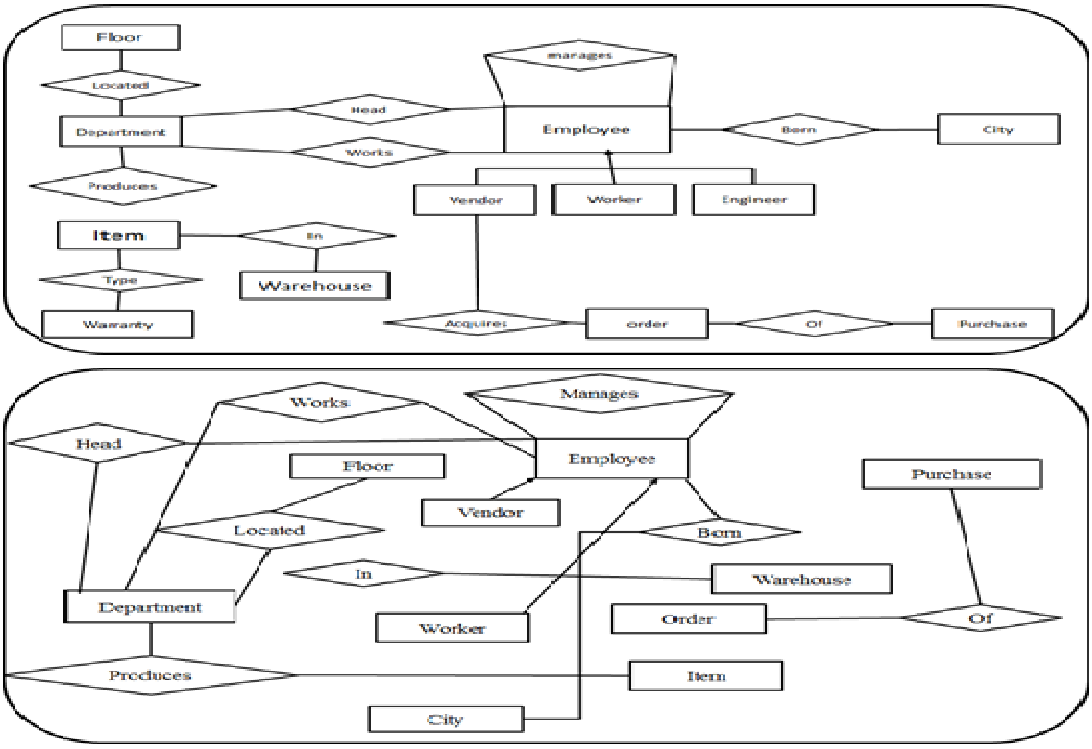

Figure B-1: The entity relationship diagrams

Part II: Revisiting the Examples from Chapter 4

This section gives an overview of the three main examples in Chapter 4 and also the ERD example above and their relevant IQ concepts; EQPI, EDQ and QPI. The purpose of this table is to bring more clarity to what already have been discussed and help readers to have a recap of how EQPI, EDQ and QPI have been defined in each context. This table is not meant to show any relations between these concepts (see Section 7.5.3 for such discussions)

Each case example is briefly recapped from Section 4.4. The first column in Table B.1 presents EQPI, the second column presents EDQ and the third column describes the attributes of real world in the relevant message that EDQ is referring to. Column 4 of Table shows the perceived QPI according to the relevant contexts.

Table B.1: List of EQPI and EDQ concepts related to examples in the thesis

EQPI	**EDQ**	**Real world attributes of the message**	**QPI assessment**
Mars Example: In this example two pictures of Mars were presented and they were assessed regarding their accuracy in representing Mars as it exists in the real world. The photos were borrowed from two different websites and the related links were located underneath each photo (Section 4.4).			
Accuracy	Credibility of the source (based on information user knowledge)	Meta-data (the links to the source websites)	The photo with more credible source (Nasa website) is perceived of higher quality.
TripAdvisor example: In this example, the quality of two reviews on a hotel in TripAdvisor website is investigated. Two quality criteria as EQPI are assessed as described below.			
Accuracy	Syntactic relations in text. Structural similarity Credibility of reviewer	Syntactic relations, internal organization of the text, meta-data related to reviewer	In this example since both texts had same language structure, the credibility of the authors of the posts was more important in deciding about accuracy. The post which was written by the author with higher level of contribution was perceived higher in terms of accuracy
Currency	Submitted time of the message- time of the day	Meta-data	Both these posts were perceived as current since their submitted time was close.
Wiki Example: This example refers to quality of the content in wikis (Appendix A provides the full details of this example). In this example, the content of wiki is meant to help students to develop their skills and their knowledge.			
Currency	Submitted time of the message- time of the day	Meta-data	The contents from lasts semesters are considered as low quality.
Preciseness	Credibility of the author, compatibility of the semantic content with other with a reference version	Meta-data, semantic content. Syntactic relations of language	QPI varies between different groups of students. But mainly they give higher weight to credibility of authors rather than the other two criteria when deciding about the preciseness of the content.
ERD Example: Quality assessment between to semantically correct ERD diagrams.			

Readability	Syntactic features, semantic rules	The objects used in a diagram and their syntactic and semantic relations	Normally the first diagram can be perceived of higher quality but this example showed that it can also vary depending to the culture and the context.

Appendix C: Implications of the framework in case examples

The proposed framework in this thesis can be applied in different IQ studies from different disciplines to represent how insights from this framework can improve IQ studies and link them better together. In this appendix two papers one from information system studies and the other one from information science studies have been selected.

<u>Beyond accuracy: What data quality means to data consumers? (Wang and Strong, 1996)</u>

This paper is one of highly cited papers in IQ studies (Zhu et al., 2012). The four dimensions suggested in this paper has been widely used by other researchers (Lee et al., 2002). Both authors of this paper have been influential researchers in the field of IQ studies.

It is also important to note that this paper is considered as a breakthrough in IQ research with changing the focus toward information customers (Zhu et al., 2012, Embury and Missier, 2014). The main goal of this paper is to capture customers' insights on data quality[123] to develop a framework for measurement, analysis and improvement of information quality.

A strong positivism approach is dominant in designing the study methodology. Two stages survey is conducted first to identify attributes of data quality from customer's perspective and then to prioritize these quality attributes. The respondents in the surveys include practitioners working in industry and MBA students. Following the findings of this paper has been mapped to the proposed framework in this study.

The results of survey or finding of data collection methods and also relevant statistical analysis belong to the domain of empirical. To understand how this paper has been successful in achieving its goals, we need to identify how these findings are representing and clarifying the concepts in the domain of actual (EQPI, EDQ and QPI) and entities in the domain of real (social, material and personal worlds).

Since in the conducted survey respondents were asked to provide their view on IQ attributes, means that basically respondents' expectations have been captured. However, Wang and Strong's paper doesn't differentiate between data and information, thus the derived attributes are mixed in representing either expected quality of the meaning (EQPI) such as

[123] Wand and Strong (1996) have not differentiate between data information in their paper and the term data is used to refer to the concept of information as well.

relevancy and value-added or expected attributes of the received message (EDQ) such as representation consistency and accessibility of the system.

In relation to the entities in the domain of real, not much details are specified in this paper. It is implicitly assumed that social context of information use is the organization's context and communication medium include different technologies used in the context of an organizations. However, none of these assumptions have been explicitly defined in the paper and not considered in data collection.

Accordingly this paper can be mainly criticized regarding its approach in driving expectations and attributes of IQ without considering context of information use. Survey respondents might have different assumptions about the context and use of information when answering the survey. However the study design doesn't take into account these biases and by statistically analysing the findings ignores the importance of these contextual assumptions. This is contradicting with the initial emphasis of the paper on information customer and definition of information as "fitness for use". This paper also can be criticized in relation categorization of IQ attributes to IQ dimensions based on the statistical analysis. There is no discussion on why these categories are useful, how they are related to information user, information provider and how they can be related to IQ improvements.

Consequently although Wang and Strong paper is highly used and cited by scholars, it fails to describe and link the findings properly to the context of the study and thus is not consistent with the definition of IQ and the initial goals of the paper.

By providing more details about survey respondents and specifying the context and use of information, data collected in this paper could provide more insights on the users' expectation of IQ (EQPI) and also users' expectations in relation to the presentation of the message and the medium of communication (EDQ). If data in relation to respondents' characteristics (see Table 6-3), the specifications of the information system (see table 6-5) and also the related task (see section 6.3.2.3) was collected more meaningful insights could be achieved even from a quantitative analysis. This kind of survey could help to find the answer to questions such as "what are differences in expectations of quality for different groups of users?", "what are differences in expectations of quality for different tasks?", "what are differences in expectations of quality for different kind of systems?" Although answering these questions through survey results is not enough to address different aspects of the framework but it provides the basis to answer more questions and to design follow-up detailed research.

It is also important to notice that statistical analysis of data on its own only provides insights about the domain of empirical and without further depth analysis to discover entities and mechanism in the domain of actual and domain of real, fails to provide rigor (verifiable) scientific contributions. Figure shows how Wang and strong (1996) paper can be mapped to the proposed framework in this thesis.

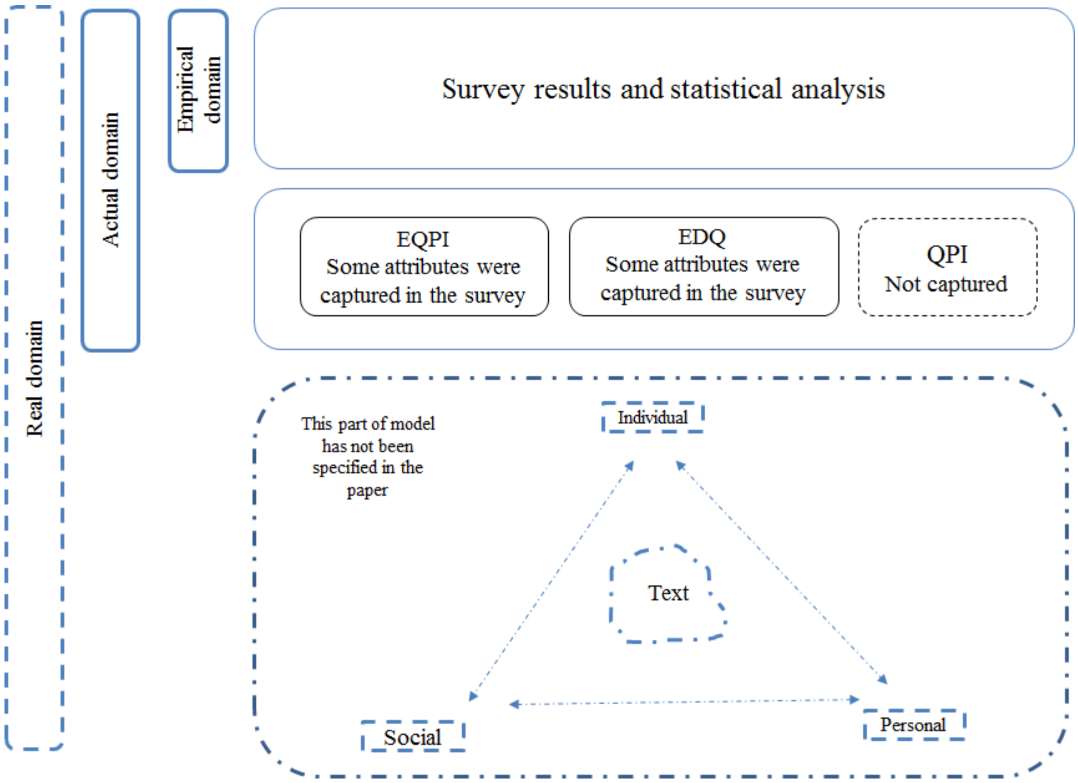

Figure C.1: Mapping Wand and Strong’s (1996) paper to the proposed conceptual model in this study

Considering the Wang and strong (1996) paper as one of the most cited papers in information system discipline and also based on a positivist philosophy, the next paper to be positioned is chosen from information science studies with more focus on interpretative methods.

Judgment of information quality and cognitive authority in the web (Rieh, 2002)

This paper is published in Journal of the American Society for information science and Technology and in the field of information science. It is a highly cited paper in this field.

The goal of this paper is to understand different factors that influence people's judgment of information quality and cognitive authority in the context of web and how these factors can effect on people's judgment and selection behaviour. In this paper information quality is defined as "the extent to which users think information is useful, good, current and accurate". Cognitive authority is defined as "the extent to which users think they can trust the information" (Rieh, 2002, p.146). According to this definition, in this thesis cognitive authority is also considered as one the criteria of information quality.

This paper starts with a conceptual framework. This model suggests that judgment of information quality and cognitive authority happens in the interaction between the information user and information object in the web environment. This study defines judgment as happening internally and choices as the actual behaviour that can be directly observed. With this definition judgment belongs to the domain of actual and the choices that user makes belong to the domain of empirical. To collect data about people decision making process and choice behaviours this study collected concurrent verbal data from users when they were doing search on a specific subject and using think-aloud methods. Following that to collect data about facets of the quality and factors influencing judgement of quality, post-research interview has been done in laboratory setting. Search logs were also collected to be able to directly analyse users' interactions and choice making process. Research participants were selected from scholars in one university including faculty members and students. Participants are from diverse backgrounds such as chemistry, computer, sociology and etc. Content analysis method or inductive coding was used to analyse the collected data.

Following the findings of this paper are discussed and mapped to the proposed framework in this study.

The collected data from all three methods (think-aloud method, interviews and search logs) belong to the domain of empirical.

As it was mentioned earlier (Rieh, 2002) differentiated between observable behaviours as choices and decision making and judgment process. In the analysis of data, two kinds of quality attributes has been distinguished in data analysis phase based on the Hogarth (1987) theory on judgment and decision making process; predictive judgment and evaluative judgment both belonging to the domain of actual. Predictive judgment is user's judgment of quality attributes before looking at a certain webpage. Thus the attributes derived in this category can represent either EQPI or EDQ in the proposed model in the current study. Evaluative judgment happens when users had a look to the webpage and the data related to this category is collected during the post-search interviews. Evaluative judgement henceforth represents the concept of QPI proposed in this thesis (See also Section 4.4). Data collected by search logs and think-a-loud method also have been used to derive attributes related to information source and information object in relation to judgment process. These criteria are representing EDQ concepts introduced in the proposed model in this study.

In data analysis stage Rieh (2002) also has differentiated between different search tasks given to the research participants and their judgment of quality. She also has identified how predictive judgement and evaluative judgment criteria can be different considering different task in search process. Data analysis in this study also showed that factors influencing subjects judgement of IQ consist in the characteristics of information objects, characteristics of the sources, knowledge, situation, ranking in search output, and general assumptions. Thus Rieh (2002) has taken in to account entities existing in the domain of real such as communicated message (characteristics of information objects), information source (communication medium), knowledge (information user) also social context (task, general assumptions, hierarchy of organization, etc.).

Figure 2 represents how Rieh (2002) paper have covered different structures and elements of the IQ conceptual model proposed in this paper. This mapping shows that by applying the domain specific meta-theory proposed in chapter 6 of this study and related concept indicator links, more details about social, material and personal structures and also their interactions could be captured. Capturing all these aspects, provides better opportunity to derive mechanisms and to provide better explanation for the empirical findings.

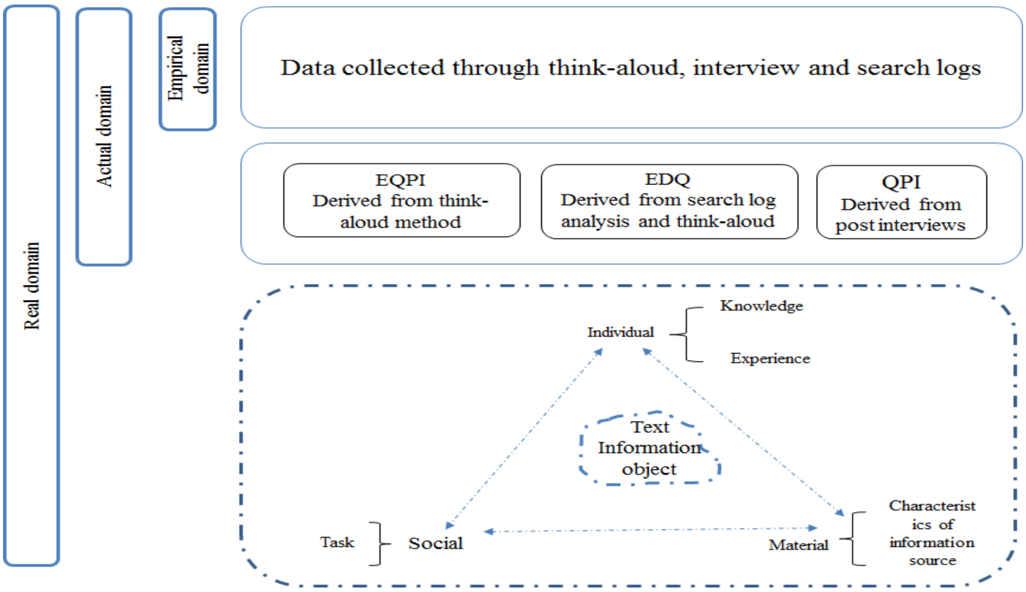

Figure C.2: Mapping Rieh (2002) to the proposed conceptual model in this study

The above positioning shows that Rieh (2002) paper have captured different aspects of IQ both in terms of concepts in the domain of actual and entities in the domain of real, considering the given context and from the perspective of the specific group of research subjects. Although this study has gone further than domain of empirical by identifying concepts and entities in the domains of actual and real, it is limited in terms of capturing important features of social, individual and material structures and also their interactions. Applying the concept indicator links defined in chapter 6 and using the same data collection method used in Rieh (2002), a more comprehensive understanding of the context of IQ study could be achieved.

Rieh (2002) also doesn't go further to explain how the identified entities and their interactions in the domain of real can enable mechanisms which generate certain empirical findings. This issue is one barrier in generalizing research results and the researcher herself also mentions that in the end of her paper. For example, considering the subjects of the study being scholars, the generalization of research findings to other types of users without identifying related mechanisms could be problematic. In order to solve this problem similar research problems can be investigated in a different setting or different subject groups. Also researchers need to ask question such as "what are specific characteristics of academics that can cause the certain judgment and choice behaviour?" (See Table 6.3), "what are the characteristics of each search task that has caused differences in the judgment and choice behaviours of the subjects?" (Section 6.3.2.3), "How social-personal interactions are changing users' behaviour?" (See

Table 6-6), "How individual relate themselves to the communication medium and how the affordances and liabilities of the systems (computers and websites) is influencing their judgment and choice behaviour?" (See Table 6-7), "How the data collection setting (socially and materially) influencing individuals and their behaviour?" This approach to data collection and asking these sort of questions, helps researcher to better explain and even generalize their research findings.

Appendix D: A review of studies on information quality in the context of Web 2.0

To understand how current studies have addressed IQ in social media, this study has conducted a structured literature review. Literature was systematically collated, analysed and synthesized to determine the gaps and current state of information quality in social media. This study adopted literature review methods suggested by Wolfswinkel, Furtmueller and Wilderom (2013) and aligned with Bandara, Miskon and Fielt (2011) and Webster and Watson (2002).

In order to conduct a literature review, first area of inclusion or exclusions, appropriate sources and search terms should be defined (Wolfswinkel, et al., 2013). This study focuses on academic publications and does not include any time limit to extract set of papers. Focusing on limited outlets cannot be justified for a literature review on social media, because research in this area has just emerged recently, and the publication channels are still scattered. In the meantime, using online database searches as a primary literature collecting approach have become an emerging culture among IS researchers who are interested in contemporary phenomena (Sabherwal, Jeyaraj, & Chowa, 2006). On the other hand, IQ in social media is a new topic in research and therefore, most publication in this field can be found in conferences rather than journals, as a result Association of Computer Machinery (ACM) and Institute of Electrical and Electronics Engineers (IEEE) have been chosen as IS databases that cover most conferences in IS, the search was also conducted on Google Scholar to find conference papers affiliated with Association of Information Systems (AIS) (Bandara, et al., 2011). ProQuest (ABI/Inform) was also selected being prominent online data base in IS discipline (Levy & Ellis, 2006).

Typically, a researcher when searching for a key topic area will identify a search term and search for this in the title, abstract and keywords- to derive those papers that are specifically focused on the target topic (Bandara et al., 2011); This study follow this approach to find papers that have investigated information quality of social media as the main concept of their studies. The researcher started with the search query "(Information quality) AND "social media") but based on the primary findings the other keyword that have been interchangeably used in literature such as "web 2" for social media and "content quality" and "data quality" for information quality were also added to search terms. Finally the following query was looked within the mentioned data bases.

("information quality" OR "data quality" OR "content quality") And ("social media" OR "web 2.0)

Overall 59 papers were found which had the above key words in title, abstract or key words. From which just 20 were imported to endnote by scanning manually the titles and abstracts and other one were extracted because they were not related to the study goal. Back and forward searching was also conducted to find more related papers (Bandara et al., 2011; Levy & Ellis, 2006; Wolfswinkel et al., 2013). Finally 54 papers were imported to endnote and were analysed in more details.

In the second round investigation, abstract and the some part of text were scanned. The papers which have just addressed lexical quality or automated retrieval methods of social media were extracted from the whole sample. The final set of 30 papers which seemed to address some aspects relevant to the main research questions of this study were chosen for more detail analysis.

The papers were analysed by conducting different levels of coding as suggested by Wolfswinkel et al. (2013) first to find the current gap in the literature and second to derive information quality attributes and definitions according to the existing literature. The results of gap identification are presented in the following section.

Overview of the research approaches

Information quality research in social media context is mostly interested towards developing algorithms and criteria for building automated tools. Considering the huge amount of information available on social media websites, monitoring and evaluating this information manually seems very time consuming. Social media monitoring has been considered as an imperative activity to extract information from social media. Social media monitoring or listening is defined by Mayeh, Scheepers and Valos (2012)" the process of scanning social media to analyse and extract information about firm's external environment". Social media monitoring tools such as data mining and retrieval techniques have just begun to address the problem of information deriving from social media websites (Agarwal & Yiliyasi, 2010; Chen & Tseng, 2011). These techniques have been widely used before to retrieve information from traditional media such as web pages and emails. A major task of text mining methods involves identifying sentimental (or bipolar) text units in the reviewed document (Chen & Tseng, 2011). There are now more than two hundred social media monitoring tools available on the market (Dai, Kakkonen, & Sutinen, 2011). Töllinen, Järvinen, & Karjaluoto (2012) argue that these tools cannot replace human judgement and still traditional person controlled research is required They also suggest that decision makers should know what they are looking for to be able to effectively use social media monitoring tools. . Chen and Tseng (2011) pointed out that these techniques does not consider quality of content provided by users, just focus on analysing and extracting opinions and mostly use lexical or syntactical features to evaluate quality. This shows the need to focus more on the aspects of information quality from the user points of view. Agrawal (2010) criticize research on information quality in social media to be limited to machine learning and automated techniques. Although, some researchers have employed information quality frameworks in search engines (Burgess, Gray, & Fiddian, 2007; Knight & Bum, 2005) but still they suffer from vague definitions and weak conceptualization of information quality (Chen & Tseng, 2011). Cheng and Tseng (2011) have stated that ignorance of the quality of data in opinion mining contribute retrieving useless or even noisy documents.

Finding the gap in the previous studies

In order to understand the current gap in research on information quality of social media, the papers are analysed based on the context of information usage, the variety of platforms which have been studied, IQ evaluation method, theoretical foundation for IQ definition and if users perspective are applied to build/test the model. These criteria are developed based on the researchers' views and perceptions of existing gaps in the literature. The results of this investigation are presented the in two sections; *methods and theories, context and the scope of the study*.

The context and the scope of the study

The first column in Table C.1 present the context and the goal of the conducted study, the second column presents the users who might benefit from the study and the third column present the platform of the study. According to Table C.1 a high portion of studies have explicitly addressed information quality in social media in order to improve quality of search engines and information retrieval services (IR), ranking answers in Q&A websites or online communities is another area which researchers seems have been more interested in. Although the main focus of all investigated studies is more on evaluation process using automated algorithms few studies have mentioned managerial decision makings implicitly (Chen & Tseng, 2011) and have focused on review websites to extract customers' feedbacks. The table also shows other contexts such as knowledge management and learning and education in information quality research on social media websites.

This review also reveals that in the area of IQ in SM researchers mostly have been interested in quality of textual features because of their potential to be used in information retrieval services (Figueiredo et al., 2013). In assessing the quality of textual content of social media and web 2.0 , most researchers have focused more on the quality of single feature or small sample of objects (Figueiredo, et al., 2013), such as tagging systems (Clements, De Vries, & Reinders, 2010) or tag recommendation (Guy, Zwerdling, Ronen, Carmel, & Uziel, 2010). There are also some works on assessing other textual contents such as question/answering (QA) websites (Baeza-Yates, 2009; Zhu, Bernhard, & Gurevych, 2009).

Methods and Theoretical perspectives

Table C.1 demonstrates that automated algorithms such as machine learning methods are most common to evaluate the quality of textual features in social media. IQ in SM is relatively a new phenomenon and most of the frameworks are ad hoc, intuitive, and incomplete and may not produce robust and systematic measurement models. Although, some scholars have tried to link IQ theories to IQ in social media research, the definitions and relations are still vague and not theorized properly (Chen & Tseng, 2011). Table C.1 also demonstrates that just one study have used users perception in developing quality models, Zhu et al. (2009) have derived and validated the measures based on users and experts perception and have derived dimension from literature and validated them using questionnaire and empirical methods. There are few studies which have validated their suggested quality framework based on users' feedback (Chuenchom, 2011; Orehovački, Granić, & Kermek, 2013). Overall the results demonstrate the lack of addressing users' perceptions and requirements in developing information quality models in social media context.

According to the Table C.1 most studies have not used any theoretical foundation to derive quality measures and dimensions. Information quality theories and frameworks have been applied by some scholars but not well developed and discussed in social media research (Chen & Tseng, 2011). On the other hand, these studies have not studied IQ in SM as a construct in organizational context. The focus on measuring and deriving information from social media is obviously dominant in literature and there is no study that investigates the relations and theoretical descriptions of IQ in SM. Although some studies emphasize on the importance of information quality of these websites on decision making in organizations (Chen

& Tseng, 2011; Kane & Ransbotham, 2012), they are not based on rigorous theoretical foundations.

In summary, while prior literature offers several avenues to study IQ measurement in SM, we observe the scope, contexts and approach of these works is disparate, largely incomparable and lacking well defined theoretical and empirical basis.

Table D.1: Analysing studies of information quality in social media

context of information use	stakeholders	kinds of social media	Evaluation method	Theories to define IQ	users perspective to build the model/ to test the model	citation
IR Services	Users	Websites	information retrieval		NO/Yes	(Burgess, et al., 2007)
	designers	CiteULike, Last.FM, Yahoo! Video, and Youtube	Automated algorithms		NO/NO	(Figueiredo et al., 2009)
		Social media	IQ measures, Montoring tools	IQ theories (Wang and strong 1996)	NO/NO	(Agarwal & Yiliyasi, 2010)
	Web 2.0 app designers	CiteULike, Last.FM, Yahoo! Video, and Youtube	Automated algorithms		NO/NO	(Almeida, Goncalves, Figueiredo, Pinto, & Belem, 2010)
	Designers	Forum	Machine learning algorithm		No	(Chai, Hayati, Potdar, Wu, & Talevski, 2010)
	Web 2.0 app designers	CiteULike, Last.FM, Yahoo! Video, and Youtube	Automated algorithms		No	(Figueiredo, et al., 2013)
	users, designer	Blogs	Survey		NO/Yes	(Chuenchom, 2011)
Ranking of the answers	Users	Q&A websites	Automated algorithms		NO/No	(Agichtein, Castillo, Donato, Gionis, & Mishne, 2008)
			NLP machine learning	IQ theories and NLP	Yes/ Yes	(Zhu, et al., 2009)
	Users and designers	Q&A websites			NO	(Fichman, 2011)
	Designers	Q&A websites	Automated algorithms	ontology based method	No	(Burel, He, & Alani, 2012)
Knowledge management	Managers	Wikipedia	social network analysis	Social network theories	NO	(Kane & Ransbotham, 2012)

	Knowledge seekers	online community		information quality and psychological theories, knowldege adoption model	No	(Wang, Liu, & Fan, 2011)
organizations decision making	Managers	Reviews	Semi-learning machine		NO	(Lu, Tsaparas, Ntoulas, & Polanyi, 2010)
		Reviews	Machine learning algorithm	IQ theories (Wang and strong 1996)	NO	(Chen & Tseng, 2011)
customer decisions	Designers	Reviews	Survey	elaboration likelihood model	No/ Yes	(Yee Cheung, Ling, & Kuan, 2012)
learning and education	Learners	Forum	Information retrieval, Automated algorithm	cognitive presence	NO/NO	(McKlin, Harmon, Evans, & Jones, 2001)
	Instructors				NO/Yes	(Kim, et al., 2006)
Web 2.0 application quality	Web 2.0 app-designers	Web 2.0		Software quality standards	NO/NO	(Olsina, Sassano, & Mich, 2008)
		Web2.0 apps	Logging actual use, questionnaire, mind mapping		NO/Yes	(Orehovački, et al., 2013)
		Wikis	Observing (induction)	Information quality and Grounded theory	NO/NO	(Schaal, Smyth, Mueller, & MacLean, 2012)
improving tagging	Wikis developer	Wikipedia	Automated algorithms		NO/NO	(Anderka, 2013)

Glossary

Close system: A close system is provided in an experimental situation and mostly in laboratory experiences where researchers are able to study a phenomenon (natural science phenome neon) by controlling environmental variables.

CR general Meta-theory/ CR ontology: The term refers to one of the levels of theorizing in Cruickshank's (2003) realistic theorizing. CR general-meta theory refers to ontological views informed by meta-theoretical assumptions of CR in theorizing such as Archers' distinction between social structures and agency.

Data: is defined as collection of signs that brought together for some purpose (Mingers 1996, Mingers 2013). This definition

Ontological Depth (Bhaskar, 1998, p.12) or **Depth ontology** (Edwards et al., 2014) or: Bhaskar refers to stratification of domains as ontological depth

Domain specific meta-theory: Cruickshank defines it as a level of theorizing between general meta-theories and developing domain specific theories in empirical studies.

Entities/objects: the terms entities and objects refers to basic theoretical building blocks of critical realism that possess causal powers. These terms are used interchangeably and refer to things such as, organizations, people, resources, relationships, attitudes, management information system, inventions, ideas or so on.

General/ Grand theories: Grand theory is the term that Merton has used to refer to General theories (Layder 1988, p. 19). General theories in social science studies are defined as having broad explanatory sphere and concerns itself either with the whole society or general aspects of social reality. In IS weber (2012) defines general theories as theories at macro-level.

Information: is propositional content of sign system (Mingers 1996). In this thesis information is defined as a concept that

IT artefact: in this study IT artefact refers to medium of communication **Laminated system**: refers to hierarchy of entities that make a phenomenon to exist or happen. Examples include physical, biological, psychological and sociological (Edwards et al., 2014), multiplicity of structures (Bhaskar, 1998). **Meaning**: Meaning is generated in recipients' mind after receipt of a message. It is also called digitalized information (Dretske, 1981). Two kind of meaning has been introduced; the systems of meaning which are publicly available within the sign system through connotation and language. The second is the meaning that is generated through dynamic interpretation and is effected by different social and contextual factors.

Message: is used to refer to any combination of signs that is communicated to the receiver or observer

Open system: In an open system, researcher is not able to control different variables and environmental factors influencing on the research phenomenon, regularities happen sporadically and it is not possible to make predictions with a high degree of certainty.

Perceived information: is used as equivalent to the meaning. Meaning is generated in the mind of an observer through a process called digitalization of information (Dretske, 1981, Mingers, 1995). In this thesis the term perceived information is referring meaning as received and digitalized information.

Reference theories: In IS the term reference theory is used to refer to theories borrowed from other disciplines. Many of these theories fall in the category of general theories since they have a broad explanatory power that makes them adaptable to IS context as well.

Semiosis: Peirce defined semiosis as “action of signs” or “the process that signs have cognitive effect on their interpreters”.

Sign: in this study sign is mainly used as representamen or something that stand for something in some respect or capacity.

Sign’s categories by Peirce: this is a categorization based on the relationship between signs and objects and consist in Iconic, Indexical and Symbolic. Iconic is when the relation between sign and the object is their similarity, indexical when sign can be related to the object as an occurrence or result (fire and smoke) and symbolic refers to the category of arbitrary and conventional signs like language.

Stratification or depth ontology: these terms are used as synonyms (Edwards et al., 2014) refers to distinction between real, actual and empirical

Stratified world: is used to refer to both depth ontology or domains of reality and also the hierarchical structure of entities.

Structures: Structure refers to internal relations of entities and what makes entities what they are.

Text: set of different kinds of sign (not only limited to language signs and can include different visual or audio signs) communicated with different media. In this study the term text is used to refer to both data (as sets of signs) and also the communicated message.

Transfactual conditions: are conditions for something (a social structure) to be what it is and not something different" (Danermark et al., 2001, p.78)

Typological theories: Typological theories are domain specific theories which identify contingent generalization on how and under what conditions different mechanisms can be enacted and produce different research outcomes (Bennett, 2013)

<u>Other acronyms in the thesis</u>

CS: Computer Science

DSMT: Domain Specific Meta-Theory

EQPI: Expectation of Perceived Information (Expectation of the meaning)

EDQ: Expected Data Qualities (Expected attributes of the sign system)

IQ: Information Quality

IS: Information System

QPI: Quality of Perceived Information