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OLLSCOIL LUIMNIGH

**An Empirically-Derived
Personalisation Theory
for Technical Support**

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For the degree of Doctor of Philosophy**

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Abstract

This thesis focuses on Technical Support (TS) as a post sales service provided to users of Information Technology (IT). One of the goals of TS is to maintain a high level of customer satisfaction by providing high quality answers to technical questions. TS Advisers aim to respond to users' needs in a timely and effective way when they have problems using a product. However, the sophistication of software, frequent changes and updates to new technologies has made developing an effective Technical Support (TS) challenging.

Users of software systems need support. These days users are not only demanding a quality product, but also an effective service with respect to product delivery, cost of the product and after sales service. When users choose to go directly to online forums rather than report issues to the source of the problem, software companies lose out. Software companies miss opportunities to gather information on where their systems could be improved, and can lose customer loyalty, future sales and goodwill. With the growing user and customer demands, service providers are looking for ways to provide better TS. In particular, software companies are starting to realise the importance of incorporating users' individual characteristics in their TS for an improved user experience.

The explicit aim of the research presented in this thesis is to empirically derive and evaluate TS User behaviour in order to determine prevalent user characteristics and prevalent interaction characteristics in TS. Empirically derived personalised characteristics could strengthen the current understanding of how to characterise users. Taking an inductive approach may provide novel perspectives and new characteristics that may, if implemented, improve TS. Providing an empirical basis for such user characteristics could provide important evaluation of presumably relevant personalisation attributes in TS, and interaction characterisation could provide a strong basis for determining how best to handle different characteristics of users and customise content for individuals. Without such empirically grounded characterization, efforts to personalise TS may be misguided.

Users and TS Advisers' behaviour is investigated by analysis of the related TS and personalisation literature. Grounded Theory method (GT) is also adopted to investigate users and TS Advisers' behaviour in several TS web-forums dataset, where individual/interaction characteristics are identified towards improving TS personalised practices.

The contribution of this research is an empirically derived substantive theory (*Personalisation In Practice*) that identifies TS Users according to groups of characteristics. Analysis of the data suggests that users of TS systems can be grouped according to their level of expertise and what they value. Additionally the communication handling process can influence desirable and undesirable outcomes. Derived from this, recommendations are presented based on the successful work-practices of personalised TS services. This assessment of the informal TS forums is aimed at supporting TS in a company-based setting. These emerging user characteristics can be considered during company-based TS system development to enhance the service in a more targeted, personalised manner.

Finally, the study assessed the validity of the empirically identified user characteristics and communication handling recommendations in a survey with a group of TS Advisers and TS Users. The findings of the validation process supported the empirically derived results which indicates that a user will be more satisfied when the TS service provider recognises concepts such as what the user personally values, their level of expertise and how best to manage users' emotions.

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Declaration

The work described in this thesis is, except where otherwise stated, entirely that of the author and has not been submitted in any part for a degree at this or any other University.

Signed: _____

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Table of Contents

Abstract	ii
Acknowledgements	iv
Declaration	vi
CHAPTER 1	2
1 Introduction	2
1.1 Research Motivation	2
1.2 Research Questions	5
1.3 Contribution of the study	6
1.4 Layout of Thesis.....	6
CHAPTER 2	10
2 IT Technical Support and Personalisation.....	10
2.1 Technical Support in IT	11
2.1.1 Technical Support Processes.....	11
2.1.2 Stakeholders	12
2.1.3 Workflow-Phases	15
2.1.4 Communication Channels	17
2.1.4.1 Asynchronous communication channels	17
2.1.4.2 Synchronous communication channels	19
2.1.5 Existing Technical Support Systems	22
2.1.5.1 TS Systems and User Characterisation.....	23

2.1.6	Quality measures in TS	24
2.1.6.1	Quality dimensions relevant to text-based service in TS	25
2.1.6.2	Quality Dimension Constructs	29
2.1.7	Individualised Services in TS.....	35
2.1.7.1	Characterisation of Users in TS.....	36
2.1.8	Addressing the TS Individualisation Issue	37
2.2	Personalisation	38
2.2.1	What is Personalisation?.....	38
2.2.2	Notion of Personalisation Implementation	39
2.2.3	User Modelling	44
2.2.3.1	Data gathering in User Modelling	45
2.2.4	Personalisation Attributes.....	46
2.2.4.1	Attributes in Standardisation Documentation.....	47
2.2.4.2	Attributes in Academic Literature.....	49
2.2.4.3	Attributes in Frameworks	51
2.3	Personalisation for Improved User Satisfaction in TS	62
2.4	Summary	63
CHAPTER 3	67
3	Research Method	67
3.1	Qualitative Approach	67

3.1.1	Types of Qualitative Research	69
3.1.2	Rationale for Applying Grounded Theory	70
3.1.3	The Grounded Theory method	72
3.2	Quantitative Approach	73
3.2.1	Quantitative Research Approach.....	74
3.2.2	Rationale for Applying Survey	74
3.2.3	Survey Method	75
3.3	Mixed Method Approach	78
3.4	Life-Cycle of the Research Methods.....	80
3.4.1	Introduction	80
3.4.2	Theoretical Sensitivity	82
3.4.3	Data Collection	86
3.4.3.1	Sampling	88
3.4.3.2	TS Forums.....	92
3.4.4	Data Analysis	95
3.4.4.1	Data Analysis Process.....	98
3.4.5	Emerging Theory.....	100
3.4.6	Theory Refinement.....	102
3.5	Summary	103

CHAPTER 4	108
4 Results of Empirical Study of User Characterisation from TS Forums.....	108
4.1 Categories	108
4.2 The Substantive Theory	114
4.2.1 Phenomenon	116
4.2.2 Context.....	116
4.2.3 Causal Condition	117
4.2.4 Intervening Conditions.....	117
4.2.5 Action/Interaction.....	118
4.2.6 Consequences	119
4.3 Summary	119
CHAPTER 5	122
5 Resultant Guidelines for Assessment of Technical Support	122
5.1 TS Forum Communication Flow.....	122
5.2 Successful and Unsuccessful Practices of TS Forums	126
5.2.1 Conclusion	143
5.3 Results of the Survey	145
5.3.1 Background Characteristics of Participants	145
5.3.2 Personalisation In Practice Success Criteria	148
5.3.3 Conclusion of the Survey	163

5.4	Summary	165
CHAPTER 6	168
6	Discussion	168
6.1	A Comparative Analysis of <i>Personalisation</i> In Practice and Literature 168	
6.2	Novel Research Contribution	182
6.3	Summary	185
CHAPTER 7	188
7	Conclusion and Future Work	188
7.1	Overview	188
7.2	Answering the Research Questions	188
7.3	Research Contribution	194
7.4	Limitations	194
7.5	Future Work	198
7.5.1	Exploring Language and Cultural Importance	198
7.5.2	Implementing Personalisation In Practice	199
7.5.3	Developing Conceptual Personalised Data Models	199
7.6	Concluding Remarks	200

List of Tables

Table 2-1: TS Communication Channels	21
Table 2-2: Existing Systems of TS	24
Table 2-3: Definitions of Quality Dimensions in TS (Applicable to Text-based) ..	26
Table 2-4: Definitions of Quality Dimensions in TS (Not Applicable to Text-based)	27
Table 2-5: List of Quality Dimensions in TS and their Definitions	30
Table 2-6: Notion of Personalisation	43
Table 2-7: Classification of Personalisation Attributes from Standard Documentation.....	47
Table 2-8: Attributes of Personalisation from Academic Literature	50
Table 2-9: Attributes of Personalisation Miceli et al's (2007)	60
Table 3-1- Total Dataset	88
Table 3-2: Output of Each Dataset.....	90
Table 3-3: Description of Forums Examined	94
Table 3-4 Open Coding Examples	98
Table 3-5: GT Method Validation Criteria.....	105
Table 4-1: Ranked List of Categories.....	110
Table 4-2: Definitions of Concepts	111
Table 5-1: Observed Success Rate	126
Table 5-2: TS Adviser Practises in identifying User Level of Expertise	148
Table 5-3: TS User Practices in Expressing their Level of Expertise	148

Table 5-4: Loyalty-User.....	151
Table 5-5: Building Trust- TS User.....	152
Table 5-6: Building Trust- TS Advisers	152
Table 5-7: Preserving Security and Privacy-TS User Perspective	153
Table 5-8: TS User Attitude Towards Individual Service	156
Table 5-9: TS Advisers' Attitude Towards Individual Service	156
Table 5-10: Preserving Security and Privacy- TS Adviser Perspective.....	157
Table 5-11: Visually Appealing Material- User	158
Table 5-12: Visually Appealing Material Practices-User	158
Table 5-13: Visually Appealing Material Practices-Advisers	159
Table 5-14: Communication Issues.....	160
Table 5-15: Manage Emotions	162
Table 6-1: TS Practices Supported by the Literature	169
Table 8-1: TS Literature Review Process	224
Table 8-2: Personalisation Literature Review process	227

List of Figures

Figure 2-1: Conceptual framework (Ralph and Parsons 2006)	53
Figure 2-2: Conceptual Framework (Jrad et al 2007).....	54
Figure 2-3: Conceptual Framework (Vesanen 2007)	57
Figure 2-4: Conceptual Framework (Miceli et al 2007)	59
Figure 2-5: Content Ontology (Cai et al 2009)	61
Figure 2-6: Analysis of TS: Understanding User Characteristics	65
Figure 3-1: The Research Method	81
Figure 3-4: The Eight TS Forums Used in the Study	93
Figure 3-6: Overview of Open Coding and Axial Coding Process (Baskerville 1999).....	96
Figure 3-7: Strauss and Corbin Coding Scheme.....	97
Figure 3-8 Properties of Credibility.....	99
Figure 4-1: <i>Personalisation</i> In Practice Theory	115
Figure 5-1: Workflow of TS Forum	125
Figure 5-2: TS Adviser Demographics (#22).....	146
Figure 5-3: TS User Demographics (# 23)	147

List of Appendix

Appendix A: Glossary of Terms	217
Appendix B: Literature Review Protocol for Technical Support.....	221
Appendix C: Literature Review Protocol for Personalisation frameworks	227
Appendix D: Transcripts.....	233
Appendix E: Success Criteria	240
Appendix F: Questionnaires.....	243

List of PhD Work Publications

Gizaw, S. & Buckley, J., 2011, March. Taxonomy of personalisation for Generating personalised content in Technical Support Forums. In Conference on Human Language Technology for Development, (pp 169-175). *This paper describes a preliminary study in this work, which analyses data from a number of technical support forums, and presents an initial taxonomy of empirically derived categories.*

Gizaw, S., 2014, May. An empirically derived personalisation framework for technical support. In Proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering (p. 55-59). ACM. *This paper describes a proposal to develop a substantive theory and a set of recommendations for improved TS, with a focus on personalisation and aligns with Chapter 2 and Chapter 3.*

Gizaw, S., Buckley, J. and Beecham, S., 2015, December. Characterising users through an analysis of on-line technical support forums. In International Conference on Product-Focused Software Process Improvement (pp. 528-545). Springer International Publishing. *This paper describes an empirically derived substantive theory that identifies TS Users according to group of characteristics, and aligns with Chapter 4.*

Gizaw, S., Buckley, J. and Beecham, S., 2016, June. Empirically Derived Recommendations for Personalised Text-Based Technical Support. In International Conference on Software Process Improvement and Capability Determination (pp. 316-333). Springer International Publishing. *This paper describes empirically derived recommendations for personalised TS services that identify the communication handling process that influence desirable and undesirable outcomes and aligns with Chapter 5.*

Gizaw, S., 2016, June. Personalised technical support for text-based interactions: a validation study. In Proceedings of the 20th International Conference on Evaluation and Assessment in Software Engineering (p. 8-12). ACM. *This paper describes, in depth, the survey carried out to evaluate the TS guidelines derived in this work, and aligns with Chapter 5.*

Chapter 1

Introduction

CHAPTER 1

1 Introduction

1.1 Research Motivation

Technical Support (TS) is a post sales service provided to users of, for example, Information Technology (IT) products where, ideally, TS Advisers respond to users' needs in a timely and effective way when they have problems using a product (Das, 2003). One of the goals of TS is to maintain a high level of customer satisfaction by providing quality answers to technical questions.

According to Posselt and Gerstner (2005) post-sale factors are considerably more influential than pre-sale factors with respect to retaining customers, and TS is an important component of post-sale service for IT technologies. A quick and accurate response to the users' problems ensures user satisfaction and improves the company's reputation (Heras et al., 2009). Negash and his colleagues concluded in their service quality measurement study that the good reputation gained through TS is also used to build a long-term relationship with the users (Negash et al., 2003).

Additionally, in the software and hardware industries efficient TS can be considered a major revenue stream in itself, where payments can entitle users to TS, patches, and minor upgrades (Durcikova and Fadel, 2010, Cusumano, 2008). As a result software product firms are taking advantage of TS services as a necessary cost centre (Cusumano, 2008, Raninen et al., 2015). It follows that a TS system provider must ensure that it makes the appropriate information prominent; that it has an appropriate response time; that it can be trusted with a good level of privacy and security; that it has a well-designed TS interface and that it provides individualised service (Stefani and Xenos, 2008, Bivall and Mäkitalo, 2013).

The literature suggests that users are not fully satisfied with company-based TS services; partially due to a lack of guidance and support on how the service can

assist when problems arise (Smart and Whiting, 2001, Lee et al., 2001). TS users isolate themselves because of a series of unsatisfactory interactions, which do not fulfil their expectations (Len-Ríos, 2002). According to Len-Ríos (2002), the current communication handling process seems not to be helping the companies relationship with their users because it does not take into consideration the user's age, cultural groups, nationalities and habit differences. Indeed, there is some evidence to suggest that companies are failing in their efforts to provide effective TS, as users are ignoring company-based information channels such as documentation, FAQ, chat, call centres, email and websites. Instead they seem inclined to seek out alternatives in the form of community-based forums where they appear to be better supported (Stefani and Xenos, 2008, Oxtan, 2010, Steichen and Wade, 2010).

The dismissal of company-based TS, in favour of open-source, non-proprietary alternatives is not an optimal solution for the IT company, since users who remain loyal to the company build and maintain long-term relationships, continue to purchase their products and services and spread good-will to enhance the company's reputation (Massey et al., 2001, Stefani and Xenos, 2008, Oxtan, 2010, Steichen and Wade, 2010). Additionally, companies may lose control over user experience information and information on the source of problems, and thus where their systems could be profitably improved (Gorla and Somers, 2014).

A review of the literature suggests that a core problem with company-based TS is the neglect of user characterisation in TS (Wu et al., 2003, Viviani et al., 2010, Na et al., 2010). This is somewhat surprising given that the user experience can be enhanced by channeling support to meet the user's individual needs (Steichen and Wade, 2010, Oxtan, 2010, Wu et al., 2003): providing an individualised response to each user is an effective user satisfaction strategy (Kim et al., 2005).

The literature shows that individualised value-added services can meet users' requests at a deeper level than that of traditional TS services by providing accurate information and processing the information to satisfy user requirements (Na et al.,

2010). Other Customer Relationship Management (CRM) research Fan et al. (2004), suggests that individualising TS can thus improve customer acquisition, customer retention, customer loyalty and customer profitability through individual information to be administered in the right context and at the right time (Tam and Ho, 2003). Users expect individualised services and two-way communication (Len-Ríos, 2002). Wang et al. (2013) suggests that successful communication with users can even reduce software failure rates and produce better versions of the application (Wang et al., 2013).

The literature suggests that, to achieve a much better user experience, TS should consider the individual characteristics of the user (Negash et al., 2003, Na et al., 2010, Lee et al., 2001, Tam and Ho, 2003). Parasuraman et al. (2005), highlighted the importance of the user in their quality assessments of “How much and how easily the site can be tailored to the individual users’ preferences and histories of navigation”. The literature also suggests that research on user characterisation currently reports a diverse set of attributes that differ from source to source and generally lack an empirical under-pinning (Wu et al., 2003, Viviani et al., 2010, Na et al., 2010).

Likewise, research that does address user characterisation issues specifically in the TS field does so in an *ad hoc* fashion and is not based on *in vivo* empirical evidence (Negash et al., 2003, Gao et al., 2011, Lee et al., 2001, Na et al., 2010, Tam and Ho, 2003). Defining user characterisation in an *ad hoc* fashion is unreliable, unrepeatable, and can result in inconsistencies, and a weak understanding of user characteristics. Given the lack of empirical evidence in identifying consistent and relevant individual characteristics, this work asserts that, the quality of TS services can be enhanced by taking into account the individual characteristics of the user which more accurately reflect the user needs. Furthermore, these individual characteristics should be empirically derived based on *in vivo* practice to truly reflect the user needs. Without empirically-grounding the characterisation efforts to individualise TS may be misguided.

Empirically derived personalised attributes could reinforce our current understanding of how to characterise users and, by taking a more inductive approach, may possibly provide novel perspectives and new attributes, novel to the literature that may in turn improve TS interaction.

This work undertakes the empirical investigation of user characteristics by taking a mixed method approach with sequential exploratory strategy: a grounded theory qualitative approach and a survey-based quantitative approach. Grounded Theory method (GT) is applied to a Technical Support (TS) web-forum dataset, where prevalent user characteristics and their interaction context are determined from the data. The study reported here uses forums as a dataset because they seem to be successful and the implicit good practice that is suggested could offer guidance for all providers in the TS arena (Vesanen 2007, Oxtan 2010, Steichen and Wade 2010). The focus is to try to empirically understand the current TS forums in regards to the success (user satisfaction) but also to learn from unsuccessful scenarios (user dissatisfaction). The work subsequently derives TS guidelines from the findings, and these guidelines are assessed, with respect to real world TS, by means of a more quantitative survey of TS providers and TS Users.

1.2 Research Questions

The fundamental research question, this study aims to answer is:

- How can we improve TS systems to satisfy user requirements in a more targeted, personalised manner?

This, in turn, is based on the following four specific questions:

- RQ1: What are the user characteristics found in TS?
- RQ2: What are the communication handling processes observed in TS?
- RQ3: What can we learn from the successful scenarios in TS with respect to user characteristics and communication handling?

- RQ4: What can we learn from the unsuccessful scenarios in TS with respect to user characteristics and communication handling?

1.3 Contribution of the study

The output of the research is a *Personalisation In Practice* substantive theory which will in turn serve as a road map on how to handle personalised user characteristics and how communication should be structured towards success, ultimately satisfying user requirements. The substantive theory may not necessarily be better in any absolute sense, or it may be more costly to produce; it is merely proposed to be better for individual users and more valuable to them. The recommendations from the *Personalisation In Practice* theory makes it possible for service providers to track the changes in behaviour, preferences, demands, and desires of their users and serve them with precision, accuracy, and cost-effectiveness. This improvement, in turn, should help the service provider to retain their users and increase their loyalty.

1.4 Layout of Thesis

The remainder of this thesis is organized as follows:

- **Chapter 2: IT Technical Support and Personalisation.** The first section of this chapter discusses TS from an IT domain perspective and its processes. The second section discusses personalisation approaches and frameworks which may be suited to TS. The final section summarises the two preceding sections and focuses on how an individualised service, defined through empirically derived user characteristics, can be a potential solution for the issues described in TS.

- **Chapter 3: Research Method.** This chapter outlines the methods that have guided the research in this study. The first section describes and rationalises the Grounded Theory qualitative research method in terms of this work. Subsequently, the second section describes the choice of/design of the survey/quantitative research method. The third section describes the mixed method approach. The life-cycle of the research carried out in this work is described in the last section.
- **Chapter 4: Results of Empirical Study of User Characterisation from TS forums.** This chapter presents the empirically derived findings of the Grounded Theory analysis of TS forums. It answers the fundamental questions that underpin the study: What are the individual characteristics found in TS forums? And how are the observed individual characteristics handled during the TS communication process? In particular, in the first section, the contextual framework of the empirical study is described. The contextual framework contains observations drawn from the data, such as types of participants and the communication flow identified in TS forums. The second section, based on the relationships between the more abstract concepts, presents a substantive theory of *Personalisation In Practice*.
- **Chapter 5: Resultant guidelines for assessment for Technical Support.** This chapter presents the definition of the guidelines and empirical assessment in terms of a survey. The first section presents the illustration of the *Personalisation In Practice* theory and a set of recommendations for TS providers are described. The second section summarises the core results of the survey and discussion on the implications of the survey results.

- **Chapter 6: Discussion.** This chapter discusses the comparison of the *Personalisation In Practice* theory with the wider literature and describe the significance of my findings. Once the findings were sufficiently grounded and developed, the literature on TS, personalisation and other communication handling processes was revisited in the first section. The purpose of this literature review is to compare the similarities and differences of the research findings to the literature and to relate the theory through the integration of ideas. The second section discusses the major findings of the study.
- **Chapter 7: Conclusion and Future Works.** This final chapter summarises the core contributions of this thesis, provides a discussion of the implications of *Personalisation In Practice* for practitioners, the limitations of the study, and finally suggests ideas for future work in this area.

Chapter 2

IT Technical Support and Personalisation

CHAPTER 2

2 IT Technical Support and Personalisation

Technical Support (TS) is a post sales service provided to users of, among others, information technology products. TS aims to respond to users' needs in a timely and effective way when they have problems with the use of a product (Das, 2003). One of the goals of TS is to maintain a high level of customer satisfaction by providing quality answers to technical questions. Thus, a TS system must ensure that it makes the information prominent; that it has an appropriate response time; that it can be trusted with a good level of privacy and security; that it has well-designed interface and individualised service (Stefani and Xenos, 2008, Bivall and Mäkitalo, 2013). However, the literature suggests current TS services are not satisfying user requirements: users are abandoning traditional company-based TS, in favour of open-source, non-proprietary alternatives (Stefani and Xenos, 2008, Oxton, 2010, Steichen and Wade, 2010). This is not an optimal solution for the company, since users who remain loyal to the company build and maintain long-term relationships and continue to purchase their products and services and spread good will to enhance the company's reputation (Massey et al., 2001).

A review of the literature suggests that user characterisation is a neglected activity in TS where, at best, a user's characteristics are captured in an *ad hoc* fashion (Wu et al., 2003, Viviani et al., 2010, Na et al., 2010). This is somewhat surprising given that the user experience can be enhanced by channelling the support to meet the user's individual needs (Steichen and Wade, 2010, Oxton, 2010, Wu et al., 2003): Channelling help to fit attributes like a user's level of expertise, culture, language fluency, and urgency, would intuitively seem to be more effective and efficient. Both parties will benefit; the provider will be able to communicate more effectively, and the user will be able to quickly grasp what is needed to solve the problem.

This chapter examines the related literature in order to establish three things:

1. The current state of the art in TS.
2. The challenges and best practices in user characterisation in TS as per the TS literature; and,
3. How users can be identified by type, reviewing the personalisation literature for models and frameworks developed specifically to characterise types of users in related domains such as Human Computer Interaction.

That is, this chapter highlights the user-characterisation issues in TS and then reviews personalisation as a potential basis for approaches dealing with this issue.

2.1 Technical Support in IT

This section discusses TS from the IT domain perspective and its processes; the impact of different communication channels used in TS; how existing TS systems characterise users and the state-of-play with respect to individualised services in TS. TS, as defined by Das (2003), is “*A post sales service provided to users of information technology products to respond to users’ needs*”. The goal of TS is to maintain a high level of user satisfaction by effectively responding to technical questions, helping users keep the hardware and software in working condition and also overcoming any technical issues (Mannonen and Holttä, 2013, Posselt and Gerstner, 2005).

2.1.1 Technical Support Processes

A process is a set of logically related tasks performed to achieve a specific goal (Bradford and Dumas, 2007). In relation to services, Earl (1994) defined a process as a horizontal form that encapsulates the interdependence of tasks, roles, stakeholders and functions required to provide a customer with a product or service. Thus, processes define which tasks should be performed, under which conditions and in which order, and which data, documents and resources are required to perform each task.

The TS process can be performed In-house or can be outsourced (González et al., 2005, Gorla and Somers, 2014). In In-house TS all tasks that are involved in the TS process are performed by the company's own TS Advisers (Morrison et al., 2000). In-house TS requires highly skilled experts and major resources to be dedicated to TS services (Davidson and Tay, 2003, Krishnamurthy et al., 2009, Schwarz, 2014). The literature suggests that In-house TS may not be appropriate for small software companies since they lack In-house expertise and may not have the required resources to provide effective and efficient TS (Morrison et al., 2000). However, some small software companies see retaining their services In-house as a competitive advantage (Raninen et al., 2015).

Outsourcing is defined as contracting the full or partial services or functions to vendors (Schwarz, 2014). Companies outsource TS to locate the service closer to customer bases, and to enhance local relationships while at the same time taking advantage of localised areas of expertise (Davidson and Tay, 2003, Krishnamurthy et al., 2009), low cost labour and highly educated workers across the Globe. In addition it allows companies focus on their core business rather than TS. Outsourcing TS also has shortcomings such as: loss of control over user experience information, inability to cope with changing user information needs, and potential delay in service delivery because of lack of the outsourced vendor commitment and slow implementations (Gorla and Somers, 2014). These shortcomings can be augmented by reduced user experience, increased fees and costs, and a lower level of service, leading to frustrations and dissatisfaction of users (Alaranta and Jarvenpaa, 2010).

2.1.2 Stakeholders

In this section the stakeholders, from an In-house perspective, involved in the TS process are discussed in detail, before the workflow-phases are discussed in the next section (2.1.3). Three stakeholders are identified from the literature: TS system providers, TS Users, and TS Advisers:

- **TS system providers:** TS systems are software systems that encompass communication, providing a platform for receiving queries from the user and managing the resources and responses. TS systems are responsible for receiving inquiries from their users using any communication channels and are managed by firms who are known as the system providers (Das, 2003).
- **Users:** As one of the stakeholders in TS systems, users engage with TS systems adopting different information seeking strategies to address their issues. Users also report technology problems, issues or faults (González et al., 2005). Users are given different labels in the literature, such as 'client' (Shih et al., 2014), 'customer' (Shaw et al., 2012), and 'end-user' (Bivall and Mäkitalo, 2013).
- **TS Advisers:** When a problem is reported by the user, TS Advisers will provide a series of suggestions to the users to implement or check as a means of rectifying the reported problem. TS Advisers are labelled differently in the literature: analysts (Delic and Hoellmer, 2000), operators (Heras et al., 2009, Gupta et al., 2008) and advisers (Bivall and Mäkitalo, 2013), computer support specialists (Kajko-Mattsson et al., 2004) and service engineers (Durcikova and Fadel, 2010).

Given the many labels for the TS stakeholders, in this thesis, the terms TS User, TS Adviser, and TS System provider are used, as defined here. (Appendix A contains a glossary of terms used in this thesis).

Good TS depends, in many cases, on the experience and skills of its TS Advisers (Heras et al., 2009) including communication skills: to be able to communicate with users' and maintain a productive user relationship (Djavanshir and Agresti, 2007). Help offered by TS Advisers is based on past experience and/or extracted from a customer service database that contains service records of current queries (Foo et al., 2000). Heras et al. (2009) in their study on the role of technical advisers in a TS call centre identified three levels of TS Adviser:

- First level, advisers who receive customer queries and answer the ones for which they have the background, and training.
- Second level, technicians in charge of solving the problems that the first level advisers could not solve.
- Third level, Chief technicians and administrators, who are in charge of organising working groups, of assigning problems to specific technicians and for creating generic solutions, which will be registered and used later by the lower level TS Advisers.

The assignment of tasks to TS Advisers depends on the expert skill level of the TS Advisers. Indeed there are some automatic ways of assigning the tasks. For example, Lazarov and Shoval (2002) developed a rule-based automatic assignment system, which allocates service faults to the appropriate TS Advisers to improve the execution of task assignment under conditions of pressure. This approach has been embedded in TS associated with Chrome, Internet Explorer, Mozilla and Amazon (Teltzrow and Kobsa, 2004). Having TS at 3 levels is likely to depend on the size of a company for example, in Raninen et al's (2015) study of Small and Medium Enterprises (SMEs), TS Advisers took on several roles to include development.

With regard to having the necessary communication skill required in TS, it is reported that IT experts are often highly trained in their respective software domain but do not have the experience or knowledge on how to interact with the customers (Shih et al., 2014). This lack of knowledge creates a communication gap where TS Advisers fail to respond to their user in a positive fashion. For example, TS Advisers may need training in how to manage aggressive communications from customers who are frustrated, irritated or exhibiting other negative behaviour. Learning how to turn these situations around through improved interaction skills will help to both satisfy customer requirements and organisational survival in the highly competitive IT industry (Shih et al., 2014).

2.1.3 Workflow-Phases

In the TS process, the problem posed by the user prompts a set of actions or tasks (Fan et al., 2004). Chandrasekaran et al. (1992) defines these various tasks which Das (2003) later modifies to define and categorise generic tasks resulting from TS User questions. According to Das (2003) the empirical analysis of questions posed by the user in TS suggests the following categories of generic tasks:

- **Information Retrieval.** Examples include requests for information such as: “what, when where is...?”, for example: “What is a virus?” Getting help by requesting specific information of this nature may result in an information retrieval task.
- **Plan Synthesis.** A user may seek a procedure to achieve a particular goal, leading to a plan synthesis task. Examples include questions such as: “How do I do...?”, “How can I install a printer?”
- **State Abstraction.** A user may want a thorough examination of the consequences of performing a proposed instruction, for example, downloading and installing software for diagnosis or providing detailed personal information to different sites. An example would be a request to know about the consequences of an action such as “What will happen if I download and install this software?”
- **Abductive Diagnosis.** In the case of abductive diagnosis tasks the TS Advisers are required to generate hypotheses that explain an observed error. Such questions are typically phrased in the following way: “When I perform this action, why does this error occur?”

Even though the generic tasks are categorised as above, the actual TS process may result in the combination of two or three generic tasks. For example, after the hypotheses generating task in abductive diagnosis, the user may also seek an opinion about the consequences of a corrective action and this produces a state

abstraction task. The user may also ask for a workaround process, in which case the TS Advisers produce a plan synthesis task.

The above generic tasks pass through different TS workflow phases depending on the communication channel used. According to Steehouder (2007) the TS workflow process is structurally divided into seven phases as follows:

- **Opening phase:** In this phase, participants introduce themselves to each other or pass greetings. The opening phase usually starts by first level TS Advisers making introductory statements such as “How can I help?” This happens particularly in a synchronised communication channel such as the telephone. However, in an asynchronous communication channel the users may introduce and identify themselves. The opening phase ends with the TS question being asked by the user.
- **Problem analysis phase:** The problem analysis phase is where questions by the TS Advisers probe any lack of clarity in the question. The clarification step may be presented through simulating the problem that has occurred, interrogating the user or asking for a narrative explanation of the problem.
- **Diagnosis phase:** Here the problem is characterised. TS Advisers may ask for a detailed description of the symptoms of the problem, which the user observed. This phase may include a discussion about steps that the user has been taking to analyse the problem, followed by a discussion and ends in a conclusion as to the problem.
- **Solution phase:** This phase proposes a solution. TS Advisers may provide suggestions, recommendations or opinions on the solution. Opinions or suggestions and further discussion may proceed until an agreement is reached by the user.

- ***Instruction phase:*** This is the declarative step of the process. TS Advisers instruct the user to perform a number of actions in order to solve the problem.
- ***Evaluation phase:*** This is a confirmation step in the process. TS Advisers may ask whether the performance of the instructions solved the problem or not.
- ***Closing phase:*** This is the closing step of the TS process. Participants of the TS process thank each other and wish each other good-bye.

All TS processes may not go through all these phases. It depends on the type of communication channel used or the clarity of the question posed by the user. For example, some might skip the problem analysis phase if the problem is stated fully or skip the diagnosis phase if the user diagnoses the problem correctly. Likewise, phases may have to be revisited. For example when an incorrect solution is evaluated, the new information from the evaluation will have to be analysed to suggest a refined solution. In forums the final sign-off may be omitted when the user is satisfied with the solution but fails to return to the forum to sign-off and thank the TS Advisers.

The next section, discusses TS communication channels and the type of interaction technology used.

2.1.4 Communication Channels

TS systems provide different communication channels for users and TS Advisers to interact through, as shown in Table 2-1. This section discusses synchronous and asynchronous communication channels, which are provided by TS systems from the context of TS efforts towards user characterisation. Detailed definitions are given in Appendix A.

2.1.4.1 Asynchronous communication channels

Asynchronous communication channels are a non-real time communication where participants provide information independently and intermittently without time constraints. The asynchronous communication channels include: Documentation; FAQs; Remote troubleshooting, Email, and Community forums in TS. Documentation and FAQs communication channels come in the form of a one-size-fits-all characterisation of users as shown in Table 2-1 (Fan et al., 2004, Weiss, 2000). Hence some users receive little or no individualised guidance from Documentation and FAQs. As a result users often find the information is difficult to follow due to their diverse characteristics and know how (Bergman, 2005, Foo et al., 2000).

Remote troubleshooting systems are automated systems that perform routine maintenance tasks such as updating software without the involvement of the user (Mannonen, 2013) or when the user allows the remote trouble-shooter experts to get local software sessions in front of the TS Advisers remotely to fix the problem (Roulland et al., 2011). In a remote troubleshooting asynchronous communication channel, the need for user characterisation is not considered important since the users are not involved in the problem solving process.

Email and Community forum asynchronous communication channels are a step towards a more user-focused service as a one-to-one interaction is established as shown in Table 2-1 (Davidson and Tay, 2003, Lee, 2009). This form of communication is highlighted since Community forums are a focal point for the study reported on in this work (see empirical study in chapters four and five).

A TS community forum is a discussion group within a given community relating to software product (Singh and Holt, 2013). The Community forum is constructed based on trust established from each user's perspective on their experiences. Steichen and Wade (2010) reported that there is a "Social Web" emerging where users engage in TS forums in order to find relevant information, replacing the service that has been done traditionally by TS Advisers. Generally, Community forums play a major role in TS as an alternative source of information (Dellarocas,

2006). As a result most organisations are now providing their own versions of such community forums where users also answer queries and thus reduce the workload of TS Advisers (Wang et al., 2013).

Despite the interactive nature of TS forums, it seems that many TS Users in TS Community forums just read the forums. These passive members may not post messages or contribute in responding to the posted messages (Preece et al. 2004). A survey by Preece et al. (2004) found that participants do not participate for the following reasons:

- Not needing to post,
- Needing to find out more about the group before participating,
- Thinking they were being helpful by not posting,
- Not being able to make the forum software system work (i.e. poor usability)
- Not liking the group dynamics
- The community was a poor fit for them

There are also a few participants referred to in the paper, as “selfish-riders”, who exist among the hidden users and get what they want without posting (Preece et al., 2004).

2.1.4.2 Synchronous communication channels

Synchronous communication channels are real time communication channels where participants provide information simultaneously in real-time. Synchronous communication channels include Chat, Telephone, and Video conferencing.

Chat, Telephone and Video conferencing is a one-to-one interaction made possible through text, audio and video respectively. During a synchronous session, the TS User (needing support) and the TS Advisers exchange typed messages in

chat, or discuss user queries through telephone or video and audio technologies such as Skype and Google Hangouts. Hence the interaction is probably even more dependent on the experience level and skill of the TS Advisers in communicating the solution in a way that helps the user (Heras et al., 2009, Djavanshir and Agresti, 2007).

Even though synchronous communication channels are a one-to-one interaction with the user, research suggests that users are not satisfied with the service, saying that TS Advisers do not explain things in terms that a user can understand (Parasuraman, 2000). Specifically, the lack of guidance and support for users on how to use information to learn about their software systems and how to assist users when problems arise are the main reason users are not satisfied with TS services (Smart and Whiting, 2001, Lee et al., 2001, Oxton, 2010).

TS Channels	User focus	Time Interval		Mode of Communication			Efforts for Improvements	
		Async	Sync	Text	Voice	Video	Characteristics	Example References
Documentation	One-size-fits-all	☑		☑			<ul style="list-style-type: none"> Well defined, generic content Well-structured content 	(Bergman, 2005)
Electronic Documentation	One-size-fits-all	☑		☑			<ul style="list-style-type: none"> Generating semantic TS Content Well defined and well-structured content Knowledge-based search Retrieving all checkpoints to have a flexible search Removing the ambiguity in user queries 	(Durcikova and Fadel, 2010) (Li et al., 2009) (Quan et al., 2006) (Bergman, 2005) (Düsterhöft and Thalheim, 2004)
Email	One-to-one Interaction	☑		☑			<ul style="list-style-type: none"> Asynchronous text-based communication 	(Lee, 2009)
FAQs	One-size-fits-all	☑		☑			<ul style="list-style-type: none"> Template-based content Auto-categorising FAQs content 	(Moreo et al., 2013) (Shaw et al., 2012)
Forums	Multiple Responder	☑		☑			<ul style="list-style-type: none"> Community forums Industry forums 	(Wang et al., 2013) (Dellarocas, 2006)
Remote Troubleshooting	Without the involvement of the user	☑	☑			☑	<ul style="list-style-type: none"> Brings local software session to TS Advisers Provide 3D virtual representation to TS Users 	(Roulland et al., 2011)
Chat	One-to-one Interaction		☑	☑			<ul style="list-style-type: none"> Synchronised text-based communication Including Symbols, emoji's and links 	(Bernett et al., 2002)
Telephone	One-to-one Interaction		☑		☑		<ul style="list-style-type: none"> Long-distance telephone calls 	(Balaguer et al., 2008) (Foo et al., 2000)
Video Conference	One-to-one Interaction		☑		☑	☑	<ul style="list-style-type: none"> Audio & video communication technology 	(Stevens et al., 2012)

Table 2-1: TS Communication Channels

2.1.5 Existing Technical Support Systems

The success of TS relies not only on the analysis skills of the experts but also on the supporting systems, tools and repositories to answer the range of problems that users' encounter (Mannonen, 2013). With the growing demands and expectations of customers, service providers are looking for ways to provide better TS experiences using different systems as shown in Table 2-2.

Several of these existing systems provide support for TS Advisers with the aim of reducing the cost of TS by finding a solution to the problem quickly (Delic and Hoellmer, 2000). Depending on the system, they also provide answers to TS queries that TS Advisers pose and give advice to enhance their problem-solving abilities (Delic and Hoellmer, 2000). Given the importance of TS, as discussed above, these systems are core to enhancing a company's reputation, retaining customers, and increasing revenue, and so research efforts should endeavour to improve their effectiveness.

Expert systems are defined as computer programs that are derived from Artificial Intelligence (AI) which simulates human reasoning (Bryant, 2009). In TS, expert systems generate suggested tasks to be completed automatically or semi-automated through user-interaction based on the identified problem (see Table 2-2) (Lieberman and Kumar, 2005).

Problem-solving is a process which constructs an appropriate evaluation structure to find solutions to a given problem and choose the optimal solution (Lumala and Quenum, 2009). Problem-solving systems are thus tools that aim to enhance the effectiveness and efficiency of TS Adviser's solution-finding processes for more complex problems (Mannonen, 2013). According to Mannonen and Holttä (2013), problem-solving systems provide the following information to TS Advisers:

- Precise and timely information on the product to be supported;

- Information about the problem
- Fast access to the knowledge and means necessary to fix the problem.

2.1.5.1 TS Systems and User Characterisation

Although AI-based and problem solving TS systems have the potential to automatically analyse the user's context the reality is that these systems perform routine procedures without the involvement of the user; the aim of extracting the problem solving responses quickly, responses which the AI system considers optimal, might not always fit the user's need. González et al. (2005) suggested that developing TS systems, which satisfy user requirements and solve the problems, is not easy, since there is a lack of what to capture and define user characterisation.

Consequently, one of the challenges in TS systems is gathering and managing user information. Fairly recently, a new customer-focused approach emerged that integrates sales, marketing and customer care in order to create and add value to the company and its customers. It is known as Customer Relationship Management (CRM) (Massey et al., 2001). CRM is one of the most explored fields in software industry in recent years as industry gradually shifted from a product-centric focus to a customer-centric focus (Na et al., 2010). CRM systems gather information from the users to determine who their customers are; what products they buy and who their most profitable customers might be (Fan et al., 2004). TS is one of the services incorporated in CRM so that a user who needs help can contact the TS Advisers while accessing the CRM portals (Moon et al., 2000), thus potentially feeding information into the TS process.

Table 2-2: Existing Systems of TS

Existing System	End User	Technology used	Purpose	Example References
Expert Systems	TS Advisers	<ul style="list-style-type: none"> Neural Network (NN) Knowledge Based 	<ul style="list-style-type: none"> Use AI approaches to recognise faults and identify solutions 	(Wang et al., 2013) (Lieberman and Kumar, 2005) (Hui et al., 2001) (Fan et al., 2004) (Bryant, 2009) (Brusilovsky and Cooper, 2002) (Mannonen, 2013) (Gupta et al., 2008) (Foo et al., 2000)
Problem-Solving Systems	TS Advisers	<ul style="list-style-type: none"> Rule-based reasoning (RBR) Case-based reasoning (CBR) 	<ul style="list-style-type: none"> Use rules and cases to recognise solutions and map to faults 	(Durcikova and Fadel, 2010) (Heras et al., 2009) (Bryant, 2009) (Mannonen, 2013) (Shaw et al., 2012) (He et al., 2009) (Tung et al., 2010)
Customer Relationship Management (CRM)	TS Advisers TS Users		<ul style="list-style-type: none"> Improve the relationship between companies and customers providing individualised and customer-focused services 	(Na et al., 2010) (Tsai and Lu, 2009) (Ibrahim et al., 2015) (Fan et al., 2004)

2.1.6 Quality measures in TS

Previous sections defined the different types of TS systems, the stakeholders, and its processes. This section considers how to measure the effectiveness of these systems by looking at the literature on TS frameworks, and general customer support services in IT related industries. The study pays specific attention to user satisfaction measures in TS within the text-based communication process since that is the focus of the study.

2.1.6.1 Quality dimensions relevant to text-based service in TS

A well cited extensive exploratory study conducted by Parasuraman et al. (1985), suggests that users assess service quality by comparing what they feel a service provider should offer (i.e., their expectations) with the service providers' actual service performance. The range of issues unique to satisfactory (or unsatisfactory) online service experience is quite different from those typically at the root of traditional service delivery systems (Holloway and Beatty, 2008). For example online issues, such as privacy and ease of navigation, have surfaced as critical elements of the online service quality (Holloway and Beatty, 2008, Wolfinbarger and Gilly, 2001).

Electronic Service Quality (E-S-QUAL) measures have become an essential quality measure for the good performance of a service provider's electronic service, and a great deal of research has been devoted to conceptualising and measuring E-S-QUAL (Parasuraman et al., 2005, Barrutia and Gilsanz, 2013). E-S-QUAL quality measures are strongly related to users' assessments of the services perceived value and users' satisfaction, that captures the general evaluation metrics of service quality fairly well (Parasuraman et al., 1985, Parasuraman et al., 2005). Parasuraman and his colleagues' studies identified many service providers' Web site features and categorised them into 11 E-S-QUAL dimensions (Parasuraman, 2000, Parasuraman et al., 2005). According to Parasuraman et al. (2005), the 11 dimensions of E-S-QUAL are: Reliability, Responsiveness, Access, Flexibility, Ease of navigation, Efficiency, Assurance/trust, Security/privacy, Price knowledge, Site aesthetics, and Customization / personalization. These 11, along with several other quality dimensions (discussed below) are defined in Tables 2-3 and 2-4.

Since the focus of this study is to try to empirically understand the current TS forums in regards to user satisfaction and learn from successful and unsuccessful outcomes in TS forums, particular attention is given to user satisfaction quality measures in TS services. User satisfaction in TS depends on the quality of the

service and the quality of TS Advisers' skill in the communication handling process along with the quality of usable online help tools (Steehouder, 2007, Raninen et al., 2015). According to Sureshchandar et al.'s (2002) suggestion, even though the service quality dimensions of Parasuraman et al (1985) appear to be good predictors of user satisfaction, additional quality measures are needed to measure user satisfaction fully. The service quality dimensions deal with the elements of human interaction in service delivery and the remaining elements such as the quality of the system (the non-human element) and the quality of the information (the actual service) are overlooked (Sureshchandar et al., 2002).

In overview then, the literature review of TS quality metrics identified 19 quality dimensions that are adapted from Parasuraman et al.'s (1985) TS quality measures, Sureshchandar et al.'s additions, and various user satisfaction measures such as proposed by Negash et al. (2003). The quality dimensions are categorized into two parts: those relevant to the text-based content focused on in this thesis (Table 2-3) and others not relevant to this text-based content (Table 2-4).

Table 2-3: Definitions of Quality Dimensions in TS (Applicable to Text-based)

#	Quality Dimensions	Definition
Applicable to text-based communication measures		
QD1	Assurance/trust	The ability of technical advisers to convey trust and confidence (Parasuraman, 2000, Parasuraman et al., 2005)
QD2	Empathy / Personalization	The provision of a caring, individualized attention to users (Parasuraman, 2000, Parasuraman et al., 2005)
QD3	Entertainment	How the information is presented to the user and ease of understanding (Negash et al., 2003) The ability of the information to fulfil users' needs for escapism, diversion, enjoyment or emotional release (Negash et al., 2003)
QD4	Informativeness	The ability to inform users about the product (Negash et al., 2003)
QD5	Loyalty intentions	User's degree of passion and commitment to the brand (Parasuraman, 2000, Parasuraman et al., 2005)

QD6	Overall satisfaction	The overall satisfaction level of the user with regard to service (Van Velsen et al., 2007)
QD7	Personnel behavioural skills	Communication skills in order to inform users in a language they are able to understand and also the ability of listening to users (Ramasubbu et al., 2008)
QD8	Personnel technical skills	The possession of the required skills and knowledge to perform the service (Ramasubbu et al., 2008)
QD9	Price knowledge	The extent to which the user can determine and compare the service price (Parasuraman, 2000, Parasuraman et al., 2005)
QD10	Reliability	The ability to perform the promised service dependably (Parasuraman, 2000, Parasuraman et al., 2005)
QD11	Responsiveness	The readiness and willingness of employees to assist users by providing prompt, timely services (Parasuraman, 2000, Parasuraman et al., 2005)
QD12	Security/privacy	Enabling the user to feel free from danger, risk or doubt including financial security and confidentiality (Parasuraman, 2000, Parasuraman et al., 2005)

All quality dimensions adapted in TS may not be applicable to measure the findings of this study. For example, the quality dimensions that are not applicable to measure text-based communication processes in TS are defined from QD13 to QD19 in Table 2-4. These dimensions may not be included in the quality dimensions for evaluating the findings of this study since they do not measure text-based communication processes in TS. For example, accessibility to the service would usually be considered a key measure, such as the ability to reach the service provider when needed (Parasuraman, 2000, Parasuraman et al., 2005). The objective of the study carried out here is directed at text based communication process assuming the system is up and running. Hence, measuring accessibility is outside the scope of this study.

Table 2-4: Definitions of Quality Dimensions in TS (Not Applicable to Text-based)

#	Quality Dimensions	Definition
Not Applicable to text-based communication measures		
QD13	Access	The approachability and ease of contact (Parasuraman, 2000, Parasuraman et al., 2005, DeLone and McLean, 1992, Pitt et al., 1995) Ability to reach the service provider when needed (Negash et al., 2003)
QD14	Ease of navigation	Site contains functions that help users find what they need without difficulty, and has good search functionality (Parasuraman, 2000, Parasuraman et al., 2005)
QD15	Efficiency	Site is simple to use, structured properly, and requires a minimum of information to be input by the user (Parasuraman, 2000, Parasuraman et al., 2005)
QD16	Flexibility	Choice of ways to services (Parasuraman, 2000, Parasuraman et al., 2005)
QD17	Interactivity	The performance of the system under study (DeLone and McLean, 1992, Pitt et al., 1995, Negash et al., 2003)
QD18	Site aesthetics	Appearance of the site (Parasuraman, 2000, Parasuraman et al., 2005)
QD19	Tangible	The appearance of physical facilities, equipment, personnel and communication materials (Parasuraman, 2000, Parasuraman et al., 2005, Van Velsen et al., 2007)

Thus, out of the 19 quality dimension, the 12 TS User satisfaction quality dimensions described in Table 2-3 are thus applicable to a text-based communication process. Table 2-5 contains this list of quality dimensions, constructs and measurement scales that are applicable to measure dimensions of the text-based communication process and user satisfaction. Also included in the table are citations to the work that use these constructs to measure these quality dimensions and the scales they use. In the next section, the quality dimension constructs of these quality dimensions and metrics used are presented. In Chapter 5 these quality measures are revisited, and incorporated in a set of success criteria used in the evaluation survey. Both the 12 quality dimensions listed in Table 2-3 and how to measure these dimensions in the next subsection are used to inform my evaluation survey presented in Section 5.3.

2.1.6.2 Quality Dimension Constructs

This section considers each quality dimension listed in Table 2-3 and introduce associations construct from a user perspective. Measurement scales are also listed which are adapted in TS quality measures that can be applicable to text-based communication process and user satisfaction in TS.

As can be seen from Table 2-5, forty four quality dimension constructs have been used to measure user satisfaction and to indicate the effectiveness of TS service from a user perspective (see Table 2-5). The table also shows how each user satisfaction quality dimension is measured in terms of the Likert scale (Fabio et. Al. 2011) allowed to respondents.

Measurement scales ranging from a 2-point scale (Yes/No, Satisfied/Dissatisfied) to a 7-point scale (1= Totally Disagree, 7=Totally Agree). However a few constructs are measured with 10-point scale (1 (Not Satisfied) to 10 (Highly Satisfied) or 1 (Poor) to 10 (Excellent)) scale measures. Most of the constructs are measured with a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree or 1=Very Unlikely, 5=Very Likely). User satisfaction surveys in TS are shown to use various measurement point scales for the same quality dimension construct, as shown in Table 2-5. As shown in Table 2-5 a variety of constructs are found which mainly used Likert scales. This work used a mix of scales; explained in more detail in Chapter 5, Section 5.3.

Table 2-5: List of Quality Dimensions in TS and their Definitions

Quality Dimensions	Quality Dimension Construct (From the user Perspective)	Measurement Scale
Applicable to validate user characteristics		
1. Assurance/ trust	1.1 The user feels at ease when using the TS service	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005, Van Velsen et al., 2007) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Negash et al., 2003)
	1.2 Trust develops over time	7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Negash et al., 2003)
2. Empathy / Personalization	2.1 Usually TS Advisers give user individual attention	7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
	2.2 TS systems have a good interface to communicate user needs	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Negash et al., 2003)
	2.3 Usually TS Advisers provides personal advice to the best interest of the individual user	7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
	2.4 Usually TS Advisers understands user needs and requirements	7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman et al., 2005)
3. Entertainment	3.1 The information provided in TS service was entertaining, enjoyable and fun to use	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Negash et al., 2003)
4. Informativeness	4.1 The TS has up-to-date information	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Negash et al., 2003)
	4.2 TS service presents a useful alternative to solve user problem	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Negash et al., 2003)
	4.3 The instructions from TS provided is easy to read and to perform	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Negash et al., 2003)
5. Loyalty intentions	5.1 Users say positive things about the TS service	5-Point Scale (1= Very Unlikely, 5= Very Likely) (Parasuraman et al., 2005) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)

	5.2 Users recommend the TS to others who seeks support	5-Point Scale (1= Very Unlikely, 5= Very Likely) (Parasuraman et al., 2005)
	5.3 Users encourage friends and others to use the TS service and the product in general	5-Point Scale (1= Very Unlikely, 5= Very Likely) (Parasuraman et al., 2005)
	5.4 Users can consider the product and TS service to be their first choice for the future	5-Point Scale (1= Very Unlikely, 5= Very Likely) (Parasuraman et al., 2005) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
	5.5 Users are willing to do more business in future	5-Point Scale (1= Very Unlikely, 5= Very Likely) (Parasuraman et al., 2005) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
6. Overall satisfaction	6.1 The overall satisfaction level with regard to the TS service matches user expectation	10-Point Scale (1 (Poor) to10 (Excellent)) (Parasuraman et al., 2005) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Negash et al., 2003) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)
	6.2 The overall quality of the TS is better than user expectation	10-Point Scale (1 (Poor) to10 (Excellent)) (Parasuraman et al., 2005) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Negash et al., 2003)
	6.3 Users issue was resolved to their satisfaction	10-Point Scale (1 (Poor) to10 (Excellent)) (Parasuraman et al., 2005) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
7. Personnel behavioural skills	7.1 The TS Advisers listens to users patiently and responds immediately	7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
	7.2 TS Advisers is always willing to help	7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
	7.3 Politeness and friendliness of the TS Advisers	10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)
	7.4 Ability to provide support with user's best interest	7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)

	7.5 Good communication skills during TS service	7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)
	7.6 The positive attitude of TS Advisers	7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008) 5-Point Scale (1= Totally Disagree, 5= Totally Agree) (Raninen et al., 2015)
8. Personnel technical skills	8.1 TS Advisers is competent	7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008) 5-Point Scale (1= Totally Disagree, 5= Totally Agree) (Raninen et al., 2015)
	8.2 TS Advisers is knowledgeable about the product	7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)
	8.3 TS Advisers has the appropriate knowledge	7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)
	8.4 TS Advisers does understand my IT environment	7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002) 10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)
9. Price knowledge	9 Availability of different price for different TS service	2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)
	9.1 Discount TS service for updated software purchase	2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)
	9.2 Availability of low prices for TS services	2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)

	9.3 Users' willingness to pay for an individualized and better TS services	<p>2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008)</p> <p>5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)</p> <p>5-Point Scale (1= Totally Disagree, 5= Totally Agree) (Raninen et al., 2015)</p>
10. Reliability	10.1 TS service provides the right solution to users request	<p>5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)</p> <p>7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)</p>
	10.2 TS service is dependable	<p>5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)</p>
	10.3 TS service is an accurate source of information	<p>5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)</p> <p>7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)</p>
	10.4 TS service does not give user unnecessary information	<p>5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)</p> <p>7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)</p>
11. Responsiveness	11.1 The TS Advisers gives user a prompt service	<p>2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008)</p> <p>5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)</p> <p>7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)</p> <p>10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)</p>
	11.2 TS provides timely information	<p>2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008)</p> <p>5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)</p> <p>7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)</p> <p>10-Point Scale (1 (Not Satisfied) to10 (Highly Satisfied)) (Ramasubbu et al., 2008)</p>

	11.3 TS Advisers responds quickly during the busy hours of the day	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
	11.4 TS Advisers timely follow-through on the user issue	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005) 7-Point Scale (1= Totally Disagree, 7= Totally Agree) (Van Velsen et al., 2007)
	11.5 Users have got an answer to their question in X days (Where X represent the following options: Never, Later than 2 days, After 2 days, The next day, On the same day)	5-Point Scale (1= Never, 5= On the same day) (Raninen et al., 2015)
12. Security/privacy	12.1 User feel safe when using TS service	2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005) 7-Point Scale (1= Very Poor, 7= Very Good) (Sureshchandar et al., 2002)
	12.2 The TS systems provide protection over the user information and information about their credit card	2-Point Scale (Satisfied/Dissatisfied) (Holloway and Beatty, 2008) 5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)
	12.3 During the TS process, TS Advisers provides warnings to protect user from risk or danger	5-Point Scale (1 = Strongly Disagree, 5 = Strongly Agree) (Parasuraman, 2000, Parasuraman et al., 2005)

Note: Although sometimes for measurements are phrased as the first person “I” in the literature and some as a third person “user”. I have changed all to the third person “user” to clarify who the measurement is aimed at and to keep consistency throughout the quality dimension construct.

Usually the 2-point scale leads to open questions so that the responder provides elaboration, depending on the response to the 2-point scale measurement. The rest of the scales (5, 7 and 10 point scales) gather the response from the user as to the degree to which the user agrees/disagrees with the construct statement provided.

It seems reasonable to assume that increased user satisfaction with the TS service may lead to an increased satisfaction with the main product. However, there is little empirical evidence to support this (Van Velsen et al., 2007), even though recently a sound TS process has been recognised as a meaningful asset to improve software development and the resulting product, according to customer satisfaction surveys in an SME (Raninen et al., 2015). Furthermore, Raninen et al. (2015) found that users are prepared to pay extra for a good TS service, and therefore can become a revenue stream in its own right.

2.1.7 Individualised Services in TS

Section 2.1.5 shows that there are on going efforts to improve the efficiency and effectiveness of TS. However, the existing TS systems are product centric rather than user centric (Na et al., 2010). As shown in the previous sections, while the approaches in the existing systems do concern themselves with quality, they do not generally consider user characteristics in their information spaces. This limitation of existing systems with respect to individualising services prevents TS from optimally resolving user problems. The intuition is that, as a result, the user is abandoning TS services in preference for community forums (Steichen, 2010). Those that do persevere with TS services are often left to find their own way through the available documentation, browsing through sometimes irrelevant information to find what they need. In some situations, even when users find the content, they might not have sufficient prior knowledge to make use of it.

On a more optimistic note, according to Van Velsen et al. (2007), awareness of the importance of individualised user support, is increasing. In particular, organisations aim to incorporate individual preferences and demands to make their

TS service better suited to individual users and thus more valuable to them (Smart and Whiting, 2001). Such individualised services allow users to appreciate the alignment of the service with their interests and needs and also lead to increased use of the product (Steichen and Wade, 2010, Stefani and Xenos, 2008). Therefore an individualised service is a preferred approach to securing customer retention over a one-size-fits-all generic customer service (Blechs Schmidt et al., 2005, Alt and Puschmann, 2004, Sunikka and Bragge, 2008).

Individualised service capabilities are present throughout a large number of commercial software packages. However, this is just beginning to be incorporated into TS in an *ad hoc* fashion (Wu et al., 2003, Viviani et al., 2010, Na et al., 2010). Even though *ad hoc* individualised service is a step forward, it does not capture and define user characteristics in a way that is repeatable or consistent. As such the TS community's ability to provide individual services is really 'sub-optimal'.

2.1.7.1 Characterisation of Users in TS

One reason which makes characterisation of users in TS difficult is the difficulty in the eliciting of requirements since users do not explicitly know what they want, and it is difficult for them to express their ideas (Tuunanen and Rossi, 2004). Unfortunately, there is also very little evidence showing what characteristics should be captured making characterisation of users in TS efforts and even more difficult to define (Tam and Ho, 2003). The lack of definition leads to each TS provider to capture and define individual users' characteristics in an *ad hoc* fashion (Wu et al., 2003, Viviani et al., 2010, Na et al., 2010) and so a consistent view is missing. This inconsistency may prevent companies from fulfilling the expectations of users, may prove more time consuming, and may prevent TS from providing a good service.

However some guidelines for deriving individualised services have been developed from the user point of view in Customer Relationship Management (CRM) that includes TS. For example, Karat et al.'s (2003) recommends carrying out individualisation based on:

- Creating a user profile

- Identifying the user
- Adapting the service based on users' recent navigation
- Contact in the context of the profile and the current task to be performed
- Considering past purchasing for the future

While this provides a generic framework it is obvious that no comprehensive characterisation of users is included. However some research has been conducted to define a schema for gathering user requirements from customer data sources (Na et al., 2010). For example, Fink and Kobsa (2000) conducted a literature review and analysis on background deployment requirements of individualised services on the WWW, supporting CRM from a real-world environment perspective. According to Fink and Kobsa (2000), potential sources of information for gathering useful user characteristics include:

- The user system usage and the usage environment
- Users' competence in handling computers and the ability to manipulate interfaces
- Available user groups or stereotypes
- Identification and authentication

But, as this review implies, the actual user characteristics in TS domain are seldom reported on and at best are minimal.

2.1.8 Addressing the TS Individualisation Issue

According to Kim et al., (2005), providing an individualised response to each user is an effective user-satisfaction strategy. The literature, supports this view noting

that individualised value-added services can meet users' requests at a deeper level than that of traditional TS services by providing accurate information and processing the information to satisfy user requirements (Na et al., 2010). Other CRM research Fan et al. (2004), suggests that individualising TS can improve customer acquisition, customer retention, customer loyalty and customer profitability. Individualised services promote individual information to be administered in the right context and at the right time (Tam and Ho, 2003).

This individual user perspective is referred to as personalisation (Gibb and Matthaiakis, 2007). Personalisation has a tried and tested approach to profiling users, which may be suited to TS. The relevant literature in personalisation is now reviewed.

2.2 Personalisation

2.2.1 What is Personalisation?

Personalisation is primarily concerned with ensuring that information can be output to individual different end-users, which reflects their specific needs (Gibb and Matthaiakis, 2007). It involves delivering the relevant content and presenting the information according to individual users' preferences. Personalisation is typically based on serving the customers so as to improve the quality of their experience (Instone, 2004, Kuno and Sahai, 2002). As described by Blom (2000), there are three motivations to personalise: to access information effectively, accomplish a user's work goal, and accommodate individual differences.

Over the past few decades, a wide variety of disciplines have been dealing with personalisation: most notably in the fields of Information Science (Bender, 2002, Kim, 2002), Computer Science (Instone, 2000), Social Science (Brooks, 2002, Wellman, 2002), Cognitive Science (Yang et al., 2006) and Marketing/e-commerce (Riecken, 2000). From this variation of focus, it can be inferred that personalisation depends on the particular field of study, the target group and type of personalisation implemented. Another interpretation is that it is an important

concern for all these fields of study. For the purpose of this work, the definition of personalisation from the field of the information science is considered appropriate:

“Fine-tuning and prioritizing information based on criteria that include timeliness, importance, and relevance to the audience” (Bender, 2002)

“Delivering to a group of individuals’ relevant information that is retrieved, transformed, and/or deduced from information sources” (Kim, 2002)

As this research is working towards empirically derived personalisation characteristics to improve personalised TS, which is strongly related to delivering relevant information to the user, these definitions are adopted.

2.2.2 Notion of Personalisation Implementation

In general, implementations of personalisation are based on three dimensions (Fan and Poole, 2006):

- what to personalise (content, interface, service, modality);
- to whom to personalise (individuals, group of individuals);
- how to collect information (implicit, explicit);

Over the past decades many information systems have attempted to implement personalisation. However the requirements of different implementations differ as distinguished by what needs to be personalised and the mechanism of personalisation. This section describes different implementations of personalisation through Human Computer Interaction (HCI) which concentrates on personalising the interface, Information Retrieval (IR) which concentrates on personalising the content by ranking the search results, Adaptive Hypermedia (AH) which concentrates on personalising the content and the interface by providing various choices and preferences to users at run-time and User-Centred Design

(UCD) which concentrates on personalising the content and interface by engaging the user at a design stage. An overview of these approaches is presented in Table 2-6.

HCI approaches enhance computer interactions by presenting computer interface options according to user preferences (Alvarez-Cortes et al., 2007). HCI is not only designing the interface with beautiful views and bright colours according to user preferences but also integrating various graphic image, textual and sound elements with the necessary interactive hands-on functions (Zhang and Liu, 2010). Users are likely to differ in the content they prefer to encounter during their interactions with computers (Alvarez-Cortes et al., 2007). Hence Gasparini and his colleagues suggested that, integrating HCI and content delivery technologies such as TS with personalisation may reduce the complexity and interaction experience bringing enjoyable and productive tailoring of the system to users' needs (Gasparini et al., 2011).

The amount of information on the Web is increasing rapidly, creating new challenges (Liu et al., 2004) in information retrieval (IR) . Therefore, in order to rank the search results optimally, IR systems focus on indexing text and searching for documents (Teevan et al., 2005). However success has been limited, as most of the output does not reflect the intention of the searcher, since users differ in their assessment of relevance of search results, even for the same search query (Teevan et al., 2005, Liu et al., 2004). Recently, IR systems have started to address personalisation issues by implicitly gathering information about the user from their previous search histories to filter the relevant documents' ranking (Speretta and Gauch, 2005).

Personalisation systems can adapt a content structure, presentation form and functionality to each user's characteristics and user behaviour by changing the system and/or a service according to user preferences (livari and livari, 2006). A system that builds a model of the choice and preferences of each individual user is called an Adaptive Hypermedia (AH) system (O'Keeffe et al., 2006). AH uses

this model throughout the interaction with the user, in order to adapt to the needs of that user with fixed (corpus) data content or categories at run-time (Brusilovsky and Cooper, 2002, Henze and Kriesell, 2004). Thus the AH system has properties that can adjust its characteristics and interaction to the user's individual needs (Fan and Poole, 2006, Schreiber et al., 2008, Magoulas and Dimakopoulos, 2006).

Software designers can fall into the trap of trying out developing personalised new tools with new features without providing real value to their customers (Kramer et al., 2000). Thus UCD emerged from HCI by involving users in the design stage for explicit elicitation and modelling of user's goals, beliefs and behaviours. UCD is a discipline that takes into consideration every individual user's capabilities in order to satisfy each user's individual needs (livari and livari, 2006). According to Klett (2005) UCD has four sets of principles. These four sets of principles are: the active involvement of users and a clear understanding of user and task requirements, an appropriate allocation of function between user and system, and iteration of design solutions and multi-disciplinary design.

Different personalisation implementations now incorporate the active involvement of the user through UCD. UCD has emerged in the HCI field in order to incorporate user preferences in the design of systems or services to satisfy individual needs (Klett, 2005). UCD is also incorporated in IR in a personalised search, based on a user-centred recommendation engine (Zhuhadar and Nasraoui, 2010). Users are involved by using user relevance feedback where the platform provides the capability to remove "non-relevant" documents among the search results (Zhuhadar and Nasraoui, 2010). AH can also incorporate UCD in user-friendly knowledge learning systems (Klett, 2005, livari and livari, 2006). In this instance, for example, the AH system gathers information on how users accomplish a task or how they learn, which may provide additional information towards better understanding of the interaction process and proper interface design solutions (Klett, 2005).

However, Solheim (2009) suggested that there may be a potential pitfall if the user and task modelling fails to take the user's experience, competence, and the user's

actual, real perspective into account (Solheim, 2009). Thus, in the next section discusses how user modelling is implemented in personalisation in order to understand and learn important information about the user.

Table 2-6: Notion of Personalisation

Personalisation Implementation	Personalise What?	Purpose	How Implemented?	References
Human-Computer Interaction (HCI)	Interface	<ul style="list-style-type: none"> • Reduce the complexity and interaction experience • Enhance being enjoyable and productive tailoring the system to users' needs 	<ul style="list-style-type: none"> • Engage users in the design stage • Integrate various virtual elements and Interactive hands-on functions 	(Yannakakis and Togelius, 2011) (Gasparini et al., 2011) (Alvarez-Cortes et al., 2007)
Information Retrieval (IR)	Content	<ul style="list-style-type: none"> • Indexing text and searching for documents in order to rank the results optimally • Implicitly gathering information about the user from their previous search histories to filter the relevant documents' rankings 	<ul style="list-style-type: none"> • Query Adaptation • Adaptive Retrieval • Adapting content to user's information needs and contexts 	(Steichen et al., 2012) (Steichen and Wade, 2010) (Calegari and Pasi, 2008) (Schreiber et al., 2008) (Linckels et al., 2007) (Mangold, 2007) (Teevan et al., 2005)
Adaptive Hypermedia (AH)	Interface Content	<ul style="list-style-type: none"> • Adapting to the needs of that user with fixed (corpus) data content • Improving the efficiency and effectiveness of the interaction with the system 	<ul style="list-style-type: none"> • Adaptive selection, sequencing, and presentation of categorised content and interactive services at run-time 	(Solheim, 2009) (Fan and Poole, 2006) (Magoulas and Dimakopoulos, 2006) (O'Keeffe et al., 2006)
User Centred Design (UCD)	Interface Content Context	<ul style="list-style-type: none"> • Incorporating user preferences in the design of systems • Determining the target user segments of the experience being designed • Elicitation and documentation of the user's object model 	<ul style="list-style-type: none"> • Active involvement of users • A clear understanding of user and task requirements, • An appropriate allocation of function between user and system, • Iteration of design solutions 	(Zhuhadar and Nasraoui, 2010) (livari and livari, 2006) (Klett, 2005) (Kramer et al., 2000)

2.2.3 User Modelling

The approaches to personalisation shown in Table 2-6 all depend on some level of understanding of the user. The process of gathering user-needs and characteristics is referred to as user modelling. Good user modelling is one of the factors that can improve the quality of personalisation by creating a user profile, which can be used to identify, classify, store, filter, organise and present content which matches the individual's needs. User modelling approaches are focused on modelling user's behaviour and characteristics (Alvarez-Cortes et al., 2007). As users' needs and behaviour may change over time, this means that any profile will have to be regularly updated (Gibb and Matthaiakis, 2007).

Various personalisation applications contain different types of data about individual users. However, in many applications, this data can be classified into two basic types: demographic and transactional, where demographic data describe who the user is and transaction data describes what the user does (Adomavicius and Tuzhilin, 2001, Magoulas and Dimakopoulos, 2006). For example, in a marketing application, demographic data might include name, gender, birth-date, place of birth, language, and salary. The transactional data might consist of records of purchases the customer made over a specific period of time. A purchase record would include such attributes as the date of purchase, product purchased and the technical support needed by the customers over a specific period of time (Adomavicius and Tuzhilin, 2001).

In another example that emphasises a user's IT status, according to Instone, (2004), the user's generic demographic profile contains their:

- location (Geographical presence);
- job (e.g. User of the product, Manager, Assistant, Developer);
- interest (e.g. User Manual, TS manual, Language Preference);
- preferred mode of access (e.g. Email, chat, phone, sms);

- network conditions (on the user's side);
- range of access devices (e.g. Web site, Mobile phone)

2.2.3.1 Data gathering in User Modelling

Personalisation considers individual preferences, which are gathered in two ways (Gibb and Matthaiakis, 2007). The first is through explicit user interaction where they explicitly describe themselves and their experience, and the second one is through automatic profiling based on implicit observation of the behaviour of the users and their context.

A challenge across the explicit approach is that users often have difficulty expressing their needs, particularly in areas in which they have limited experience (Gibb and Matthaiakis, 2007). In contrast, automatic profiling or the implicit approach reduces the opportunity costs for users. This means users do not put any efforts to describe their interest and preferences. It can also exploit data about users which they would be unable to provide. Examples of this include gathering those parts of a screen in which they show more interest, repeated journeys through web pages, or metadata associated with downloads (Smeaton and Callan, 2005).

Implicit data gathering is often performed without users' knowledge. According to Magoulas and Dimakopoulos (2006), implicit data gathering is preferred for the following reasons:

- To avoid distracting users from their tasks
- Consideration that users are often reluctant to perform actions (like providing data about themselves) that are not directed toward their immediate goals

Users might benefit in the long run from this personal information, which is gathered implicitly, even though they do not receive immediate benefits (Magoulas and Dimakopoulos, 2006).

However, implicit data gathering from the user and ensuring privacy are contradictory intentions (Dickinson et al., 2003). Nowadays, the process of gathering personal information is subject to official restrictions. For example, most Web-based systems now request users' permission in order to collect data implicitly, a request they can decline (Dickinson et al., 2003). Furthermore once the data is gathered, the EU data protection regulations present a clear data protection policy, which consists of a set of requirements for all companies that hold data on European citizens, ensuring appropriate security measures (Cate, 1994).

To gather effective user data, it is important to know the relevant data to capture. Of course, often there is a difference between what should be captured to gain an in-depth knowledge of the user and what a third party is able/permitted to capture. In addition, there is very little evidence outlining what should be captured and so it makes data capture efforts more difficult to define. Even though there are many models that attempt to predict user preferences, they have shortcomings in taking into account that individual users have a different set of preferences (Halvey et al., 2005). Thus, identifying attributes of personalisation becomes a big challenge for user modelling. The next section explains the various attributes of personalisation identified and their derivation, as found in the literature.

2.2.4 Personalisation Attributes

This research explores the attributes of personalisation from the academic literature and standard documentation. However, sometimes attributes may not be stated or defined as personalisation attributes directly in the academic literature, making their identification more difficult. Rather, these attributes appear under the banner of user modelling characteristics, categorisation of services, or discussion of target audiences. Standard documentation also defines attributes of

personalisation. Knowing the attributes from both these sources provides a basis for comparison of the Grounded Theory results derived in this work. Thus, attributes of personalisation, which are reported in the academic literature (covering papers and frameworks) and standard documentation are explored and presented in this section.

2.2.4.1 Attributes in Standardisation Documentation

Applications of personalisation are mainly based on attributes that are defined by standard body projects. The standard bodies are public and/or private sector consortiums which coordinate, propose and develop standards. Personalisation attributes are proposed and developed by the following standard body projects: the W3C on Platform for Privacy Preferences (P3P) project (Cranor, 2011), the EUROgatherer on Telematics Information Engineering (TIE) Project (Amato, 2000), IEEE on Learning Object Metadata (LOM) (Committee, 2002) and ISO on Dublin Core Metadata Initiative (DCMI) (Dublin Core Metadata, 2012). These standard bodies have attempted to classify different attributes of personalisation for their own specific purposes. An overview of the attributes proposed from these bodies is presented in Table 2-7.

Table 2-7: Classification of Personalisation Attributes from Standard Documentation

Standard Body	Name	Core Categories	Attributes
W3C P3P 1.0	P3P	Demographic attributes	Gender, Birth date, Income, Geographic region
		Professional	Employer, Job title, Expertise, Revenue
		Navigation	Interaction records, Time spent at each navigation link, Search Terms
EUROgatherer B-1030	TIE	Personal data	Identity
		Collected data	Content, Document-Structure, Origin of document
		Delivery date	Time, Date of delivery
		Behavioural data	Trace of user-system interactions

IEEE 1484.12.1	LOM	Difficulty	Content (Hard, Easy)
		Interactive Type	Active, Mixed, Expositive
		Interactive level	Low, Medium, High
		Typical Age Range	Max Age, Min Age
		Learning Document	Title
		Technical	Technical Requirements
ISO 15836	DCMI	Document	Title of the document, Subject, Type (Image, Text...), Creator, Publisher, etc....

The P3P and TIE standard documentation define user characteristics and provide a generic list of attributes of personalisation with implementation schemas on the World Wide Web. However, LOM and DCMI standard documentation classify contents that are targeting to different individual content and focus on these interests. Even though LOM and DCMI standard documentations do not directly define personalised characteristics, they characterise content to suit personal interests and thus can inform indirectly on personalisation attributes: By classifying contents for different user interests they indirectly define the characteristics of the users whom the content is intended to serve. The standard documents also describe not only the attribute elements, but also the coding and implementation schemas.

The non-standardisation of these attributes provides some difficulties in comparing them or aggregating them into a larger whole. For example, P3P and TIE personalisation attributes are almost the same even though the labels and categorisations are different. For example, the Demographic category from P3P and Personal category from TIE have very overlapping attribute descriptions. Similarly, the Navigation category attributes from P3P overlap considerably with the Delivery, Collected and Behavioural categories from TIE which have the same kinds of attribute descriptions. However the level of attributes is often different. For

example, P3P demographic attributes describe each Demographic attribute in detail, but the TIE personal attributes are defined only by an identity attribute. And sometimes they diverge hugely: For example, P3P also describes additional professional attributes apart from the demographic ones, whereas TIE does not. Thus the depth, focus and granularity level of attributes and categories differ across the various standards. Overall, the landscape is of overlapping definitions that ultimately lack consistency across standards.

2.2.4.2 Attributes in Academic Literature

This section looks at the wider academic literature to investigate the state of the art in personalisation attributes and how they are applied in practice. Table 2-8 shows personalisation attributes that are identified and synthesised from academic literature.

Attributes that are identified in this section were gathered using different extraction methods by the researchers in question. These extraction methods include gathering information from the user using questionnaires or analysing user logs from service provider databases. The identified attributes of personalisation are categorised into 10 groups. Some of the attributes and categories that are identified are self-explanatory. On the other hand, some of them need to be defined more explicitly. The definitions of each category and each attribute in Table 2-7 are included in Appendix A.

There exist many inconsistencies between personalisation attributes found from the academic literature and the standard-body documentations. For example, personalisation attributes 'employer' and 'job title' exists in the standard-body documentations as shown in Table 2-7 whereas these two attributes does not exist in academic literature as shown in Table 2-8.

Several attributes exist both in standard-body documentations and academic literature. However, they often differ on the description of what the attribute represents. For example, 'behaviour' personalisation attributes exist in both the standard documentation (see Table 2-7) and academic literature (see Table 2-8).

The ‘behaviour’ personalisation attribute in the academic literature describes users’ interest and involvement, whereas the standard-body documentation describes the attribute as trace of user-system interactions as shown in Table 2-7.

These differences in the standards and personalisation implementations show a non-cohesive view of the important personalisation attributes. Personalisation attributes across the literature show inconsistency suggesting uncertainty and diversification in the field regarding the appropriate attributes. Within each category, it appears that several researchers have focused on different attributes, or that researchers have focussed on the same attribute but have used different terms to define it. These examples suggest diversity and suggest uncertainty in the characteristics, further suggesting the need for the empirical derivation of prevalent characteristics.

Table 2-8: Attributes of Personalisation from Academic Literature

Category	Attribute Examples	Addressed (in articles cited) through	References
Product state	Installation, Activation, Configuration, Pro-active actions, Re-active actions	<ul style="list-style-type: none"> • AH (Architecture) • AH (eLearning) 	(Steichen and Wade, 2010) (Conlan et al., 2002)
Knowledge state	Novice, Intermediate, Expertise, Specialized, Procedural	<ul style="list-style-type: none"> • AH (User Interface) 	(Magoulas and Dimakopoulos, 2006) (Solheim, 2009)
User Values	Privacy, Security, Trust, Brand, Price	<ul style="list-style-type: none"> • Information Architecture • Privacy Framework • Personnalisation Framework 	(Bart et al., 2005) (Jiménez Torres and San Martín Gutiérrez, 2007), (Instone, 2004), (Xiao and Tao, 2006), (Ralph and Parsons, 2006)

Orientation	Goal Oriented, Utilitarian, Hedonic, Beliefs	<ul style="list-style-type: none"> • AH (Semantic Web) • Personnalisation Framework 	(Lawler and Joseph, 2006), (Sun, 2004), (Henze and Kriesell, 2004), (Ralph and Parsons, 2006)
Behaviour	Interest, E-loyalty, Involvement	<ul style="list-style-type: none"> • IR (Web Usage Mining) • AH (Educational Systems) 	(Jin, 2010), (Novak et al., 2000), (Martins et al., 2008)
Demographic make ups	Gender, Age, Income	<ul style="list-style-type: none"> • Privacy Framework • AH (Educational Systems) 	(Bouzeghoub and Kostadinov, 2007), (Xiao and Tao, 2006), (Martins et al., 2008)
Content preference	Procedural Consult, Explanations, Overview	<ul style="list-style-type: none"> • AH (Metadata Generation) • Information Architecture 	(Steichen and Wade, 2010), (Instone, 2004), (Rossi et al., 2001)
Process Type	Activity, Task, Concept (Narrative Text, Table, Image, Summary)	<ul style="list-style-type: none"> • IR (Metadata Generation) 	(Novak et al., 2000), (Şah and Wade, 2010)
Educational	Difficulty (Hard, Easy), Interactive Type (Active, Mixed, Expositive), Interactive level (Low, Medium, High)	<ul style="list-style-type: none"> • IR (Metadata Generation) • AH (Educational System) 	(Steichen and Wade, 2010), (Martins et al., 2008)
Content Type	Author, Title, Publisher, Subject	<ul style="list-style-type: none"> • IR (Metadata Generation) 	(Rossi et al., 2001), (Şah and Wade, 2010)

2.2.4.3 Attributes in Frameworks

This section identifies attributes of personalisation as defined in personalisation frameworks. Details of these conceptual frameworks are investigated to analyse

the following three questions: (1) what attributes are included in the framework? (2) what are the sources of these attributes? and (3) How are the frameworks validated?

Having conducted a research review as shown in Appendix C five frameworks relating to the area of customer care service/TS were found. These five frameworks are from four focus areas or perspectives: Online personalisation, marketing, interactive service and mobile service perspectives. These frameworks are discussed in detail as they may provide guidance towards initial interpretation of sets of personalisation attributes as required for my thesis and to illustrate that they do not resolve the diversity/uncertainty issues that arose in the previous sections.

- **Online Personalisation**

Ralph and Parsons (2006) and Jrad et al. (2007) proposed two different personalisation frameworks from the online personalisation perspective. As illustrated in Figure 2.1, the framework, divides all potentially useful information into two domains: the user space and the provider space. The user space contains all information provided by or derived from users, whereas the provider space contains all of the information, systems and objects that comprise a website. Each component of the framework is also divided into several categories and subdivisions to accommodate increased scope and granularity. For example, the session variable contains the type of browser, the version and the IP addresses. Likewise, the navigation variable contains the sequence of pages viewed by the user (represented by the as-viewed or not-viewed attribute or a-continued viewing-time attribute). The personal/private component represents that data that are sensitive to the user like: social security number and credit card number.

Jrad et al. (2007), proposed a framework on how to model the user and their context in an extensible way that can be interpreted and used for web personalisation. Figure 2-2 describes the user context which is divided into multiple

working contexts grouping together facts related to and relevant for the same task and/or role of the user. The authors used characteristics of users, including task context, a user profile and their current behaviour. For example, as shown in Figure 2-2, the authors describes user characteristics from their navigation history such as their browsing and selection history, form user profile such as gender, age and their current location and finally from the current behaviour such as what they are navigating and what they are trying to do.

Both frameworks from online personalisation suggest areas that need attention on individualising user online experience. However they seem a bit general in defining attributes of personalisation. Additionally the frameworks are not empirically derived or validated.

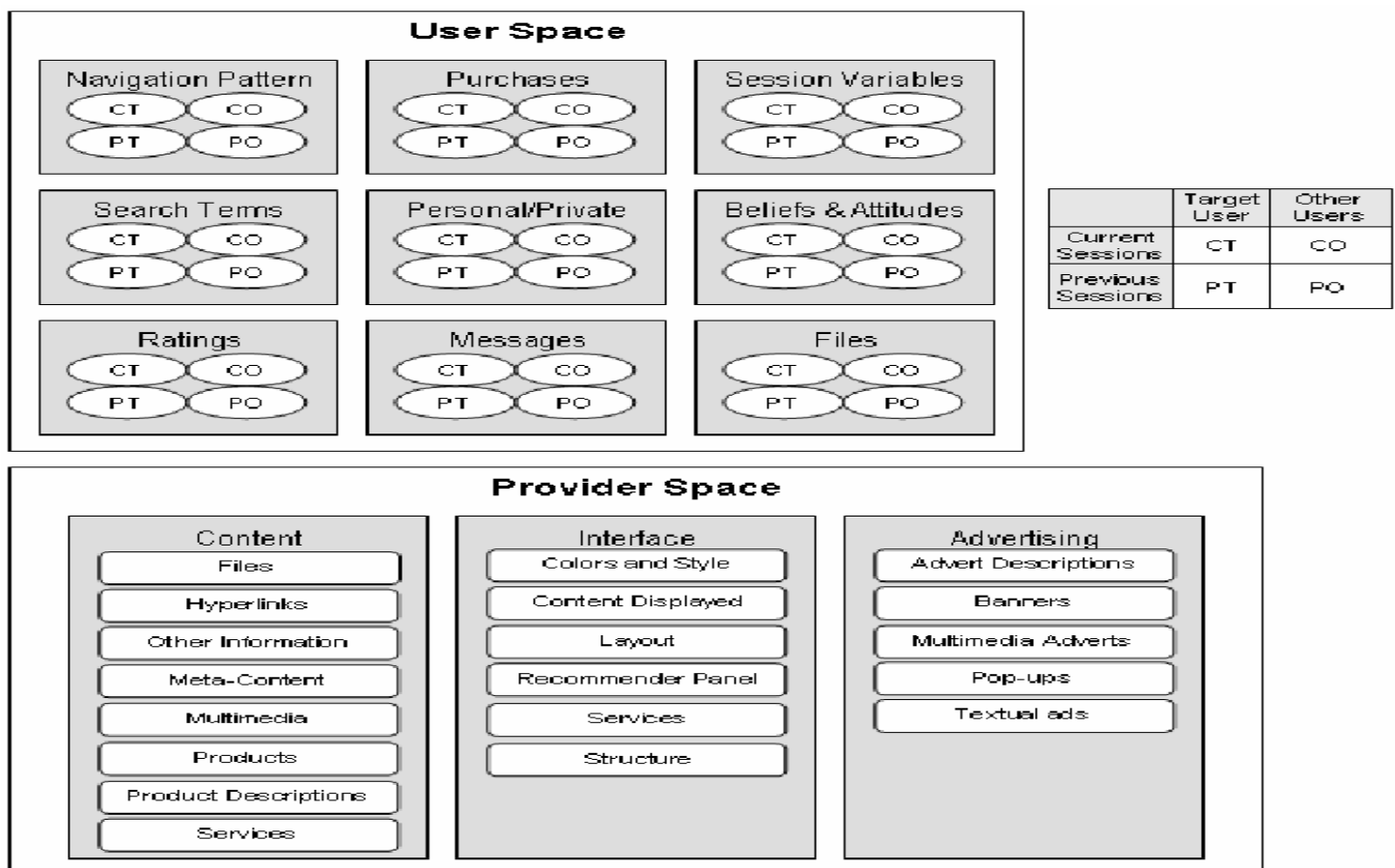


Figure 2-1: Conceptual framework (Ralph and Parsons 2006)

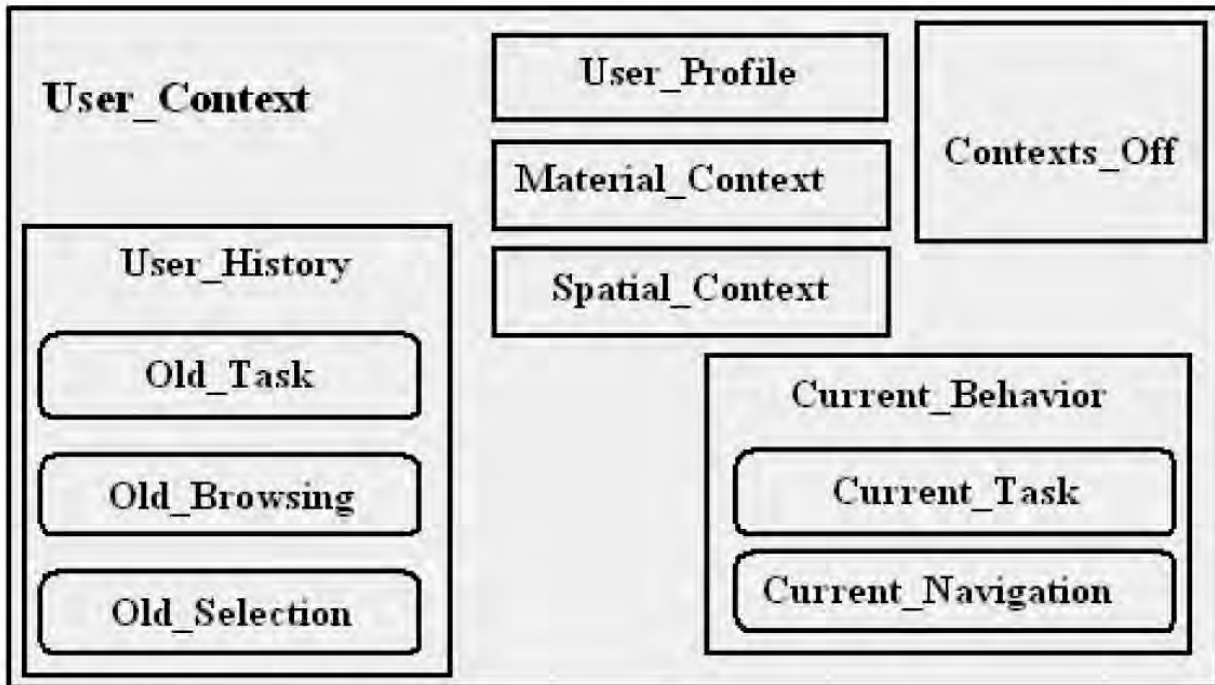


Figure 2-2: Conceptual Framework (Jrad et al 2007)

- **Marketing**

Vesanen (2007) proposed a conceptual framework for personalisation from the marketing point of view. As illustrated in Figure 2-3, Vesanen shows the relationship between customers and service providers in the form of products/services, promotion/communication, price and delivery, and the creation of value for both the customer and the marketer. Vesanen then decomposes each of these concepts further into a series of subtopics to develop a taxonomy, which relates the common components of interactive marketing strategies. This conceptual framework helps to identify the actors who participate in the process of personalisation (Customer and Marketer), the services that are personalised (Product, communication, price and delivery), those who do the personalisation (Marketer) and the flow of information (Reaction, Interactions). This framework focuses on a category of attribute that seems prevalent in the literature in this area: user values.

In spite of providing this conceptual framework for personalisation, the work does not explicitly show the attributes of personalisation. Instead, they are categorised into four major categories (Product, communication, price and delivery) from which personalisation attributes may be derived (requirement for value for money, for example).

Hence again, his conceptual framework is like that of (Ralph and Parsons, 2006): it seems to be general in defining attributes of personalisation and not based on empirical evidence. In addition, Vesanen (2007) has only shown the costs and benefits of personalisation in a market scenario, based on a literature review that considers issues such as waiting time and extra fees.

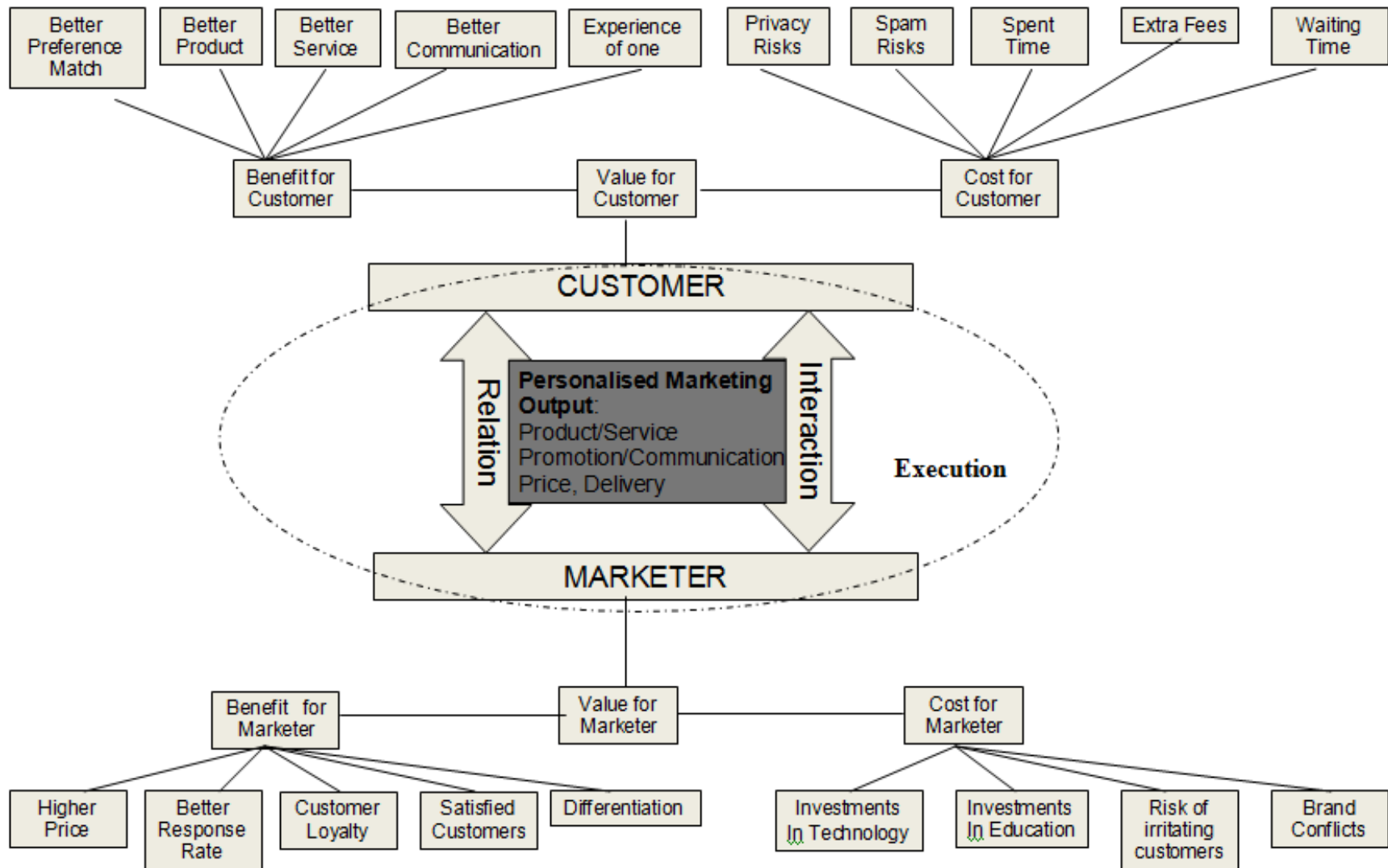


Figure 2-3: Conceptual Framework (Vesanen 2007)

- **Interactive Personalisation**

From an interactive personalisation, marketing domain perspective, Miceli and colleagues also proposed a conceptual framework of e-customer profiling (categorisation of customers), as illustrated in Figure 2-4, which is more directly related to the focus of this research (Miceli et al., 2007). Miceli et al. (2007) framework is designed for more interactive personalisation by separating the content (expected customer benefits) and process issues (expected degree of interaction). They identify four dimensions along which they characterise personalisation: value, knowledge, orientation, and relationship quality. Value refers to customer expectations for personalisation content. Knowledge pertains to the customer's expertise and know-how. Orientation depends upon the consumer's intention or attitude. Relationship quality refers to the tie that a customer has with the service providers and encompasses issues like trust.

Miceli et al. (2007) argues that these four dimensions are useful for determining the value of personalisation for a marketer to categorise customers. The conceptual framework first clusters customers from these four dimensions according to gathered information about the customer. Based on the information of the first step, the user will be mapped to the specific content, which satisfies the cluster he/she falls into. The user clusters ranges from unfaithful customers, which randomly checks the product and provides suggestions, to loyal customer, who frequently dedicates their time towards the improvement of the product. This conceptual framework generally addresses the question of what to personalise (content and process) and how to personalise (clustering-driven and content specific profiling). On an on-going basis, the system will collect information gathered from the session for feedback to clustering for the next session when the customers login. Miceli et al. (2007) collected and categorised attributes of personalisation for the four categories from different literature as shown in Table 2-9. This categorisation helped them to define interaction-based customer heterogeneity for their conceptual framework.

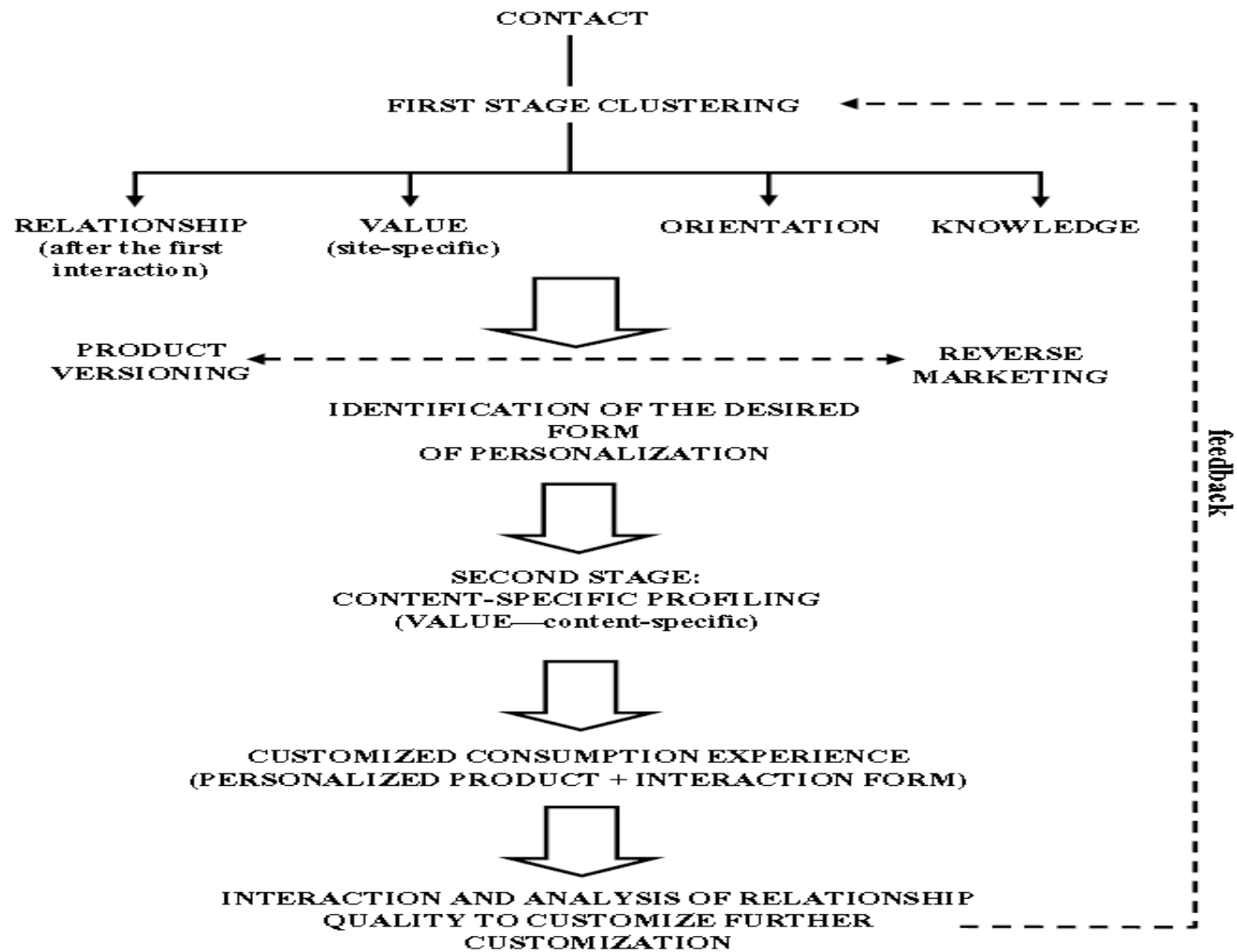


Figure 2-4: Conceptual Framework (Miceli et al 2007)

Table 2-9: Attributes of Personalisation Miceli et al's (2007)

Value	Knowledge	Orientation	Relationship Quality
Privacy	Procedural	Goal-oriented	Long-term
Security	Specialized	Involvement	Price Competition
Navigation	Experts	Utilitarian	Brand
Presentation	Novices	Hedonic	Trust and Cooperation
Trust		Playfulness	E-loyalty

Miceli et al. (2007) conceptual framework, along with the standard documentation attributes, can provide information as a starting point for this research's design to analyse the core personalisation issues in customer care TS. However, it should be noted that this framework is not based on empirical data, and there is no evidence that it has been validated. Therefore the model remains theoretical calling into a question how useful or trustworthy this model is in practice.

- **Mobile Services**

Cai et al. (2009) proposed an ontology-based personalisation framework for mobile content services. The framework can be conceptualised into three major ontology categories, which are extended from three inter-related parts of the OWL-S (Semantic Web Ontology Language) description:

1. **Service ontology:** can be used to automate a variety of service-related activities involving service discovery, interoperation and composition.
2. **Context ontology:** defined as Mobile Content Provision tasks (MCPContext) is composed of three subclasses: PhysicalContext, User Context and ComputingContext as shown in Figure 2-5. MCPContext describes what contexts are necessary before any kind of service is deployed properly. The attributes used in the MCPContext are adopted from the W3C consortium project. This ontology is relevant to define user

characteristics since it defines attributes directly in the user context as shown in the Figure 2-5.

3. **Content Service ontology:** is the basic representation of content, which is adopted from the Dublin Core Metadata standard which was described in section 2.2.4.1. This ontology is also relevant to user characteristics since characterising content for various users indirectly defines user characteristics.

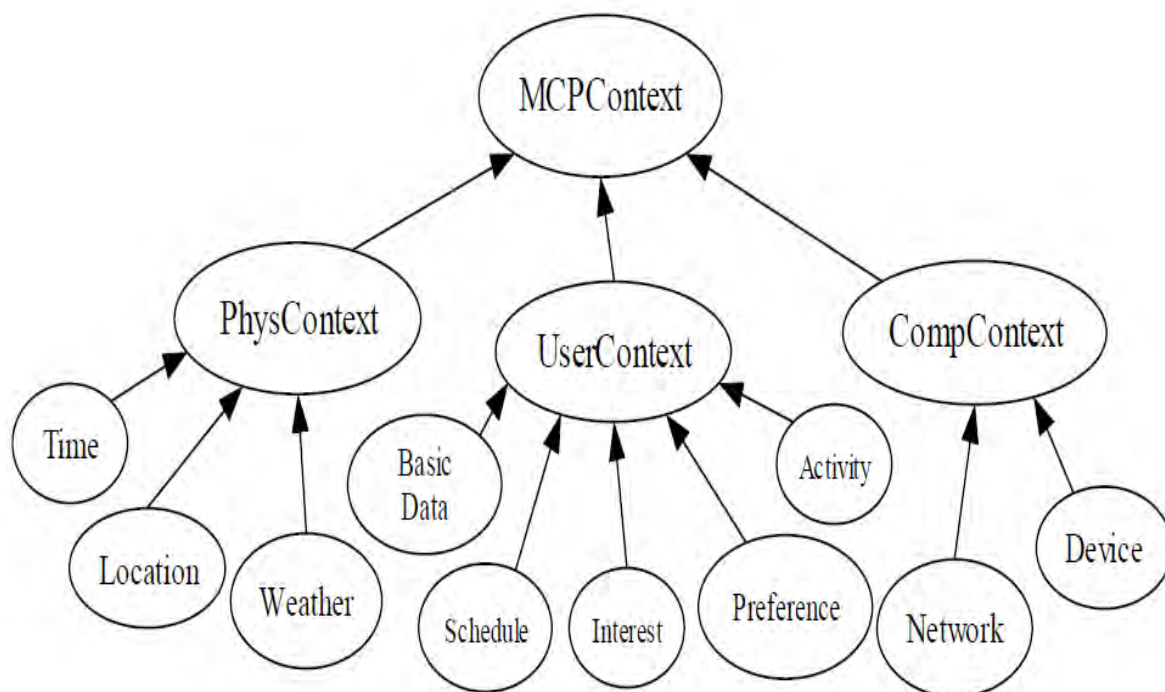


Figure 2-5: Content Ontology (Cai et al 2009)

Finally Cai et al. (2009) proposed a multi-agent architecture based on the three ontology-based personalisation frameworks. Groups of personalisation attributes are clearly stated as per the bottom nodes in Figure 2-5, and defined in this personalisation framework, based on the standard bodies.

In summary, a review of the literature in personalisation frameworks found five specific frameworks that have attempted in one way or the other to define personalisation characteristics in their own contexts. These studies provide a somewhat incoherent set of personalisation attributes.

In addition the frameworks present constructs at different levels of granularity. For example (Ralph and Parsons, 2006) have not included attributes of personalisation explicitly in their framework. However Jrad et al. (2007) show how to profile users at a greater depth. And the frameworks present different personalisation attributes. These factors suggest a lack of consistency in our knowledge of relevant personalisation attributes.

Finally, even though parts of the personalisation frameworks and their attributes may be intuitively correct, they are not based on *in vivo* practice and/or validation. All the five frameworks based their work on hypotheses about the important attributes of personalisation, surveying or identifying attributes from the literature without *in vivo* practice. However, these frameworks may inform the work presented here in order to assess my derived findings.

2.3 Personalisation for Improved User Satisfaction in TS

The literature shows that users are not fully satisfied with existing TS services, specifically they lack guidance and support for users learning about their software systems and how they might be assisted when problems arise (Smart and Whiting, 2001, Lee et al., 2001, Foo et al., 2000). Personalisation may help this situation by tailoring content and interaction to individual's needs. However there is a lack of research into individualising TS service based on user characteristics. Indeed the personalisation attributes that are identified in the literature/standard documents and frameworks described above have not been empirically evaluated and thus are open to threats to validity.

Figure 2-6 summarises the state of the art showing how some research presents solutions where one-size-fits-all (weak TS services/weak user characterisation - bottom left quadrant) to developing different systems. Expert system and problem-solving systems improve TS but do not consider user characterisation and these are represented by (strong TS services/weak user characterisation) in the-top left quadrant. However, as suggested by this review and in the top right quadrant, the

desired strong TS services/strong user characterisation is not adequately researched. This reveals a gap in personalising TS which can be addressed by understanding user characteristics and assessing their interplay in the real-world interaction of TS.

TS services do not sufficiently consider how users accomplish a task or how they can learn. A lack of such information might lead to different practical implementations of personalisation. Additionally, research shows that those TS services that do address this from of user characterisation do so in an *ad hoc* fashion and are not based on *in vivo* empirical evidence. Defining user characterisation in an *ad hoc* fashion is unreliable, and not repeatable, resulting in inconsistencies, and a weak understanding of user characteristics.

Empirically derived and evaluated characteristics of users may determine prevalent user attributes, which may in turn enhance the process of implementing personalised TS. Empirically derived personalised attributes and their interplay with successful communication could reinforce the current understanding of how to characterise users and, by taking a more context-aware approach (the TS interaction), may possibly provide novel perspectives and new attributes that may lead to an improved TS service.

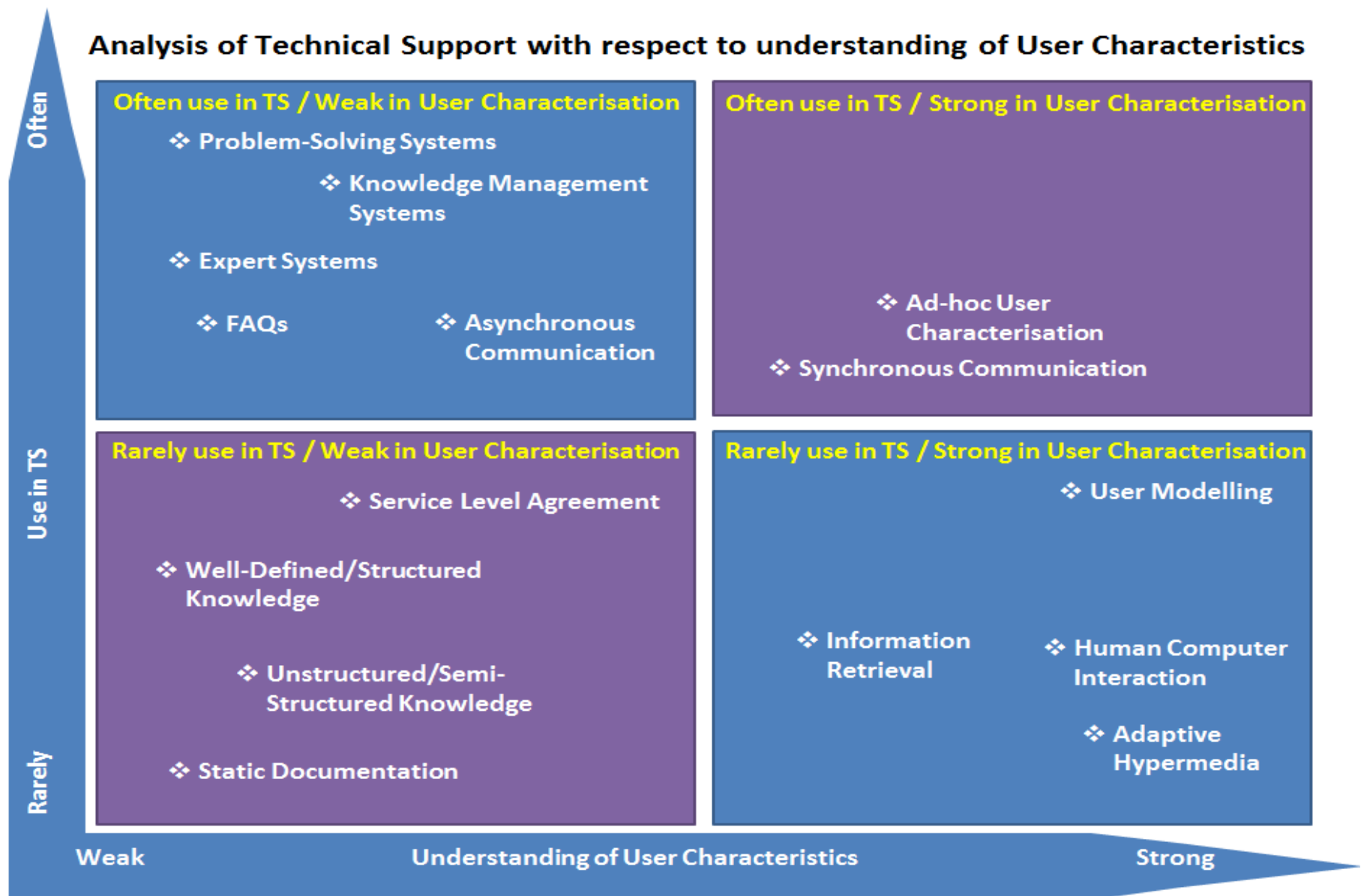
2.4 Summary

The main aim of the literature review was to highlight key elements of TS research that exclusively reports on individualised TS services based on user characteristics. The literature review has shown that TS services focus on personalisation in an *ad hoc* fashion and personalisation attributes identified in the literature/standard documents have not been empirically evaluated and thus are open to threats to validity.

Furthermore, the literature review has highlighted personalisation research areas associated with user modelling and personalisation attributes. These are considered as potential practices in individualising TS services.

The next chapter explains the research methods followed to conduct the research study.

Analysis of Technical Support with respect to understanding of User Characteristics



Chapter 3

Methodology

CHAPTER 3

3 Research Method

This chapter outlines the methods that have guided the research in my thesis. The research follows a mixed methods approach with sequential exploratory strategy. Section 3.1 describes the qualitative method chosen for the empirical research, the Grounded Theory method (GT). The GT description includes the most common philosophical assumptions that underpin this method and a rationale is given for why this research initially follows this qualitative approach. Subsequently the guidelines derived by the qualitative methods are evaluated by means of a survey that employs both a qualitative and quantitative element as described in Section 3.2. This section includes the description of the choice/design of the survey employed. Section 3.3 describes the mixed method approaches. Subsequently, in Section 3.4, the protocol employed in this research is described.

3.1 Qualitative Approach

Qualitative research, as the name implies, places 'emphasis to qualities of entities and on processes and meanings that are not experimentally examined or measured in terms of quantity, amount, intensity, or frequency' Denzin and Lincoln (2009). It is a type of research that produces findings not arrived at by statistical procedures or other means of quantification (Strauss and Corbin, 1998). Its core purpose is to explore the meaning individuals or groups ascribe to a social or human phenomenon (Creswell, 2009, Denzin and Lincoln, 2009) and to understand the contexts within which decisions and actions take place (Myers, 1997). Qualitative research aims at hypothesis and theory formation rather than theory verification and is more suitable for research areas that are new or less mapped out (Cairns and Cox, 2008). Researchers who do qualitative research support the inductive approach that starts from specific observations to broader generalisations and theories, focus on individual meaning and try to understand the complexity of a situation (Gray, 2004).

The main objective of using an inductive approach are to: condense extensive and varied raw data into a meaningful format; establish clear links between the research objectives and the derived output from the raw data; and develop a model or theory about the underlying structure of experiences or processes which are evident in the raw data empirically (Gray, 2004). This empirical approach gathers data with no preconception of how data is ordered or what explains it and inductively identifies patterns and relationships within the data (Coolican, 1990). It gives much emphasis to situational and structural contexts (Strauss and Corbin, 1990).

Qualitative research involves the use of qualitative data, such as interviews, documents and participant observation data, to understand and explain social phenomena (Denzin and Lincoln, 2009, Myers, 1997). Unlike quantitative data, qualitative data provides contextual information and rich insight into human behaviour, and also helps to avoid the disjunction of grand theories with the local context: the inapplicability of general data to individual cases (Guba and Lincoln, 1994).

Some researchers gather qualitative data, but they code and analyse the data statistically; that is, quantifying qualitative data (Strauss and Corbin, 1990). But Strauss and Corbin (1990) assert that this cannot be considered true qualitative analysis. In some cases also, qualitative and quantitative research designs (mixed method), can be used together in one research effort, mainly for the purpose of triangulation (Creswell, 2009). Even though its origin is in social science, qualitative research is now being used in multiple disciplines (Denzin and Lincoln, 2009, Myers, 1997). In the field of Information Systems, Myers (1997) for example, reported that with the shift in related research away from technological to managerial and organisational issues, there is an increasing interest in the application of qualitative methods in the field.

For the development of the theory, I choose to employ qualitative research primarily, because of the nature of the research under study, which tries to address

the social context and processes surrounding information systems and specifically forums. In addition, it is suitable because the research is typically more hypothesis-formation than hypothesis-evaluation. It specifically aims to explore the attributes and the structural patterns in the online TS forum communication, showing how communication happens on these forums. In doing so, the research uses qualitative data: archives of Technical Support forums. And, in contrast to hypothesis-testing, it aims at semantic analysis in identifying and describing the personalisation attributes and the communication handling process to develop a theory that specifically works for forums that can be personalised. However, while the theory-formation stage is qualitative, the research subsequently quantifies the prevalence of different personalisation and communication attributes to determine their prevalence in the theory and to assess the relationships between different attributes. Given that the theory evaluation stage is also quantitative this work can be considered 'mixed method with sequential exploratory strategy '.

3.1.1 Types of Qualitative Research

There are different types or approaches of qualitative research, but the most common ones are Ethnography, Case studies, Phenomenological research, Narrative research, Action research and Grounded Theory (Morse and Richards, 2002).

- **Ethnography** is used to study an intact cultural group in a natural setting over a prolonged period of time and usually the researcher collects data from immersive observation and interview.
- **Case study** is a method where an individual or group, program, event, activity, or process is explored in depth over a given time, using different data collection procedures.

- **Phenomenological research** is used when a researcher focuses on identifying the essence of human experiences about a phenomenon as described by the participants.
- **Narrative research** is used when a researcher studies the lives of individuals and asks one or more individuals to provide stories about their lives.
- **Action research** is a strategy of inquiry where the researcher is typically a participant and deliberately intervenes while at the same time, studies the effect of that intervention so that the learning can be used to benefit others.
- **Grounded Theory** is used to derive a general theory of a process, action, or interaction grounded in the data. Among other things, it involves theoretical sampling, constant comparison, coding and the interrelationship of categories.

3.1.2 Rationale for Applying Grounded Theory

The Grounded Theory method was originally developed by two sociologists, Barney Glaser and Anselm Strauss, and is defined as the discovery of theory from data that is systematically obtained from social research (Glaser and Strauss, 1967). The rationale behind grounded theory was to systematise the qualitative analysis of data so that the generated theories could be trusted and, underpinning this was the observation that too much emphasis had been given to verifying or testing prior existing theories rather than generating theories from collected data.

Glaser and Strauss argued that in order for a theory to fit the situation being researched and being able to explain the behaviour under study, there should be an initial, systematic discovery of the theory from the source data (Glaser and Strauss, 1967). Thus Grounded Theory contrasts with traditional research whereby theory was generated by logical deduction from prior assumption. Rather,

it aims at generating theory through a process of data collection without any preconceived ideas to prove or disprove (Glaser and Strauss, 1967).

Among the different qualitative research methods, Grounded Theory was chosen for this research. As shown in Chapter 2, existing personalisation frameworks propose attributes of personalisation (Vesanen, 2007, Miceli et al., 2007, Ralph and Parsons, 2006, Steichen and Wade, 2010) but even though these attributes might be intuitively correct, they are not in any way validated or derived from real participants in real environments.

For this work GT appears particularly relevant for the following reasons:

a. Theory Building

Grounded Theory method focuses on generating a theory through observation of patterns in raw data (Strauss and Corbin, 1990). This would appear suited to investigating Technical Support Forum data. There is no strong theoretical basis for work in this area so Grounded Theory is a natural choice (Glaser and Strauss, 1967, Strauss and Corbin, 1990).

b. Process Investigation

Forums (the data source for this research) are characterised by interactional processes. Participants in a forum take some action and participate in the interaction of subsequent events happening in the communication forum. Therefore, exploring the attributes and the communication handling process of technical support forums are logically investigated from an interactive, social, process perspective. Grounded Theory is particularly suited to examine social processes (Glaser, 1978).

c. Suited for Research Field

Grounded Theory has been shown to be useful in Human-Computer Interaction (Lazar et al., 2010), and Information Systems research (Urquhart and Fernández, 2013); topics closely related to this area. The focus here is to investigate user characterisation in TS and how that might advance TS systems in terms of handling. As such it is strongly related to the domains of Human Computer Interaction and Information Systems.

d. Rigor

GT has become a standard, accepted practice in many fields. The rich, established, rigorous theory that Grounded Theory provides for analysis of data means that it is suitable as the primary guiding method for the derivation of the TS personalisation and communication theory.

3.1.3 The Grounded Theory method

After its inception, the Grounded Theory method has developed into different variants: one favoured by Barney Glaser (Glaserian), another favoured by Anslum Strauss and Juliet Corbin (Straussian) and, recently, one proposed by Kathy Charmaz (Urquhart and Fernández, 2013, Charmaz, 2006). Glaser's approach avoids literature review before analysing the raw data so as not to prejudice or influence the perception of the researcher. However, the Straussian and Charmaz approach have distinct differences with respect to their perceptions of the literature review believing that researchers need some context, and thus a more generalised literature review.

In this research Strauss and Corbin's variant is adopted for the following reasons: Firstly, it supports a role for a literature review before data collection, by providing to have some theoretical background and it also encourages researchers to apply prior insights and experience to the analysis where appropriate (Strauss and Corbin, 1998). Additionally, they suggest analytical tools and guiding principles,

especially for their coding, which facilitates examination of codes, in terms of different coding paradigms that support the researcher (Glaser and Strauss, 1967, Strauss and Corbin, 1990). For example, a coding paradigm they suggest (based on cause and effect) enabled the researcher to investigate relationships between different categories and sub categories in this work and so finally to develop the PiP theory (this is illustrated more fully in section 3.3).

3.2 Quantitative Approach

Quantitative research, which was originally developed to explain natural phenomenon in natural science (Myers, 1997), places emphasis on testing objective theories by examining the casual relationship between variables (Denzin and Lincoln, 2009). It deals with numbered data, measured typically on instruments, and analysed using statistical procedures and techniques (Creswell, 2009). Researchers who choose quantitative research perform theory testing through a deductive style, protection against bias, controlled alternative explanations, and the ability to generalise and replicate the findings (Robson, 2002).

The quantitative research approach is best directed at research that aims to test a theory or explanation, to identify factors that influence an outcome, to understand the utility of an intervention or to determine the best predictors of an outcome (Creswell, 2009). It is also applicable for studies that target larger sample size and aim at generalising to a larger population (Myers, 1997).

3.2.1 Quantitative Research Approach

There are different experimental and non-experimental methods of quantitative research. The most common ones are experimental, correlation and survey research (Morse and Richards, 2002, Cairns and Cox, 2008).

- **Experimental research** is used to study cause and effect relationships (Gray, 2004). Experimental research tries to determine if a specific treatment influences an outcome (Creswell, 2009, Wu et al., 2003).
- **Correlation research** examines differences of characteristics or variables of two or more entities (Robson, 2002). A correlation exists when one variable increases or decreases correspondingly with other variable.
- **Survey research** is an attempt to get a quantitative and qualitative description of the different variables of a population by obtaining characteristics for a sample of that population (Creswell, 2009, Wu et al., 2003). Survey research uses scientific sampling and questionnaire design to measure characteristics of the population with statistical precision. A Survey research provides a quantitative (numeric description) or qualitative (text description) of trends, attitudes, or opinions of a population by studying a sample of that population with the intent of generalizing from a sample to a population (Creswell, 2009).

3.2.2 Rationale for Applying Survey

Among the different research methods, a survey approach was chosen for this research. A qualitative and quantitative survey approach appears particularly relevant for the following reasons:

a) Dependable

The anonymity of surveys will allow participants to answer with more honesty: open and valid answers generating an accurate dataset with which understand the population (Gray, 2004, Robson, 2002). The survey documents clearly stated that survey responses will remain completely confidential.

b) Distributed Population

The population of interest for this work is dispersed over a broad geographic range. The survey can provide the platform to reach and administer the participants and their responses in many modes including online surveys and email surveys to an international sample (Robson, 2002). But it would almost certainly be less feasible to do research that requires interviewers to visit directly with participants if they are widely dispersed.

c) Large Population

This work targets a large population and draw samples to get a more general view about the opinions of the large population. A survey is a useful approach in describing the opinions of a large population and ensures a more accurate sample to gather the results in which to draw conclusions.

The next section describes the choice/design of the survey method and preliminary analysis that documents basic frequency and descriptive statistics of the characteristics of the participants and specific communication variables.

3.2.3 Survey Method

A survey, in the form of a questionnaire to TS User and TS Experts, was carried out to validate the work-practices proposed by *Personalisation In Practice*. This section describes the survey design; pre-testing; data collection and analysis and results.

- **Survey design**

In survey design, specification of the questions that the survey needs to address are defined (Robson, 2002). In order to strengthen the theory using the survey, without revealing to the real-world practitioners, success criteria from the theory were defined to create a clear objective design.

The study adopts TS service quality dimensions, as described in section 2.1.6.1, to validate the theory, in order to determine user satisfaction. Thus the success criteria are defined from a TS service quality measures perspective in relation to each proposed successful and unsuccessful practice of *Personalisation In Practice*. The success criteria and the corresponding purpose (including TS quality measure dimensions) are shown in Appendix-E. The questionnaires prepared for TS Users and TS Advisers are shown in Appendix F1 and F2 respectively. For example, in order to measure TS Advisers' practices of establishing and handling user expertise, the following question is raised: "*When dealing with a user using text based communication how often do you establish their level of experience before offering help?*". This question is measured by a three-point Likert scale (Always, Sometimes, and Never) and is followed by open question so that the responder can elaborate on why for each response. The main reason I used the three-point Likert scale is to initiate more information in the follow up open questions.

- **Pre-testing**

In the pre-testing stage, the draft questionnaires were tested to check whether the questions were clear, simple and ambiguous and in order. Four participants provided constructive feedback and comments. The feedback from the participants was used to refine the various elements of the survey. For example, their feedback provided information on a: more appropriate layout and clearer presentation, and changing several closed questions to open questions in order to assess possible biases and gain richer insight.

- **Data collection**

The questionnaire contained open and closed ended questions (Briony, 2006). Closed questions offer a set of pre-defined answers and TS Advisers and TS Users were asked to choose one or more that most closely represents their views. Open-ended questions were added for each question where participants provide their opinion in a free, textual form on each matter.

- **Sampling in the Survey**

The reliability and validity of survey data depends on the type of sampling methods used and the size of the sample (Gray, 2004, Robson, 2002). The sample size of the population is usually determined by the objectives, questions or hypothesis that the survey needs to answer (Robson, 2002).

The populations of interest are all TS Users and TS experts in the IT domain. My sampling aims to take consideration of the different strata of the population proportionally within the sample and so a stratified random sampling technique was employed. Therefore, the sample population I proposed targeting consists of TS Users and TS Advisers from several software development companies and different continents. In addition, TS Advisers with different educational level and work experience would be targeted to widen the stratified sampling and thus the external validity (Winter, 2000) of the study with respect to these factors. Furthermore TS Users with different IT levels of experience and with different experience of using IT TS (that ranges from rarely to always) are targeted for the same reasons.

- **Data coding and analysis**

The data coding stage of the survey, involved entering the data collected into a MS-Excel, for all the responses captured. Each TS Adviser was assigned a unique identity number. Prior to the data entry, the questionnaires were checked for

completeness. In the case of unanswered questions, I contacted the respondent. Additionally, two respondents of the questionnaires were rejected because they only used telephone as their communication media, whereas this research focused on text-based communication.

The survey analysis used frequency distribution and descriptive statistics to capture and describe the frequency of closed responses. Additionally open coding analysis techniques were used to qualitatively categorise the results of open questions (Robson, 2002). For example, the reasons behind the responses on the importance of establishing user level of expertise were determined by categorising similar responses together and thus identifying clusters.

3.3 Mixed Method Approach

Although the concept of mixing methods originated back in 1959 in the psychology field and has been discussed in the literature using numerous terms, recently, the mixed method approach has gained in popularity and is now a distinct methodology (Creswell, 2003). The mixed method, “as a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone” (Creswell and Plano 2007:5).

According to Creswell (2009), there are six types of mixed method strategies and four major factors that influence the design of procedures. The six types of mixed method strategies are sequential explanatory strategy, sequential exploratory strategy, sequential transformative strategy, concurrent triangulation strategy, concurrent embedded strategy, and concurrent transformative strategy. While the major factors are timing, weighting, mixing and theorizing. Timing refers to whether qualitative and quantitative data collection occurs sequentially, concurrently or as a combination of the two; weighting refers to the equal or unequal priority given to either qualitative or quantitative method; mixing considers when and how the

mixing occurs and the last factor, theorizing, emphasises whether or not theoretical perspective guides the entire design (Creswell, 2009).

Taking into consideration the above six mixed method strategies and four major factors identified by Creswell, this research falls in the category of sequential exploratory strategy. Sequential exploratory strategy involves a first phase of qualitative data collection and analysis which is followed by quantitative data collection and analysis that builds on the results of qualitative phase. Weight is given to qualitative data collection and analysis and the data are mixed through being connected between the qualitative data analysis and the quantitative data collection. The design may or may not be implemented within an explicit theoretical perspective and even sometimes it might not be mentioned (Creswell, 2009). The purposes of sequential exploratory strategy include to explore a phenomenon, test elements of an emergent theory resulting from the qualitative phase and generalise qualitative findings to different samples, determine the distribution of a phenomenon within a chosen population and develop a new instrument (Creswell, 2009).

Placing this in context with the four factors, in terms of 'timing', this research used qualitative and quantitative data collection and analysis in phases or sequentially where in the first phase the qualitative method, Grounded Theory, is used to explore and empirically derive user characteristics and communication handling process in TS. In the second phase primarily a quantitative, survey approach is applied with closed and open ended questions. The survey is used to build on the qualitative findings and validate the emerging grounded theory. Considering the 'weighting' factor, priority is given to qualitative data as the primary focus of the research is to empirically identify user characteristics and communication handling process in TS.

Regarding the 'mixing' factor, the mixing of the two methods occurred where after the first phase of qualitative data collection and analysis there was a need to build on the qualitative findings and validate them. Accordingly specific themes and

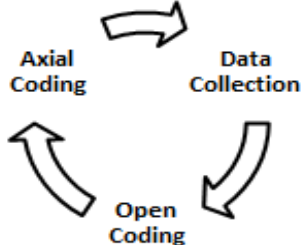
participants were selected and a survey method, which was primarily quantitative with open and close-ended questions was implemented. Considering the final factor 'theorizing', in the research, no theoretical perspective is used to shape the design of the utilized mixed method approach. At the final stage of the research the results of findings from both the qualitative and quantitative studies were combined and interpreted.

3.4 Life-Cycle of the Research Methods

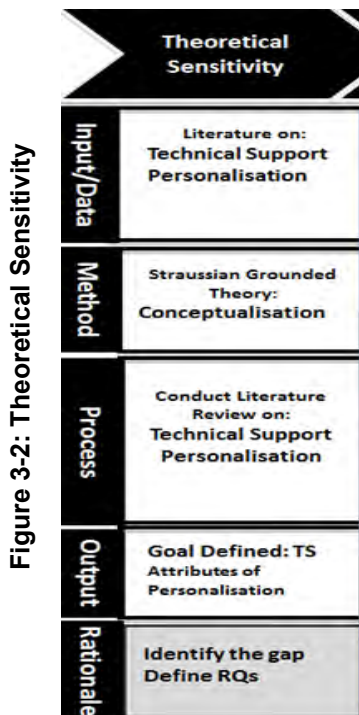
3.4.1 Introduction

This section provides a brief description of the different stages of research carried out in this study. The main distinguishing features of the Grounded Theory method such as: continuous undertaking of theoretical sensitivity, data collection, coding and analysis, theoretical sampling, theoretical saturation, memoing, sorting, and the constant comparative are included and broadly discussed in life-cycle of the research methods (Glaser and Strauss, 1967, Glaser, 1978, Strauss and Corbin, 1990).

This life-cycle of research methods as applied in the study is shown in Figure 3-1. Although the life-cycle of research methods as shown in Figure 3.1 is linear, the process is iterative as explained in each step in this section. The research is initiated in step one with "theoretical sensitivity" and follows a predominantly GT approach. Finally, the method includes an evaluation to test the theory quantitatively using a survey with potential users and TS Advisers. This part of the study checks the usefulness of the theory in the real world by testing the set of recommendation for TS providers as derived from the GT against the feedback from the survey with the intention of validating and refining the theory.

	Theoretical Sensitivity	Data Collection And Analysis	Emerging Theory	Theory Refinement
Input/Data	Literature on: Technical Support Personalisation	Forum Threads	Emerged Categories	Survey with potential users Qualitative and Quantitative data
Method	Straussian Grounded Theory: Conceptualisation	Grounded Theory: Theoretical Sampling Constant Comparison Theoretical Saturation	Grounded Theory: Theoretical Sorting	Survey Evaluation/ Assessment
Process	Conduct Literature Review on: Personalisation Technical Support		Theory practice Integration Selective Coding Diagramming	Success criteria tested against feedback from potential users
Output	Goal Defined: TS Attributes of Personalisation	Categories: characteristics of emerged concepts	Substantive Theory	Refined and Validated Theory
Rationale	Identify the gap Define RQs	Identify Concepts (Codes) Address RQs	Refine Theory	Support Theory: Check usefulness in real world setting

3.4.2 Theoretical Sensitivity



Glaser takes the position that the researcher should begin with an empty mind without reviewing literature on the subject area as he states it 'might contaminate, stifle or otherwise impede the researcher's effort to generate categories' (Glaser, 1992). This has often been criticised, as it is almost impossible to limit preconception by not engaging with the existing related literature in advance (Dey, 2007). Rather Dey (2007) advises to keep an open mind rather than an empty head, where even ideas from the literature in the field of interest can be a useful guide to analysis. Strauss and Corbin (1990) on the other hand, highlighted the need to cautiously use literature to enhance but not to constrain theory development or hinder creativity, and

also suggested that if it is used as an analytic tool, it can also possibly foster conceptualisation. Among other things, literature can be used to make comparisons with the emerging concept, enhance sensitivity of what to look for in data and stimulate questions, as well as being able to inform appropriate sampling strategies (Strauss and Corbin, 1990).

Theoretical sensitivity is the term used to describe the ability to see relevant data and to reflect upon the empirical data material with the help of theoretical terms (Strauss and Corbin, 1998, Kelle, 2007). It means having insight into the data, derived through what the researcher brings to the study as well as through immersion in the data during data collection and analysis (Strauss and Corbin, 1998). Sensitivity to theoretically relevant concepts is central to recognising indicators, properties and dimensions of those concepts in the data (Strauss and Corbin, 1998).

In this research, a preliminary literature review (chapter 2) was carried out to guide analysis and facilitate conceptualisation, thus building up certain theoretical sensitivity as shown Figure 3-2. A traceable method is used to do the preliminary literature review. The initial TS questions that the preliminary literature review addressed are:

- How is TS defined in the IT software domain?
- What empirical studies exist in literature for TS in IT?
- And kinds of individualised services exist in TS?

Regarding personalisation the literature review tried to answer questions such as:

- How is personalisation defined?
- Which attributes are used in personalisation user modelling?
- And what are the sources of these attributes?

The methods and process I followed during this literature review are detailed in Appendix B for Technical Support and Appendix C for personalisation. Indeed, this research area is ideal for Strauss and Corbin's variant of Grounded Theory, given the immaturity of the field, as only a preliminary review was possible: The attributes of personalisation in the literature are diverse, inconsistent and lacking empirical support and personalised services in TS are implemented in an *ad hoc* fashion as suggested in chapter 2.

Theoretical sensitivity was gained during the initial literature review, which provided conceptual clarity of concepts that might be relevant to guide the research. For example, the researcher found reading literature on technical support and personalisation was useful in order to have a basic general knowledge in the area, to choose the data sources, to understand the empirical gap with respect to personalising TS, to be informed of some of the personalisation

concepts or attributes and to frame the operational definition of personalisation and dimensions to be used as a guide in the research. However, concepts from the initial literature review merely suggested a starting point for data collection and analysis and whether these concepts were included in the theory was premised on what emerged from the data (Strauss and Corbin, 1998).

- **Sampling**

In this section, I discuss different data sampling techniques from the literature before discussing how theoretical sampling techniques determine the collection of data in my study.

“A sample is a selection from the population” (Robson, 2002). Sampling techniques are usually divided into two categories that allow the researcher to generalise to a greater or lesser degree to the entire population:

Probability Samples: A probability sampling plan is a sampling process where the different elements of the population have equal probabilities of being chosen (Robson, 2002). There are different approaches of probability sampling as explained briefly below.

- **Simple random sampling:** a selection at random from the sampling frame, of the required number of persons in the sample. It gives each candidate an equal chance of being included in the sample.
- **Systematic sampling:** a process of choosing a starting point in the sampling frame at random and then choosing every *n*th person. A systematic sampling requires a full list of the population where the list being organised in a way unrelated to the subject of the survey.
- **Stratified random sampling:** a process which involves dividing the population into a number of groups or strata where the members of the groups share particular characteristics, then followed by random sampling within the strata. However, in order to implement stratified random

sampling, the numbers in the groups selected for the sample should reflect their relative numbers in the population as a whole.

- **Cluster sampling:** a process which involves dividing the population into a number of units or clusters where each cluster shares characteristics. However, the clusters themselves are chosen on a random basis, which makes it different from stratified random sampling.
- **Multistage sampling:** an extension of cluster sampling where selecting the sample take in stages i.e. taking samples from samples.

Non-probability samples: Any sampling plan where the more desirable probability sampling is not possible is called non-probability sampling or sometimes referred as purposive sampling (Robson, 2002). A wide range of approaches are available where a probability sample would not be feasible, such as where no sampling frame is available or the resources required are not available as discussed below:

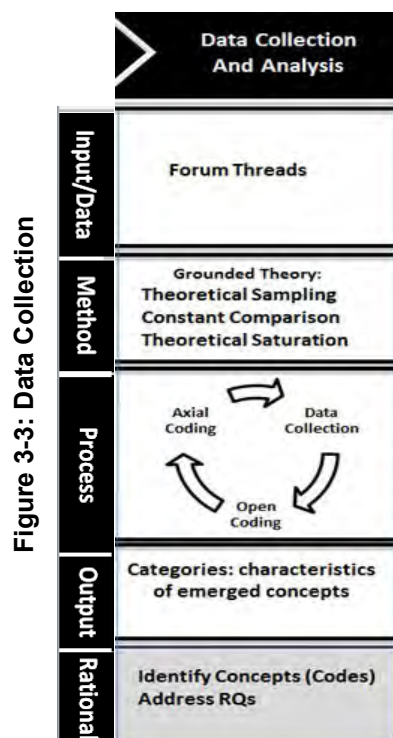
- **Quota sampling:** is used to obtain (at least one) representative of the various elements of the population.
- **Dimension sampling:** an extension to quota sampling, where every representative of every various element of the population thought to be of importance to the survey is included.
- **Convenience sampling:** involves choosing the nearest and most convenient person to act as respondents. Convenience sampling is one of the most widely used and least satisfactory methods of sampling (Robson, 2002).
- **Purposive sampling:** the selection process is performed based on the researcher's judgement on distinctive characteristics or interests, in order

to satisfy his/her needs in the study. Purposive sampling is referred to in Grounded Theory as theoretical sampling.

- **Snowball sampling:** a process where the researcher identifies one or more individuals from the population of interest in order to identify other members of the population, using the first individuals as informants.

In the next section I describe the data collection and sampling method employed in the data collection process.

3.4.3 Data Collection



The data collection and analysis processes are performed in an iterative, cyclical manner where data collection is analysis driven. The process begins with an initial sample of data collection according to theoretical sampling, followed by analysis, followed by more directed theoretical sampling data collection until categories reach saturation (Strauss and Corbin, 1998) (see Figure 3-3).

In my research the aim is to extract data from sources that reflect the domain of interest. For this purpose, TS in IT, forums are selected as the data source. These forums focus on IT products and help users of products resolve problems through user generated content (Das, 2003, Pitta and Fowler, 2005).

TS forums are selected as a data source because:

- These forums provide a naturally occurring data set that reflects the perspectives of real-world TS participants.

- Of their growing acceptance in terms of satisfying users' requirements better than other TS communication channels (Vesanen, 2007, Oxtan, 2010, Steichen and Wade, 2010).

Ralph and Parsons (2006), suggest that many information sources such as user message posts to online forums have not been well-exploited for personalisation and those forums might be rich resources of data to mine towards characterisation of personalisation attributes. Thus, TS online forums, as a place where both users (questioners) and advisers (respondents) meet to discuss issues and provide solutions, appear appropriate for the thesis' aims. It is likely that examination of the discussion within these forums will provide empirically relevant attributes and will reflect the communication dynamics that contributes to a discussion's success and failure, thus informing best practice in handling personalised communication.

Once the data source (open source TS forums) and the kind of data to be collected (discussion threads) were decided upon, the next step is selecting an appropriate sampling method. According to Grounded Theory, sampling is characterized by Theoretical Sampling (Purposive sampling). This implies that sampling is determined by the emerging theory where concepts are identified from the collected data, and the theory as it emerges. This emergent theory then helps the researcher to decide what data should be collected next, so as to strengthen the findings and determine the sample size of the research (Glaser and Strauss, 1967, Goulding, 1999).

The aim of theoretical sampling is to develop the theory and saturate the relevant categories in terms of their properties (characteristics) and dimensions (range), uncovering variations and identifying relationships between concepts. By doing all these, it determines the sample size (Strauss and Corbin, 1998). Theoretical sampling guides the research towards the point of theoretical saturation which is the point in category development at which no new properties, dimensions, or relationships seems to emerge during analysis of new data (Strauss and Corbin, 1998).

Therefore, the dataset for the research can be collected iteratively until it tends towards theoretical saturation. The main objective of the first dataset collection is to have a small exploratory sample to begin with and the rest of the data collection iteration is determined by the emerging theory. The first dataset collection performed with.

3.4.3.1 Sampling

This section describes the data collection and sampling process from IT TS forums. According to Strauss and Corbin's (1998) Theoretical Sampling (Purpose Sampling) method, the first round of data collection was by initial random sampling and the other data collection iterations were guided by the emerging theory. The dataset for the research was collected in three rounds until it tended towards theoretical saturation. The first dataset was collected from March 15 to July 20 2012, the second dataset was collected from March 30 to April 3 2012, and finally third dataset was collected from September 05 to September 26, 2012. Table 3-1 shows the total dataset collected in each iteration. Each iteration of data collection is discussed in detail in this section.

Table 3-1- Total Dataset

Dataset	Description	# Forums	# Threads	# Messages	# Messages per Thread
1	Exploratory sample	6/8	40	747	1-54 (range)
2	Focussed set	8/8	61	1217	1-87 (range)
3	Long interactive threads	8/8	15	1100	51-127 (range)
Total		8	116	3064	1-127 (range)

In the initial sampling, forums were selected from Google's™ search engine using the search terms "Technical Support forums in IT". Among the results of the search (1.8 million), forums were included for consideration based on the following criteria:

- They were written in English.

- They were non-affiliated with any products. For example, forums, which support unique products such as Microsoft forums or Linux specific products forums are not included.
- They were Information Technology (IT), (definitions are given in Appendix A), TS forums that covered diversified domains such as general technical support, Hardware, Networking, Security, Viruses and Windows products.

For the first iteration, the top-six returned forums were selected that fulfilled the above criteria. Each selected forum contains over 200,000 threads categorised into different domains. 40 threads were selected from those 6 forums. The initial sampling tried to reflect the general population of open source TS forums by selecting different sizes of threads from different domains found in these forums. From the collected 40 threads, 747 messages were found. The number of messages in each thread ranged from 1 to a maximum of 54 and included all the topics mentioned above.

In analysing the first dataset it was found that the threads obtained from some domains were dominated by experienced users of IT, which raised questions that the emerging theory could be reflective of more experienced users only.

In addition, a frequency count of the first data set showed that 26 threads ended up successfully, 9 were undeterminable, and 5 were unsuccessful as shown in Table 3-2. Because of the limited number of unsuccessful observations there was a need to observe more threads with unsuccessful outcomes. So, during the second dataset-gathering-iteration attempts were made to add new sites and more threads from each forum to expand the probability of collecting threads that end up unsuccessful, and that reflected more novice user.

Table 3-2: Output of Each Dataset

	Dataset1	Dataset2	Dataset3	Total
Successful	26	38	8	72
Unsuccessful	5	8	4	17
Undeterminable	9	15	3	27
Total	40	61	15	116

From the interaction data, it was observed that threads that ended up with a status of “undeterminable” typically finished after the right information had been posted. So indirectly, it could be assumed that participants just did not acknowledge it, or had maybe left the forum before the response was posted. Hence it is reasonable that most of the threads of status “undeterminable” could be considered as successfully ending threads. Despite this assumption, I only use the threads with known outcomes to build my theory since the outcome of the interaction is important and explicitly noted outcomes are more trustworthy.

The second dataset considered threads that potentially can have low user experience in their specific field by adding additional domains that cater for inexperienced users. Also, the second selection process took into consideration threads which have titles suggesting that individuals with lesser experience levels posted the query. For example, generic/shallow titles suggest lesser experience. Examples include: *“Help me choosing anti-virus”* or *“Internet stops working”*, *“Do anti-virus programs protect me?”*, *“Assistance needed software install”*. By diversifying into such threads more diversified users may be found with respect to experience. In the second dataset, theoretical sampling also attempted to add new sites and more threads from each forum to increase the probability of collecting threads that end up unsuccessfully by looking at the final messages in threads. The two additional forums added to the dataset in round 2 were “Technical Assistance” and “PC Help”.

The second dataset was taken from 8 TS forums. There were a total of 61 threads and 1213 messages within these threads. The number of messages per thread

ranged from 1 to a maximum of 87. However, the vast majority of threads contain less than 50 messages, and this length profile was largely mirrored by the first dataset. There were two exceptional threads that had more than 50 messages that are included in this dataset.

In the second dataset, even though only a very small number of long threads were studied, the analysis revealed that longer threads enable the observation of more diversified, richer communication patterns, showing how difficult situations can occur and how TS Users and advisers try to resolve the situation or how they escalate. It specifically indicated communication issues such as: misunderstandings between TS User and TS Adviser; misinformation by the TS Advisers and confusion by the TS Users. Such occurrences often lead to invitations for the moderator's involvement. This led to the third dataset collection which focused on collecting very long threads (in terms of messages) to elaborate on how these issues arise, how they are addressed and how a moderator's involvement changes the communication pattern and sometimes the selection of content that satisfies questioners' interests.

The third dataset consisted of threads with a very large number of messages in the same set of forums. Overall, in the third iteration there were 15 new threads gathered with an average of 87 messages in each.

Due to the nature of the data source, all selected TS forum threads were saved separately in html format during each iteration of dataset collection and then the format was converted to Word© to edit it for analysis in Atlas.ti: The html file format contains attributes and data that are not important for this research. For example, presentation attributes, empty lines, symbols, pictures and upload-download instruction lines were removed. Some transcriptions included in this research may contain spelling and grammatical errors but those errors have been made by the posters of the text. This study disregards such errors and includes these threads where the meaning is clear, verbatim, to give traceability.

3.4.3.2 TS Forums

Forums are divided into different specific topic areas which are called 'domains'. Each forum discussion is organised into 'threads' (Pitta and Fowler, 2005) where a thread is a full conversation resultant from one post/question raised. It contains the question, the responses given to clarify the problem, the questioners' responses to these requests and the problem solution. Participants may add information on the thread and each entry by each participant can be referred to as a message. A message is a single text entry written by the participants in a thread.

In the forum, TS Users and TS Advisers can insert pictures and symbols, along with inputting text. However, this study focused on text-based communication, in which forum participants interact by means of the written word. Other inputs such as symbols and pictures are not considered within the scope of this research as each input media needs broad research for interpretation in itself. In this research, text is chosen because it was believed that this was the richest source of data with respect to the specific objectives of this study: identifying personalisation characteristics and relevant communication attributes found in TS forums.

The whole dataset was taken from eight technical support forums. As shown in Figure 3-4 the forums support many diversified IT domains. In total 116 threads (the blue bars in Figure 3-4) were collected within the three iterations; 3064 messages (the red bars in Figure 3-4) were found within these 116 threads.

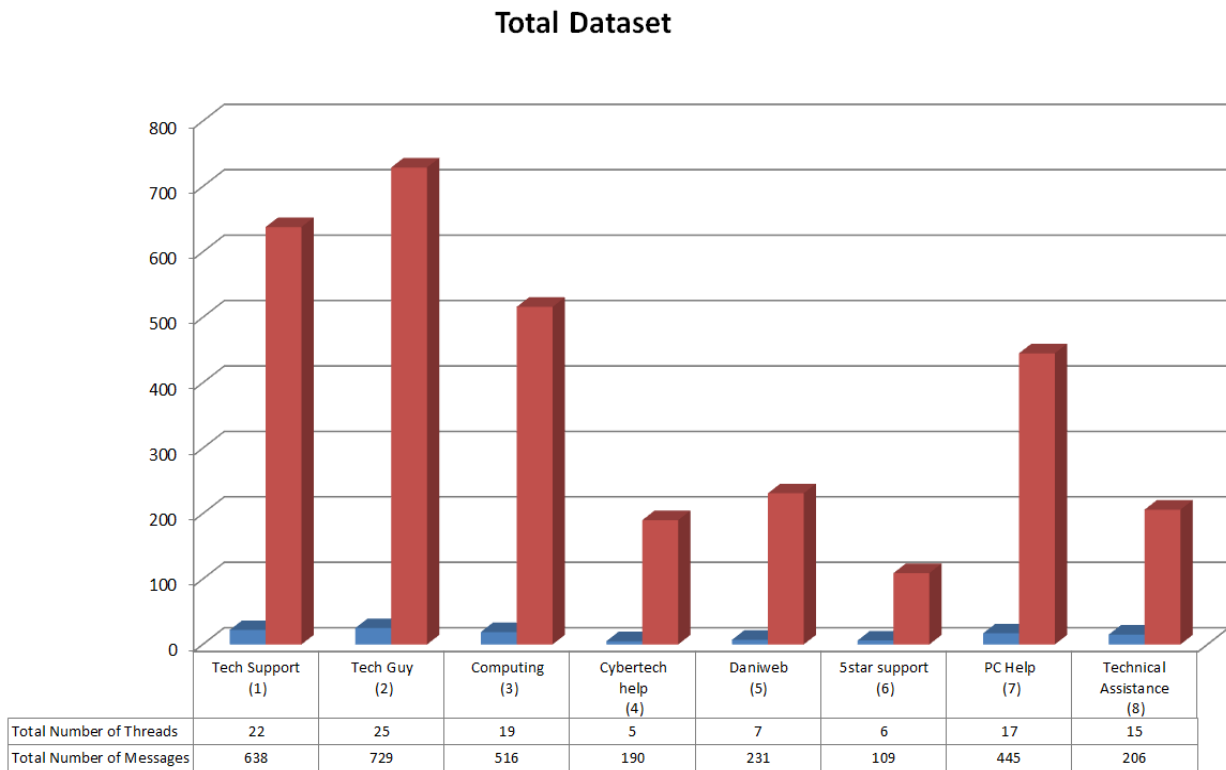


Figure 3-4: The Eight TS Forums Used in the Study

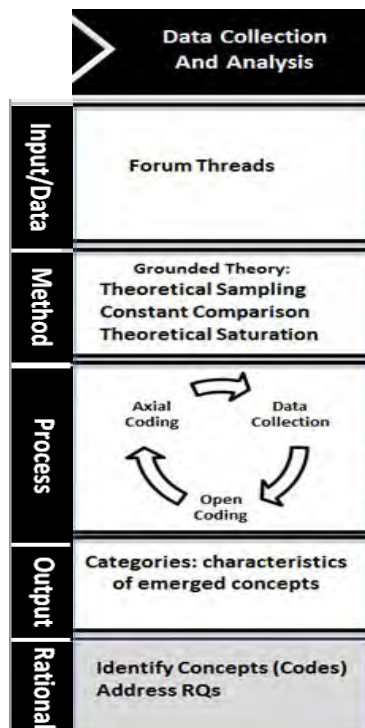
Table 3-3 also shows the detailed description of each examined technical support forums. Over half of the examined TS forums are established as free community forums where the TS Advisers are volunteers. However privately owned forums moderators are paid staff members. Each TS forum provides support many topics where each topic is subdivided into different areas within IT. For instance, in the computer operating system topic, different operating systems areas such as “windows OS versions” (that ranges from Windows XP to Windows 10) and/or different Linux OS flavours such as Mandriva, Ubuntu, Rehat, Fedora are discussed. Some of the forums do touch on additional topics which are not related to Information Systems as shown in the Table 3-3 such as travel & lifestyle, Hobbies & Interests, Games Phones & mobile devices.

Table 3-3: Description of Forums Examined

Forum	Found in	Users	Advisers	How do they work	Topics
5 Star Support	California, USA	Registered and Guests	Volunteers	Free Community Forum	Computer operating systems, Computer software, Computer Hardware Computer Security, Internet Browsing and General (travel & lifestyle, Hobbies & Interests)
Computing	California. USA		Paid Staff moderators	Limited Liability Company (LLC)	Hardware & Devices, Software, Operating Systems, Drivers
Tech support forums	Toronto Canada		Paid Staff moderators	Privately owned forum	Computer Security Forum, Microsoft Support Forum, Mac Support Forum, Linux Support Forum, Hardware Support Forum, Networking Forum, IT Professionals Forum, Gaming Forum, Graphic Design Forum, Automotive Support, Home Support
Tech Guy	California USA		Volunteers	Free Community Forum	Security & Malware Removal, Internet & Networking, Software & Hardware, Operating Systems, Phones & Mobile Devices
Cyber Help	Dallas, USA		Volunteers	Free Community Forum	Operating systems. Software, Hardware Computer Security and virus, General, Games
Dani Web	USA		Volunteers	Free Community Forum	Microsoft Windows, Hardware, Software Development, Web development, Databases, Programming
Technical Assistance	United Kingdom		Paid Staff moderators	Privately owned forum	Personal Computer , Software , Website related forum, security
PC Help	Dallas, USA		Paid Staff moderators	Privately owned forum	Security, Publishing, Configuration & Scripting, Setup, troubleshooting, Media, Database Manager, Module Development, Web Farms

3.4.4 Data Analysis

Figure 3-5: Data Analysis



Analysis is based on asking questions and making constant comparisons, which are the two essential operations for theory development (Strauss and Corbin, 1998). Data analysis in GT method is generally a non-linear process and often can be recursive as shown in Figure 3-5. For example, as analysis proceeds new things may be noticed and, as a result, there is a need to go back to old data and analyse them again. Indeed, it may even prompt new data collection.

In the Grounded Theory method (GT), according to Strauss and Corbin (1998), interpreting data involves three stages of coding procedures. These

coding procedures are:

- open coding to discover categories,
- axial coding to further develop and relate the categories
- and selective coding to integrate and refine the theory (Glaser and Strauss, 1967, Strauss and Corbin, 1998).

In open coding, similar concepts identified by immersive study of the data are grouped together to form categories and in axial coding categories form core a category as shown in the Figure 3-6 which is adopted from Baskerville (1999).

Selective coding systematically relates the categories according to a predefined scheme that captures the phenomenon in terms of context, causal conditions, intervening conditions, action/interaction and consequences as shown in Figure 3-7 (Strauss and Corbin, 1990). The predefined coding scheme has been used by other researchers in IT (Urquhart and Fernández, 2013) and explained in the

basics of Grounded Research (Strauss and Corbin, 1998). The configuration of the diagram shown in Figure 3-7 may vary in different researches theory outputs, but the components of the coding schema remain the same.

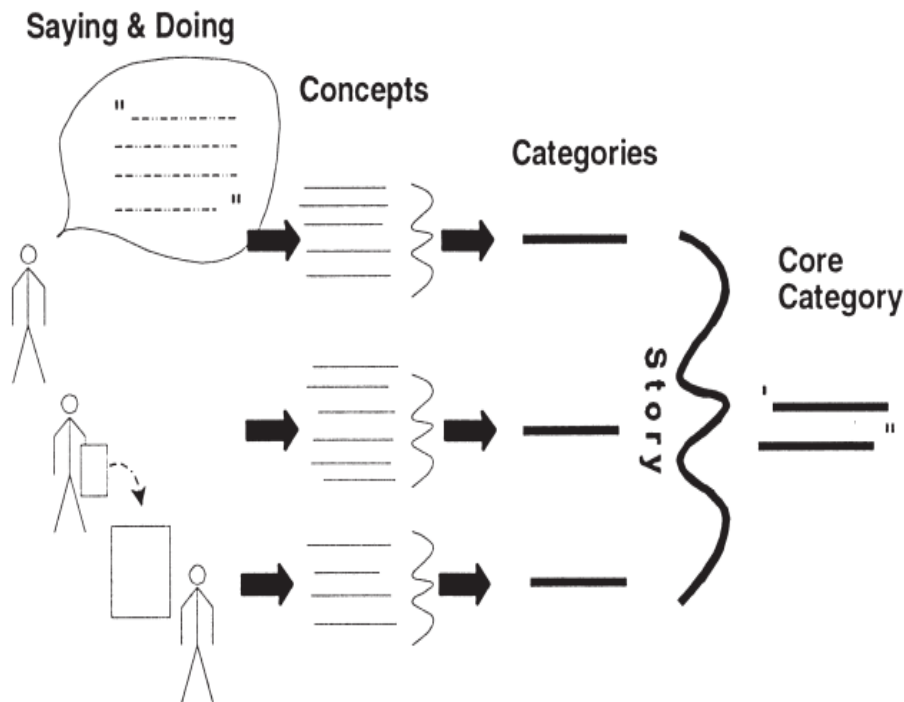
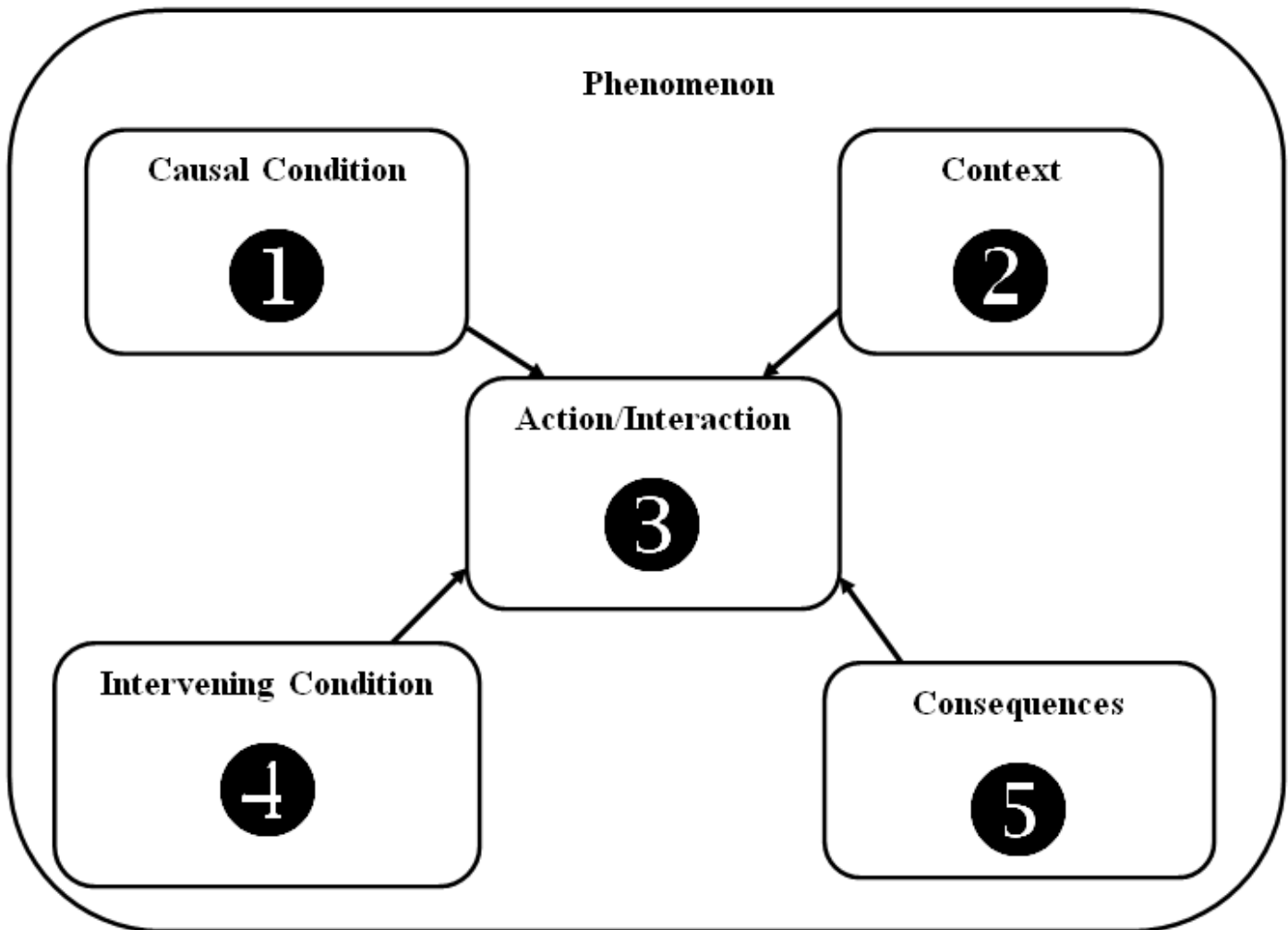


Figure 3-6: Overview of Open Coding and Axial Coding Process (Baskerville 1999)

The three coding techniques are not necessarily sequential analytic steps (Strauss and Corbin, 1998). For example, open and axial coding overlap and are often iterative as the categories are developed and refined, and axial and selective coding overlap as the categories are related and integrated into an explanatory theory. These coding techniques facilitated analysis as the researcher progressed to a higher and more abstract theory moving from theoretical description to conceptual ordering and then to an explanatory scheme (Strauss and Corbin, 1998) of communication/personalisation handling.

Figure 3-7: Strauss and Corbin Coding Scheme



With regard to the specific analysis of threads performed as part of this research, each thread was read several times to gain an overall understanding of the content. A summary description was developed outlining the context of each concept. The chronological order of events and sequences of actions were also captured which was important when coding the communication handling patterns. A detailed description of how the three coding techniques (i.e., open, axial, selective) were used in this research to facilitate analysis as outlined by Strauss and Corbin (1998) is presented in the next section.

3.4.4.1 Data Analysis Process

In this research, open coding began with the first thread and a message-by-message analysis. The purpose of open coding was to identify codes in the data and to begin to discover categories and their properties and dimensions, as described in the above section. Table 3-3 presents an example of open coding that begins with an interpretation of each message that summarises the underlying concept (shown by the square bracketed text). For instance, line 072 is coded as “**Problem of user not stating the question properly**”. Consequently, a memo about the concept is created as shown in line 073. Atlas.ti V 6.2 (<http://atlasti.com>) was used to manage and analyse the textual data. The tool also helped to connect categories as well as index the data.

Table 3-4 Open Coding Examples

Line	Text and [open code]
072	“Had you explained what your reason was we could have advised you sooner”. [Problem of user not stating the question properly]
073	Memo: <i>The respondent reminded the questioner it would have been better to state the question and reason in the first place</i>
078	“I think this poster is not reading the answers” [Novice] Memo: <i>Prior discussion shows the questioner has low level experience</i>
080	“It's hard to soar like an Eagle when you are flying with Turkeys” [Insulting]

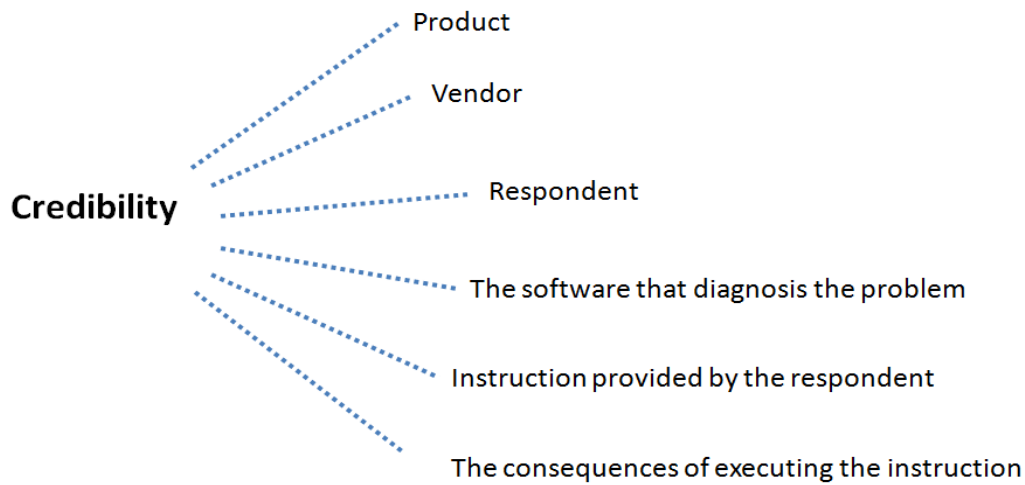


Figure 3-8 Properties of Credibility

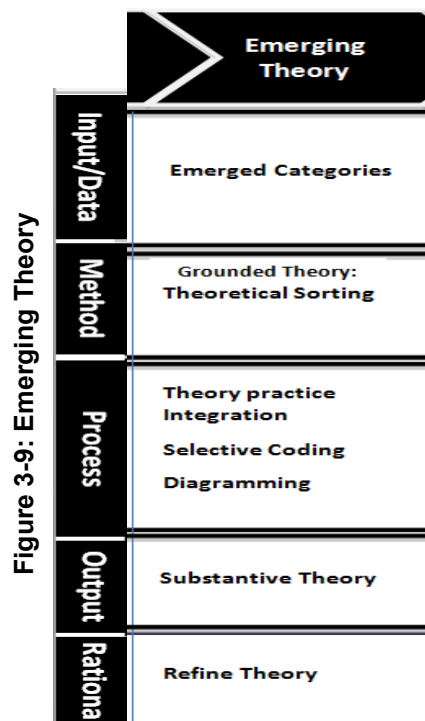
After identifying categories through the open coding process, the next step is an intermediary coding process known as axial coding. In axial coding, concepts are sorted, synthesised and reassembled. Each property of a given concept is grouped into a new set of categories that represent the ideas. Strauss and Corbin (1998) define a property as a general or specific characteristic of a category and a dimension as a location of a property along a continuum or range. For example, 'credibility', is one of the categories identified as something that is important to a user in this study. It has a dimension ranging from trust to mistrust. A property of 'credibility' is the differentiator cause, where credibility can be 'caused' by the product, the vendor, the respondent, the instruction, the consequences of executing the instruction, or the software that diagnoses the problem (see Figure 3-8).

Selective coding is the final coding process in GT method, and involves the selection of core categories of the data. Selective coding systematically relates the categories identified in axial coding, and integrates and refines them to derive theoretical concepts. This is achieved according to a coding framework that captures the phenomenon in terms of context, causal conditions, intervening

conditions, action/interaction and consequences. The context captures the environment within which decisions and actions take place; the causal and intervening conditions reflect the why, when, how come, and where the phenomenon occurs; these culminate in a portrayal of actions/interactions of the people in response to what is happening in the situations (answers the questions 'by whom' and 'how'); and finally the consequences of the action taken or inaction.

3.4.5 Emerging Theory

In this section the important components of the emerging theory process in GT are



discussed in detail as shown in Figure 3-9.

Memoing is a continuous task of writing ideas or concepts, which can grow to a theory that emerges from the analysis while coding (Glaser, 1978). It is writing thoughts about what has been learnt from the data analysis. Memoing is one of the processes that aid the carrying out of constant comparisons, and effectively helps theories emerge from concepts and categories (Strauss and Corbin, 1998). Iteratively, memos will be modified through data collection and analysis, to reflect the new ideas emerging.

In GT three kinds of memos can be written and maintained: analytical memos, methodological (operational) memos, and theoretical memos (Strauss and Corbin, 1998). Analytical memos contained thoughts and ideas about what was observed in the data, and decisions concerning themes and categories as they developed and continued to emerge and evolve. Methodological memos contained thoughts

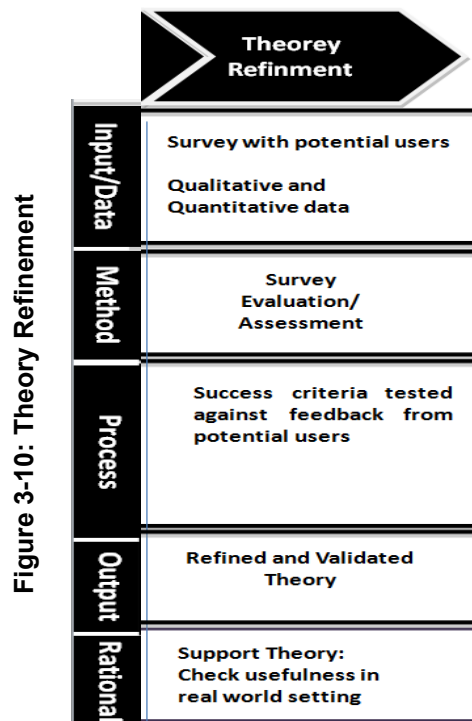
on issues related to theoretical sampling: for example, the points or justifications for the collection of the subsequent dataset. Theoretical memos contained thoughts on the provisional theory of how categories might relate. Hence here we are most concerned with analytical memos. (*For detail descriptions on Memoing see Appendix D – Transcript: p33:f6*)

There are two types of sorting: theoretical categories sorting and memos sorting. These are the final steps of the analytic process. Theoretical categories sorting enables the researcher to write on each topic in detail and also on the integrated whole. It sets up the outline for writing about the research (Strauss and Corbin, 1998). By sorting categories the researcher can discover how the categories come together around a main category (Strauss and Corbin, 1990). Without sorting a theory will lack the internal integration of connections among many categories (Holton et al., 2007).

Theoretical memos sorting is the key to formulating the theory for presentation or writing, and once memos are sorted and fully integrated, they will also become the outline for the writing (Glaser and Strauss, 1967, Strauss and Corbin, 1990). Theoretical memos sorting is the sorting of the theoretical memos in the service of integration (Glaser and Strauss, 1967).

Diagramming is an analytic tool that facilitates moving up from the descriptive details of the data and thinking more abstractly (Strauss and Corbin, 1998). Diagramming enables depth of insight into the data, bringing indicators to their full analytic potential. Diagramming also facilitates thinking about relationships between categories and how categories were related to one another theoretically (Strauss and Corbin, 1998). For instance, placement of arrows in a diagram stimulates thinking about how concepts might be related. Sharing diagrams with my doctoral supervisors throughout analysis facilitated thinking about relationships among categories and subcategories.

3.4.6 Theory Refinement



Validation, in qualitative research, is an approach to assess the meaningfulness of the findings and the accuracy of the result as best described by the researcher and the participants (Creswell, 2009). Qualitative research methods should engage at least in two or more of these validation strategies in their validation process (Creswell, 2009). This research engages in the following validation strategies:

Construct Validity: is defined as the experimental demonstration that assesses how well the measures used reflect the

theoretical concept under study.

Construct validation can be heightened through eight empirical grounding criteria (See Table 3-4). The eight criteria stated by Strauss and Corbin (1998), which serves to validate the empirical grounding of findings, includes whether justified concepts are generated and systematically related, conceptual linkages exist, good development of and conceptual density of categories, variations on the theory are included and the significance of the theoretical findings are checked against the findings.

Additionally, once the derived substantive theory is developed, literature on the developed concepts and categories that agree with or contradict the emergent theory will be reviewed. Such a comparison with the wider literature (as shown in the discussion section 6.1), espoused by (Strauss and Corbin, 1990), answer the empirical findings validation criteria questions.

External validity: sometimes called generalisability, is defined as a degree to which the findings of the study based on the sample can be said to be the representative of the population (Gray, 2004).

Finally, external validation was assessed in the theory validation process, by a survey in order to validate the usefulness of the substantive theory in real world settings and evaluating the credibility and quality of the emerged theory (see section 5.2). A survey is defined as “*a system for collecting information to describe, compare or explain knowledge, attitudes and behaviour*” (Gray, 2004, Robson, 2002). In this study, a survey with potential TS Advisers and users was employed as a method of evaluation to validate the theory qualitatively and quantitatively. The survey aims to evaluate the findings of this study with respect to the needs of TS Users and practices of TS experts. Additionally, the survey highlighted valuable points which could help refine the theory.

Internal validity: is a measure to demonstrate the researcher’s experiment design follows the principle of cause and effect. In GT cause and effect are less relevant because it is associated with theory building and so it is not addressed in this work.

3.5 Summary

The qualitative and quantitative research methods, as applied in my research are presented in this chapter. (The proposal of the research method was presented in the EASE doctoral symposium in London in 2014 (Gizaw S., 2014)). The first section of this chapter presented a qualitative grounded theory approach according to Strauss and Corbin (1998) to developing a theory that specifically informs in-house TS systems and TS Advisers on user characteristics and their interaction with the communication process. Theoretical sensitivity was gained during the initial literature review, which provided conceptual clarity of concepts that might be relevant to guide the research. The main distinguishing features of the GT method include the continuous undertaking of theoretical sensitivity, data collection, coding and analysis, memo-ing, sorting and constant comparison, theoretical sampling,

and theoretical saturation. A quantitative approach where this research employed a survey in a form of a questionnaire to TS Users and TS experts, to evaluate the findings derived from the GT study, is also presented in this chapter.

Table 3-5: GT Method Validation Criteria

	The research process criteria	The empirical grounding Criteria
Criteria 1	How was the original sample selected? On what grounds?	Are concepts generated?
Criteria 2	What major categories emerged?	Are the concepts systematically related?
Criteria 3	What were some of the events, incidents, or actions (Indicators) that pointed to some of major categories?	Are there many conceptual linkages and are the categories well developed? Do they have conceptual density?
Criteria 4	On the basis of what categories did theoretical sampling proceed? That is, how did theoretical formulations guide some of the data collection? After the theoretical sampling was done, how representative of the data did the categories prove to be?	Is there much variation built into the theory?
Criteria 5	What were some of the hypotheses pertaining to conceptual relations (i.e. among categories) and on what grounds were they formulated and validated?	Are the broader conditions that affect the phenomenon under study built into its explanation?

Criteria 6	<p>Were there instances in which hypotheses did not explain what was happening in the data?</p> <p>How were these discrepancies accounted for?</p> <p>Were hypotheses modified?</p>	Has “process” been taken into account?
Criteria 7	<p>How and why was the core category selected?</p> <p>Was this collection sudden or gradual and was it difficult or easy? On what grounds were the final analytic decisions made?</p>	Do the theoretical findings seem significant and to what extent?
Criteria 8		Does the theory stand the Test of Time and become part of the discussions and ideas exchanged among the relevant social and professional groups?

Chapter 4

**Results of Empirical
Study of User
Characterisation from
TS forums**

CHAPTER 4

4 Results of Empirical Study of User Characterisation from TS Forums

This chapter presents the empirically derived findings of the Grounded Theory analysis of TS forums. It answers the four fundamental questions that underpin the study: What are the user characteristics found in TS forums? What are the communication handling processes observed in TS? What can we learn from the successful scenarios in TS with respect to user characteristics and communication handling? What can we learn from the unsuccessful scenarios in TS with respect to user characteristics and communication handling? Section 4.1 of this chapter presents the categories around the three themes: user characteristics, communication handling process and the outcome that emerged from the TS forums analysis. Section 4.2 presents the abstract concepts and the relationships between categories in the form of a substantive theory.

4.1 Categories

As Grounded Theory method (GT) entails, the data collection and the analysis (coding) was performed iteratively. During that process, the data was examined, compared and an attempt to conceptualise the indicators was made, where indicators refer to the actual data that might indicate concepts. The categories representing the resultant concepts are formed based on constant comparison, as discussed in section 3.3.4, through observing and analysing the indicators' similarities, differences and consistency in meaning, which generates an underlying uniformity. This process has been performed throughout the process of coding.

Initial data analysis revealed concepts with different structural and semantic properties, which allowed users' characteristics to emerge bottom up. Table 4-1 shows the occurrence of each concept in each 'characteristic' category. Separate

observations were made for the questioner and respondent as the two key stakeholders in the process. In Table 4-1 the order from right to left shows concepts which emerged from the indicators, 'characteristic' categories around-which similar concepts group together and core categories, which represent the TS-forum context adopted from the GT process overview Figure 3-5. Definitions of each concept are presented in Table 4-2. Table 4-2 also shows the frequency counts of each concept that occurred during the process of coding. It should be noted that there can be many occurrences of a concept in each thread. Typically GT method does not use quantifying data to obtain meaning, but here it was found to be useful to highlight patterns in the data, where frequency is used as a proxy for prevalence; not to give meaning by statistically analysing it.

The categories are grouped into three core categories.

- The User Characteristic core category which has two categories: a) *A level of expertise* sub category that contains concepts that define the participants' level of knowledge and/or experience in the specific field and b) *User Values* which contain concepts that determine users' judgment on information provided.
- The Communication process core category has four categories: a) *activity* category that define actions performed by the participants during communication; b) a *communication issues* category that define problems that occurred during the communication handling process; c) a *technical issues* category that define the technical problems which affect the communication handling process and d) an *emotions* category that define the emotional status of the participants during the communication process.
- The Outcome core category which has three categories: a) *successful* category which reflects a positive outcome or consequence from the communication handling process and b) *unsuccessful* category which reflects a negative consequence/outcome for the communication handling

process. c) *Indeterminate* category which reflects an outcome where there is no clear sign-off outcome ('undeterminable').

Table 4-1: Ranked List of Categories

Core Category	Category	Concept	Number of Occurrence		
			Questioner	Respondent	Total
1.User Characteristics	1.1 Level of expertise	<i>Novice</i>	47	1	48
		<i>Intermediate</i>	11	6	17
		<i>Experienced</i>	16	4	20
		Total	74	11	85
	1.2 User Values	<i>Loyalty</i>	24	53	77
		<i>Affordability</i>	27	49	76
		<i>Credibility</i>	26	9	35
		<i>Security</i>	10	14	24
		Total	87	125	212
2.Communication Process	2.1 Activity	<i>Emphasis</i>	50	88	138
		<i>Procedure</i>	18	37	55
		Total	68	125	193
	2.2 Communication Issues	<i>Misinformation</i>	9	14	23
		<i>Misunderstanding</i>	22	20	42
		<i>Confusion</i>	12	14	26
		Total	43	48	91
	2.3 Technical issues	<i>Multi-Component</i>	22	8	28
		Total	22	8	30
	2.4 Emotions	<i>Frustration</i>	18	0	18
		<i>Anger</i>	12	9	21
		Total	30	9	39
3.Outcomes	3.1 Successful	<i>Satisfaction (Good Communication, Problem-solved)</i>	141	0	141
		Total	141	0	141
	3.2 Unsuccessful	<i>Insult</i>	5	19	24
		<i>Dissatisfaction</i>	19	4	23
		Total	24	23	47

Table 4-2: Definitions of Concepts

Concepts	Definitions
Affordability	The inclination of the participant to pay for the service/product that ranges from free, cheap and costly, and that might influence the decisions to get the service. This concept also includes the participants' requests for cost, price comparison and/or monetary value of a specific product/service.
Anger	An interpretation or perception of emotion, which reflects a strong feeling of displeasure and unhappiness as a result of communication issues.
Credibility	Participant's perception of the source of information that ranges from trustworthy, reliable and competent based on some kind of relationship to mistrust, or a source who prefers to exploit the other's participant's trust.
Confusion	A lack of clarity or distinctness of the information received
Emphasis	The action taken by participants to communicate and provide information where a stress laid on particular words by means of position, repetition, or other indication; it serves to highlight a point of discussion as a note, reminder or warning or to indicate emotional situations such as frustration or satisfaction. For example, emphasis is articulated in terms of making the text bold, upper case or changing the colour of the text.
Experienced / Expertise	A participant who has special skills or knowledge that acquire through training (study) or through experience.

	'Experienced' and 'Expertise' terms are used interchangeably throughout the thesis.
Frustration	Participants' negative emotion following from unfulfilled expectations or dissatisfaction in which the expected goal or reward is not reached.
Insult	Deliberately treating with gross insensitivity, insolence, or contemptuous rudeness, behaving arrogantly. This typically causes an offensive action or remark as the outcome of the communication process.
Intermediate	A participant who is not familiar with a given domain but has skills in using different software applications. An intermediate user is exposed explicitly through the practical steps they have taken in order to diagnose the problem while pointing out their lack of experience on the specific domain.
Loyalty	A participant perception of the quality of service/product or specific brands. The perception towards brand is based on participants' good/bad experience.
Misinformation	A communication process issue where misleading information causes uncertainty about the information provided.
Misunderstanding	The wrong perception of someone's intention or communication.
Multi-component	A technical issue where the solution for the problem includes the combination of two or more domains such as third-party software
Novice	A participant who is new or inexperienced in a certain task or situation or a participant who is not familiar with a given domain.

Procedure	A fixed step-by-step sequence of activities or course of action that must be followed in the same order to correctly perform the task as a sequence of actions intended to achieve a goal during the communication process.
Security	Participants' concern to protect from harm, risk or danger caused by the actions of attackers that ranges from worry to warning.
Satisfaction	Participants' level of approval when comparing perceived performance with his/her expectations results in successful completion of the solution and/or good communication process.

As noted previously several of the threads had an indeterminate outcome but they finished after the right information had been posted. In these cases it could be assumed that users just did not acknowledge it, or had maybe left the forum before the response was posted. Even though this suggests that the communication solved their problem, the analysis only used threads with known outcomes to build the theory, since the explicit outcome of the interaction is important to increase confidence.

The prevalence of the concepts in Table 4-1 suggests that these user characteristics are applicable at persona level, where a persona (in the context of this work) is defined as a way of creating a clusters of users based on their essential commonalities and differences. Blomquist and Arvola (2002), state that a persona is a precise description of whom the user is and what the user wants to accomplish. This work moves towards such personas in the spirit of (Randy et al., 2009) as a way of creating multi-user profiles, thus allowing TS practitioners scale up their handling of individualisation. For example, prevalent concepts in this dataset are *novice*, *intermediate* and *experienced*. These suggest three grouping

of individuals that occur frequently and this can be taken as the basis of content that is generically appropriate to each group. The communication and outcomes characteristics can be viewed as indicators/guidelines towards effective communication and the interplay between the user characteristics and communication process.

4.2 The Substantive Theory

After identifying the categories and core categories in Table 4-1 through coding, concepts are sorted, synthesised and reassembled in a new way using the selective coding (Strauss and Corbin, 1998). Strauss and Corbin's (1998) predefined categories, which synthesis and reassembles concepts into a phenomenon, context, causal conditions, intervening conditions, action/interaction and consequences as described in section 3.3.4, is employed for this purpose. This coding paradigm is the scheme that connects categories of data to a central idea (phenomenon) (Strauss and Corbin, 1998).

Thus, relationships among categories of user characteristics involved in TS forums and communication themes that resonate across personas involved in the process are reassembled in a new way. These emerging propositions form a theory of *Personalisation In Practice* in TS forums as shown in Figure 4-1.

The central or core category is a distinctive category that sits at the heart of the developed theory and summarises what is happening and all other major categories should relate to the core category, which ought to appear frequently in the data (Strauss and Corbin, 1998). In GT method, there are two types of theory: substantive and formal theory. Substantive theories provide a theoretical interpretation or explanation for a particular area, in other words this type of theory is used to explain and manage problems in a specific setting. Formal theories, on the other hand, are more abstract and provide a theoretical dealing of a generic issue which can be applied to a wider range of disciplinary concerns and problems (Strauss and Corbin, 1998). During the coding process, considering the research

question “*Personalisation In Practice*” was identified as the central phenomenon because it linked the categories derived from the coding process.

Prior knowledge is categorised in causal conditions and user values are categorised in intervening conditions. In this work the author is aware that these concepts either can go in either place. But in the data set concepts that primarily appeared at the start of threads were deemed causal and concepts that appeared in the middle of the threads would be deemed as intervening. This convention was adopted so that all concepts did not appear in both groupings.

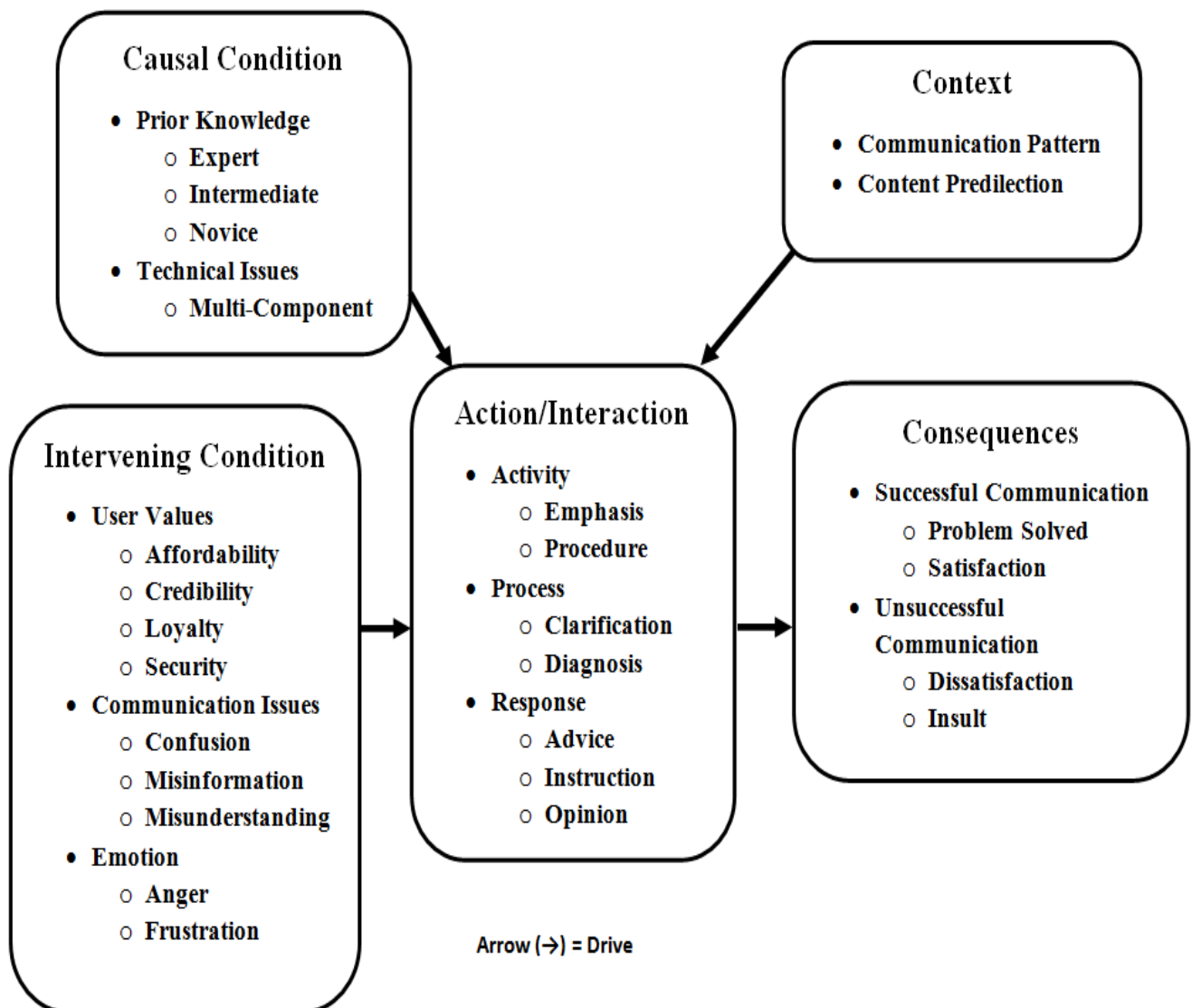


Figure 4-1: *Personalisation In Practice Theory*

4.2.1 Phenomenon

The phenomenon is a distinctive category that sits at the heart of the developed theory and summarises what is happening and how all categories and concepts should relate to the phenomenon, which ought to appear frequently in the data (Strauss and Corbin, 1998). The term “*Personalisation In Practice*” emerged from the data analysis to describe the ‘*successful/unsuccessful*’ practices of personalised communication handling in the context of content predilection and communication pattern. It also informs on how some of the ‘*unsuccessful*’ scenarios turn out to be *successful*.

4.2.2 Context

The two major points identified to describe the phenomena in technical forums is based on two contexts: Content predilection and Communication Pattern. The phenomena “*Personalisation In Practice*” is identified from the data in two basic contexts: content predilection which identifies the inclination of TS Users choice on different content based on different factors occurred and communication pattern which identifies the events that are happening or incidents about which a set of actions or interactions are directed at managing or handling communication.

Content predilection: TS Users seems to choose different contents, materials including text and images that inclined to change the course of communication as shown in open coding as observed by the researcher. The choice of contents by the TS Users is dependent on the characteristics of persona. Thus, content predilection seems to have a major factor under study that determines the course of communication in a forum.

Communication Pattern: The usual pattern of communication in technical support forums is that messages are posted by the TS User and then clarification, diagnose or instructions are posted by the TS Adviser according to the type of question

posted. This communication between TS User and adviser seems to have different patterns that are affected by many factors which could occur in the communication. The communication patterns have different contexts, conditions and consequences for different characteristics of persona in the forums. Thus, the research identified communication patterns as one of the central themes that resonate across persona that incline to determine the *successfulness* or *unsuccessfulness* of the TS forums.

4.2.3 Causal Condition

Causal Conditions are the conditions that influence the central phenomenon. One of the major factors that seem to influence the content predilection is the *level of experience* of the TS User. Thus, the *Prior Knowledge* of the TS User is one of the main causal conditions of the phenomenon that emerged from the *level of expertise (Novice, Intermediate, and Experienced)* of the TS User.

The other major factor that influences the *communication pattern* and *content predilection* is the nature of the *technical issues* of the query. As shown in open coding there are different characteristics of *technical issues* identified as conditions for the course of communication in the forums, to solve the problem. These are the severity of the problem and the multi-component involved to solve the problem. Thus, *technical issues* emerged as one of the major factors in the causal conditions of the phenomenon.

4.2.4 Intervening Conditions

Intervening conditions are conditions that shape, facilitate or constrain the strategies that take place within a specific context. One of the major factors that seems to shape and constrains the solutions provided by the TS Adviser is TS User *values*, as shown in open coding. Within a specific context, TS Users value the price of the product according to the affordability of that specific item. Thus, *affordability* is one of the major factors of the intervening conditions. TS Users also value brands for the expected quality of service by being loyal to the perceived

emotional and functional value of firms. TS Users tended to like specific brands and use this as an important value that guides the communication between TS Users and advisers. Thus, *loyalty* is one of the major factors of the intervening conditions.

TS Users value the *credibility* of the vendor and the TS Adviser. Thus, *credibility* is also one of the major factors of the Intervening conditions. The last major *user value* factor that shapes the communication pattern revealed in open coding is *security*. *Security* concerns are one of the intervening conditions where users value preventing themselves from risk or danger. According to the data, TS Users seem to have different type of *security* needs.

The other intervening condition of the communication process is *communication issues*. When the communication process went wrong, TS User and TS Adviser involved in the process had *communication issues* as described in open coding by *misinformation*, *misunderstanding* and *confusion*.

Emotion is one of the major intervening conditions in the process of communication issues that may end *successfully* or *unsuccessfully*. During a specific communication process TS User may be either *angry* or *frustrated* depending on different situations. When *anger* is involved in the communication process, TS Users and TS Advisers start to *insult* each other. The occurrence of such *emotions* has a major intervening effect of the course of the communication.

4.2.5 Action/Interaction

Action/Interaction is a strategy devised to manage, handle, carry out, and respond to a phenomenon under a set of perceived conditions (Strauss and Corbin, 1998). The study revealed the discourse of *action/interaction* as getting information from the forum through different stages of the process. In the process of these *action/interaction* TS Users with different personas posts a query and then TS Adviser responds. TS Advisers carry out the response in terms of *advice*, *opinions* or *instruction* to solve the problem. These responses may occur in *clarification*,

diagnosis or instruction stages. These emerged *action/interaction* patterns are determined by the *causal* and *Intervening conditions*.

The other major factor that manages communication within a specific context is *activity*. When TS Users and TS Advisers interact with each other certain types of communication patterns emerge from the data. In this regard, the patterns that emerged are *emphasis* and *procedure*. TS Advisers' *emphasis* contents in a specific context to manage the communication. TS Advisers provide step-by-step, detailed procedures, which help novice TS Users to execute instructions easily. TS Users and TS Advisers communicate by emphasising the response to express their emotions. Thus, *emphasis* and *procedure* are *action/Interaction* that manage and handle the communication.

4.2.6 Consequences

Consequences are the outcomes or results of action/interaction of the phenomenon. In this case, *successful* and *unsuccessful* outcomes of the communication patterns are revealed from the analysis of the dataset. *Successful* reflects a positive outcome or consequence from the communication handling process. The *successful* outcomes defined by the *satisfaction* of the TS Users through *good communication* handling process and the *problem-solved*. *Unsuccessful* reflects a negative consequence/outcome for the communication handling process. The *unsuccessful* outcomes defined by the *dissatisfaction* of TS Users during communication handling process.

4.3 Summary

In conclusion, based on the empirical study of 8 open source forums, this chapter presented the substantive theory that addressed the primary research question: How can we improve technical support systems to satisfy user requirements in a more targeted and personalised manner?

The first section presented the results, focussed on the identified individual characteristics that emerged in TS forums. Identifying individual characteristics with in-vivo practice helps to empirically derive and confirm essential individual user characteristics. The empirical study indicates that users can be characterized not only according to a level of expertise, but also according to how they value system security, credibility of the service, and whether the system represents value for money to them personally. These emerging user characteristics can be considered during company-based TS system development to enhance the service in a more targeted, personalised manner. The preliminary result from this study were presented in HLTP conference in Egypt 2011 (Gizaw S., Buckley J., 2011).

This resulting empirically derived theory highlights that users of TS systems can be identified according to groups of characteristics. The emergent substantive theory was also presented in the Hufo conference in Italy (Gizaw S., Buckley J., Beecham S., 2015). The theory supports the idea that a successful communication handling process, based on these emerging user characteristics, provides a degree of manageable individuality with economies of scale. Groups of people can be aggregated into persona clusters to customise systems or content for their intended users. That is, content can be made accessible to all groups of users based on assumptions about common characteristics, irrespective of their locale, where the focus of these groupings are now based on shared individual characteristics (personas).

Chapter 5

**Resultant guidelines
for assessment of
Technical Support**

CHAPTER 5

5 Resultant Guidelines for Assessment of Technical Support

This chapter presents the derived TS practice guidelines from the GT empirical study. Section 5.1 presents the workflow processes identified in TS forums. Section 5.2 presents the successful and unsuccessful practices of TS forums that illustrate the *Personalisation In Practice* theory. In section 5.3, a survey is used to evaluate whether the empirically grounded practices reported on in the previous chapter reflect the needs of TS Users and the practices of the TS Advisers.

5.1 TS Forum Communication Flow

This section describes the workflow process identified in TS forums. Some of the interactions ended with successful and some with unsuccessful outcomes. I present the TS forum communication flow based on observations drawn from the threads in the empirical study with successful or unsuccessful endings. Indeterminate endings will be treated separately. Many of the successful/unsuccessful scenarios of TS address clarification, diagnosis and instruction TS processes that I will now explore. These types of processes form the start of the workflow.

Participants in the forums play expected roles in the Personalised communication handling process. These roles are *Users*, *TS Advisers* and *Moderators*. For example, users ask questions; ask for advice, opinion or guidance, whereas TS Advisers *provide* a response, advice, opinion, and guide. Moderators *moderate* the TS Adviser, the user's question, and/or the user. However, in some cases these expected roles are not strictly followed, where participants may stray outside their roles during the communication process.

The communication flow in TS forums begins with a user *posting a question* by starting a new thread. The types of questions asked by the users vary, such as:

asking how to resolve his/her problem in the specific field or asking advice or opinions for different brands or asking for price comparisons. TS Advisers can also start a thread *posting guidelines* for a specific procedure or on how to accomplish a task based on their experience, with the intention of sharing learning with participants. Such posts can be followed either by another user requesting elaboration or by any other TS Advisers further extending the guidelines, from their experience. The analysis of this research focuses on the first scenario, which is that it is triggered by a question asked by the user that requires advice to resolve a problem or an opinion.

There can be more than one TS Adviser for each posted question, but usually one TS Adviser follows up a specific thread until the end, depending on the type of question. In some cases when more than one TS Adviser is involved, other TS Advisers drop out so as not to *confuse* the user with different solutions and so only one TS adviser stays to help the user. Sometimes the other TS Advisers may come back again after some time and get involved when they think the user is *misinformed*, *misdirected* or the communication process has gone wrong.

TS Advisers often ask for clarification when the question posted is perceived to be not clear enough to diagnose or provide a solution. *Clarification steps* may continue many times until both participants come to the point of understanding each other and the adviser finds himself/herself in a position where they can finally sort out the problem. However, this might not always be the case. The TS Advisers may bypass this step if the question is clear enough to him/her and may proceed directly to the *diagnosis steps* of the communication. Nevertheless, the analysis revealed that in most cases, such responses can be premature and without any further request for clarification could lead to *misinformation*, *misunderstanding* and *confusion*.

TS Advisers may also go to a diagnosis phase when *technical issues* that need additional analysis occur, before providing a solution. One of the *technical issues*, for example, is the existence of *third-party* products. *Third-party* products

involvement in the process, such as different software, drivers or hardware often makes the TS Advisers pass through additional diagnosis steps. Diagnosis steps may continue many times until analysing the symptoms of the problem results in a *successful* conclusion. However, the diagnosis process might not always be *successful* and can lead to *frustration*. In that case, both users and TS Advisers often stop responding to each other, thus making the ending *unsuccessful*.

The next step is the *provision of instructions* to solve the problem. However, the instruction provided by the TS Advisers may or may not be understood by the user and therefore they may or may not be able to solve the problem. If it is successful, the user will be satisfied and that would typically be the end of the process. Alternatively, the user may ask for clarification or for more specific detailed instructions. Sometimes, when the instructions are not smooth, it ends up with the TS Advisers insulting the user, for not being able to carry them out and both making angry comments to each other, ending up without solving the problem. The process (and it ending in the middle of the workflow at any given time) is shown below in Figure 5-1.

In general, the total dataset analysis of the workflow suggests that, among the 62% (72 threads) of threads that were successful, 23% (17 threads) and 57% (41 threads) pass through phases of clarification and diagnosis respectively. Of the 15% (17 threads) where communication was unsuccessful, the points at which it was unsuccessful were: during initial clarification 29.4% (5 threads), during diagnosis 23.5% (4 threads) and during instruction 47.1% (8 threads). These figures include instances when threads may have just been abandoned, and so should be considered slightly approximate. These success rates might be affected by the characteristics and values of the user and the approach used by the users and TS Advisers to put the question and provide the response respectively. In this context, 'characteristics' of the participants refer to attributes that distinguish their personal identity. 'Values' refer to attributes that determine participants' preference or choice of service.

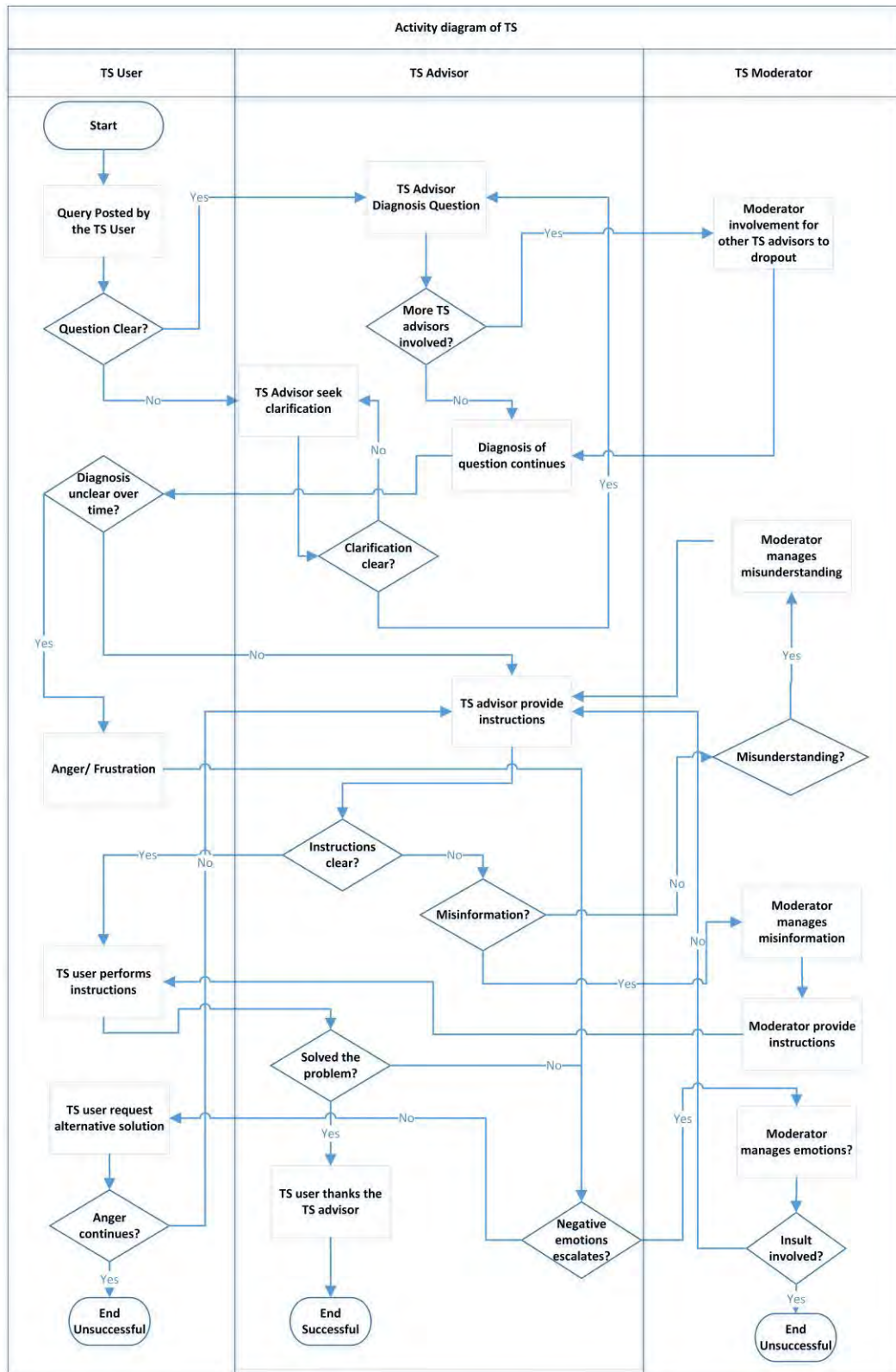


Figure 5-1: Workflow of TS Forum

5.2 Successful and Unsuccessful Practices of TS Forums

There were different outcomes for the TS forum threads, with some ending up as ‘*successful*’ (72 threads), others as ‘*unsuccessful*’ (17 threads) as shown in Table 5-1. A successful outcome is a practice where the user’s question is explicitly answered to their satisfaction e.g. *“Yep, seems to have fixed it. Thanks”* and where thus, an implicitly good communication handling process has occurred, e.g. *“Thanks for your help and response”*. An unsuccessful outcome is a practice where the user’s question is not answered to their satisfaction e.g. *“It’s starting to get on my nerves”*, *“I think I need to take it to a tech because this is way over my head”*. The remaining ones were those that were labeled as ‘undeterminable’ (27 threads).

Table 5-1: Observed Success Rate

Successful		Unsuccessful		Total	
Observed	%	Observed	%	Observed	%
72	80.9	17	19.1	89	100

Based on the successful and unsuccessful outcomes I now present ten practices (P1-P10), as recommendations for TS handling. These ten practices, extracted from the empirical data, seem to help improve the quality of TS: These practices, while based on a relatively small dataset, can provide insights into how user profiling and communication handling in TS forums can impact on success. All recommendations are aimed at the TS Adviser.

Quotes from either a user or a TS Adviser are given in italics and “double quotes” to act as exemplars of how these guidelines emerged. A few transcripts are presented as indicator examples to show a full or a portion of conversation between TS Users and TS Advisers where users’ conversation is indicated by Q(*Questioner*) and TS Advisers’ conversation is indicated by R(*Respondent*). Each example quote has a reference indicator associated with it. This indicator allows the reader to locate the associated file (f) in the Atlas.ti application. The transcript line number (s) is also presented to facilitate the reader’s evaluation of

dependability, traceability, and conformability. The Atlas.ti database is available on a CD in the back cover.

P1: Establish and handle user's level of expertise

P1.1: Establish user level of expertise

One of the defining categories extracted from the empirical data is users' *level of expertise*. TS Advisers can establish user *level of expertise* by noticing their explicitly-stated user *level of expertise* or analysing the implicit performance of the users' diagnosis process. In this research, users' *level of expertise* is described comprehensibly and in three manageable ranges:

- a) *Experienced*: A user who is skilful or knowledgeable. *Experienced* can be exposed implicitly, for example, through the painstaking steps the user has taken in order to diagnose the problem. For instance, the indicator "*Here is what I did so far to troubleshoot problem*" (p67: f122), in this case a precursor to describing the correct troubleshooting procedure taken by the user (full description of the indicator is shown below in the Transcript p67:f122). Alternatively the user can explicitly mention or categorise themselves as experienced, knowledgeable or an expert (e.g. "*I work as support proffetional*" (p23:f30:s220)).

Transcript (p67: f122)

- 5 *Q: Here is what I did so far to troubleshoot problem:*
- 7 *Q: 1. Reboot the server - upon startup the server says that a driver or service may not have stared correctly.*
- 10 *Q: 4. The server is able to access the internet no problem*
- 15 *Q: It seems as if DNS and DHCP are screwin up on the server.*
- 16 *R: Did you review the server event viewer logs? They would provide clues to the problem source.*

- 19 R: Have you tried removing the roles (DNS & DHCP) and re-adding them?
- 33 Q: I'm seeing some errors people experience doing this
- 37 R: Start with the DHCP. You can remove that role without any issues. Then flush the DNS and the workstations.

b) *Intermediate*: A user who is not familiar with a given domain, but has skills in using different software applications. An *intermediate* user is exposed through the practical steps they take in order to diagnose the problem while pointing out their lack of experience on specific domain. For example, the indicator “OH! and the last time I upgraded, I ran into some limitations due to my RAM, but it turned out to be ghosts in the machine so to speak. I'm sorry, but can you explain to me what cmos is? I've never heard that before” (p14:f21:s054) describes the user explicitly explaining what he/she knows and what they do not: the mix that defines an intermediate user in the context of their problem.

c) *Novice*: A user who is new or inexperienced in a certain task or situation. Typically a *novice* user explicitly mentions or categorises themselves as a *novice* (e.g. “IT HAS BEEN YEARS SINCE I HAVE TAKEN A COMPUTER CLASS AND I AM LEARNING” (p21: f29: s024) and “I am pretty new to this sort of thing, so please bear with me if I get confused along the way” (p44: f34: s008) shows the user explicitly low *level of expertise*.

Knowledge of the user's *level of expertise* seems to be an important aspect of the TS forum service. For example, out of the total of 89 ‘successful’ and ‘unsuccessful’ threads, users either explicitly or implicitly describe their *level of expertise* in 74 threads. Among these threads the ‘successful’ rate is 81% and ‘unsuccessful’ rate is 19%. In episodes where the TS Advisers did not capture the user *level of expertise* the thread frequently ended in *confusion*, *misinformation* and *misunderstanding*: This happened 53% of the time. However, obtaining the *level of expertise* is only one part of the *personalisation* pattern. Once established

the TS Advisers need to moderate the response accordingly, as in the next practice P1.2.

P1.2: Handling novice user queries

The above empirical data suggests that being able to gauge the level of the user's expertise influences the personalised communication handling process to prompt a successful outcome. This was borne out in the data. For example, where the user declared themselves as *novices*, the TS Advisers tended to provide *procedural instructions (a fixed step-by-step sequence of activities)* so as to guide the users throughout the process as shown in transcript (p7:f15).

Transcript (p7:f15)

11 *Q: Unfortunately I don't really know how to do what you suggest*

20 *R: 1. Double Click tool.exe to install the application <Name>*

2. Make sure a checkmark is placed next to Update, then click Finish.

3. If an update is found, it will download and install the latest version.

4. Once the program has loaded, select "scan" please be patient.

5. When the scan is complete, click OK, then Show Results to view the results.

6. Make sure that everything found is checked, and click Remove Selected.

29 *7..*

The procedural instructions seem to help the *novice* in this dataset. For example, of the 47 threads where the user declared themselves as *novices*, the TS Advisers tended to provide *procedural instructions (a fixed step-by-step sequence of activities)* (74.5% of the time - 35 threads). Of these 35 threads that were answered procedurally, 31 had 'successful' outcomes with, on average, 5 messages per thread. This is a high success rate, over a short message span, suggesting that *procedural instructions* suit *novice* users.

In contrast, the 12 *novice* queries that were not answered *procedurally* had a success rate of 33.3% and took, on average, 10 messages to reach a conclusion. This, allied with the comments of some of the *novice* users when not provided with *procedural* instruction, re-enforces the impression that *procedural* instruction may suit *novice* users “*You seem to think that everyone thinks as you*” (p82:f7:128).

P1.3: Handling experienced user queries

On the other hand, when it becomes clear that the user has a high *level of expertise* (categorised as *experienced*), different patterns are observed. The TS Advisers enquire as to the diagnostics performed by the user and provide a greater proportion of *declarative answers (stating only facts)* as shown in the above transcript (p67:f122).

When the user is experienced, TS Advisers provide procedural answers only 50% of the time (in contrast to the 74.5% associated with *novice* users). Of the 16 threads where the user declared themselves as experienced, 8 were handled declaratively and they had a 62.5% success rate, and only 31% of the threads were above 10 messages long whereas 8 were handled procedurally and they only had a 50% success rate. Therefore, not establishing and handling the *level of expertise* of the user has a big influence on the flow of the communication handling process and the consequences of the results. However, these ‘results’, due to small numbers of observations and the small difference between the success ratios for the two outcomes, should be considered somewhat provisional.

P2: Establish user perceived value to build user trust and loyalty

Users appreciate and trust TS services based on the experience of the support offered to them over time. The empirical data shows that trust should be built by empathising with user’s preferences and through good communication. However, personal experience is not the only reason a user trusts the service. According to the empirical evidence there are pre-conceptions where users will trust or mistrust

specific vendors based on the company's brand name or reputation. Users build up trust in vendors over several years: *(e.g. "I have been using <Name> for about 4 years now. Would not go back to the urreky third party ones for anything" (p40: f25: s57))* whereas a bad reputation of the product can be also built up over past experiences *"e.g. starting to loose faith in <Name> " (p54:f109:s13)*. Likewise this bad reputation can be directed at the TS Advisers: *"e.g. "<Name> support", they've hung up on me twice" (p59:f114:s164-169); (e.g. "I'm just saying I came here because I knew I could get an unbiased answer. Going to the manufacturer rarely yields an unbiased answer" (p93 f148:s164)).*

The empirical data suggests that establishing users' perceived value of the product/service before suggesting anything creates a good communication process and builds trust. Usually users provide their perceptions of a product/service proactively: *"More my thing, I like the strength of <Name> Software." (p23:f30:s081)* or what they do not: *"I swore I would not ever purchase another <Name> product" (p21:f29:s151).*

TS Advisers should allow users to provide this information before they provide a response. Such practice helps TS Advisers narrow down the potential choices acceptable to the user. Additionally, it seems important to users that TS Advisers do not affiliate themselves with specific vendors and provide balanced suggestions to the user and often advisers emphasise this: *(e.g. "But we don't work for <Name> or advertise/promote their software" (p66:f121:s190)).* Suggestions judged to be unbiased ended up being *successful* in 75% of cases among the 24 threads where expressions of loyalty were made by the user.

In addition, explicit bias by the advisers was noted derogatorily by the users: *"<Abusive Word> guys you are good marketers!"* indicating that blatant promoting of a given product can result in a loss of trust.

P3: Be aware of security concerns

Information security is a central concern for end users since computer systems bring with them the dangers of exploiting their personal information. The empirical data shows that users' *security* and *privacy* requirements are one of the important factors of personalised communication to end users in this context. This was apparent in 24 threads out of 89 successful occurrences. Usually users' show their concern about *security* by wondering how much the problem or the software used to diagnosis the issue is free from risk or danger e.g. *"I was worried incase it could be some kind of virus that keylogs the password"* (p113:f207:s006).

To handle this, TS Advisers make users aware of risks or dangers (e.g. *"That suggests to me that <NAME> might have a dodgy <NAME> setup"*(p113:f207:s164). Indeed they may request the user to make sure that they have already taken the necessary measures to avoid the risks as a caution (e.g. *"Have you changed all your passwords for your online accounts to something more secure Strong Passwords"*(p47:f102:s316)).

But sometimes TS Advisers may not address the *security* concern of the user. For instance, the action to be taken in order to solve a problem may create risks: *"use at your own risk"* (p109:f203:s011).

In summary though, 80% of the ten threads where *security* and *privacy* risks were raised by end users, ended up '*unsuccessful*' whereas 20% ended up '*successful*'. The conclusion drawn from this is that these issues are not well supported in TS forums, even though TS Advisers do try to inform users of the risks and remedial actions.

P4: Understand user's affordability concerns

In TS forums, users often mention the *affordability* of the product in the context of adding additional services like after-sales services and warranty. The empirical data shows

that, contrary to intuition, users seek the entire range of affordability from free to costly:

- a) **Free:** *“are there any free?” (p46: f101: s59); “I want a free one” (p46: f101: s009)*
- b) **Cheap:** *“I’ll find one cheap enough” (p5: f13: s605)*
- c) **Costly:** *“I’m looking for PAID PRODUCT -- not free” (p66: f121: s127)*

In the case where users first ask about *affordability* of the service the success rate is 96% out of 27 occurrences. The empirical data shows that where users clearly defined a set of alternatives for a clearly identified purpose TS Advisers provided a variety of options.

The empirical data shows that TS Advisers sometimes provide different pricing options regardless of whether the user asks about the affordability:

- a) **Free:** *“You can try many commercial cleaners with no cost and there are totally free available too” (p38: f18: s044)*
- b) **Costly:** *“There are good and paid alternatives out there” (p99: f154: s99)*

In the case where a user has got different options regarding the *affordability* of the service 77.8% of the threads ended in ‘successful’. This shows the importance of different options with regards to the *affordability* of the service to the user.

P5: Manage relevant third-party products

Usually TS Advisers support only specific products and might not have detailed knowledge of other software which works together with the product. TS Advisers may not be an expert in *third-party* software and drivers that are involved in the problem. The empirical data shows that TS Advisers sometimes provide support for *third-party* software e.g. *“What happens if you try using <Name> or <Name> rather than the <Name> software? Personal experience suggests that you’re better off using something other than the <Name> software, even with <Name>” (p76: f131: s21);*

“<Name> wouldn't be a factor since neither <Name> or <Name> can use it” (p119:f213:s39) and “You may want to try the <Name> manufactures diagnostic program. Check the manufactures web page for their diagnostic tools” (p106:f200:s453).

However, most of the time TS Advisers do not provide responses that support *third-party* products involved in the problem. Thus the involvement (or perceived involvement) of 3rd party software issues may affect the communication process by stalling it indefinitely or expanding its duration. For instance, Appendix D which is a full transcription of one of the threads (*p58: f113*), shows where the *third-party* software involved has an impact on the process of the support, which makes it difficult to diagnose the problem. As shown in line 850 the user was frustrated since the diagnosis process took a very long time and could not ultimately solve the problem.

Not managing *third-party* software has a big impact for the successful communication handling process and problem solving in TS. Out of 22 occurrences where *third-party* software was involved in the problem, only just over half resulted in a ‘*successful*’ outcome and TS Advisers sometimes asked for help with *third-party* software.

P6: Generate visually appealing material

According to the findings of the GT empirical study, effective personalised TS advice requires spending sufficient time in presenting information and suggestions to users and increasing the clarity of information by generating visually appealing materials. Specifically TS Advisers were found to use the practices of *augmenting by step-by-step instructions* and *signifying the main point of the instruction* to make the material more visually appealing:

P6.1 Augment step-by-step procedural instructions

The empirical study shows that TS Advisers often provide a procedural list augmented by a bullet pointed or numbered *step-by-step* sequence of instruction

that must be followed in the same order to correctly perform the task in order to solve the problem. Particularly *novice* users require *step-by-step* sequence of instruction provided by TS Advisers as shown in the following two indicators: “*can someone just plz give me a list of steps i can do to fix the problem*” (p15:f23:s011); “***Can you tell me a little more detailed please? Maybe step by step how to get it going***” (p34:f7:s041).

The impacts of augmenting by step-by-step instructions are described in *P1.2 handling novice user queries practice*. The success rate for *step-by-step* instructions provided to the user is 72.2% out of 55 procedure occurrences in threads. The conclusion drawn from this is that providing a procedural list augmented by bullet point or numbered step-by-step instructions are important steps for novices.

P6.2 Signify the main point of the instruction

Emphasis is used to signify the main point of discussion. Emphasis, in this context, is defined as a stress laid on particular words, by means of position, repetition, or other indication. The evidence suggests that emphasising important parts of the instructions helps the user to pay attention and follow the instruction accordingly.

Important instructions that the user should follow were *emphasised* by:

- a) Explicit stating it or presenting it in bold/italics: “***Please read and follow all these instructions very carefully***”(p24, f33: s161)
- b) Changing the colour of the part of the message: “<--**Very important** Ensure you have **disabled your Firewall....**” (p44:f34:s047).

TS Advisers also *emphasis* the text to remind a user to be careful as a cautionary reminder by:

- a) Upper case: “I would advise you not to use **ANYTHING**”(p33: f6: s061); “you **DO NOT** have to install everything”(p4:f12:s073)

b) Color: “**Note: It is important that it is**” (p24:f33:s181)

c) Bolding a word or phrase: “deal with any malware **before** doing anything else” (p24:f33:s152)

The empirical data shows that 44.4% of the emphasis was associated with ‘to-do’ instructions, 30% were warning / ‘not-to-do’ instructions. The reminder (25%) were ‘not-to-forget’ instructions. The evidence suggests that emphasising important parts of the instructions helps the user to follow the instructions accordingly. Among 88 occurrences where emphasis was used by TS Advisers in their instruction threads 78.4% ended up ‘successful’. The successful rate where emphasis was not used (among 53 threads) in the instruction provided to the user is only 49%. This suggests that TS Advisers need to use *emphasis* in ‘to-do’ instructions, ‘not-to-do’ warnings and ‘not-to-forget’ reminders.

P7: Clarify individual context

A user is expected to state the problem clearly, by describing: what the problem was, what previous steps and actions were taken to solve the problem, what kind of tools were used and detailed information about what happened in each stage of clarification and diagnosis process if this process had already been started. However, when the user composes a query, the intended purpose and goal might be misleading or the details outlined above may not be presented. In such cases a *clarification* process is needed.

The findings suggest that TS Advisers should prompt the user to provide information regarding the steps they have tried and action taken to try to solve their problem, the tools used to diagnose the problem, and detailed information regarding what happened at each stage of the problem (e.g. “A few questions, just to clarify the situation” (p118: f212:s30)).

Specifically, in this GT empirical study, a detailed *clarification* process preceded a *successful* outcome the majority of times. *Unsuccessful* outcomes were more frequently associated with queries where *clarification* was not sought. Out of all 89 threads, 53 had *clarifications* and 46 of these were ‘*successful*’. 36 threads did not have *clarifications* and only 26 threads were ‘*successful*’. However the involvement of moderators sometimes changed these latter ones of a successful status.

P8: Avoid premature response with respect to the problem context

TS Advisers should be aware of the need to try to obtain the full context before committing to a diagnosis or solution. In fact, in situations where a premature response was given by the TS Advisers, the success rate was only 2 out of 12.

This tallies with the previous guideline suggesting that TS Advisers in *Personalisation In Practice* should avoid premature responses. The empirical data suggests that by-passing *clarification* does not prove very *successful*; the subsequent responses often leading to *misinformation*. This is well illustrated by the *frustrated* comments of users to show that going to diagnosis stage without understanding the context of the question through *clarification* angers them: “*Just trying different fixes willy-nilly in hopes of resolving the problem is a waste of time and energy and more likely to make things worse than better*”(p3:f11:s19).

In some cases when the communication is unsuccessful, moderators may be involved in solving an argument between the user and TS Advisers and helping resolve the actual problem, leading to a successful conclusion.

P9: Monitor the communication flow

According to the findings of the GT empirical study, in the communication handling process many issues and problems may occur, which threatens the successfulness of the interaction. There were three major practices regarding monitoring communication flow revealed by the dataset: avoid misinforming users,

avoid misunderstanding users' requirements, and do not confuse users with multiple choices of solution. Each monitoring practice is described in detail in this section.

9.1 Avoid misinforming users

Misinformation is one of the concepts revealed in GT empirical study which may cause uncertainty about the information provided, create communication difficulties and loss of user confidence and can delay the solution.

In TS forums, users can be *misinformed* in the following ways:

- a) Leaving out important steps from the process: *"I assume you meant to put the /s after the }, since it gave me an error otherwise"* (P43:f41:s077)
- b) Not providing other necessary information: *"I tried to follow your advice on <<Name>>, but it kept saying..."* (p41:f31:s237); *"but i am almost positive it ain't malware or a virus, i pretty damn sure that it isn't"* (P45:f100:S114)
- c) Assuming the user is familiar with the topic and using technical words that novice users cannot understand: *"Whenever i start SF" Just what is SF???"* (P89:f144:s023)

TS Advisers later in the discussion may realise their mistake and correct their mistakes. For example, in this indicator a TS Adviser apologises for leaving out important steps *"right, forgot that part"* (P57:f7:s126). Sometimes users may not realise they are being misinformed or the adviser may not recognise the misinformation. In such cases, moderators may identify the *misinformation* and get involved in the situation (E.g. *"Sorry but this is an excellent example of the type of advice not to give to someone"* (p3:f11:s019)).

Misinforming users often lead to *unsuccessful* terminations of threads which in turn results in disappointing users. Out of 9 occurrences of *misinformation*, 22.3% had an '*unsuccessful*' outcome, whereas 77.7% occurrences ended as '*successful*', but most of these (55.5%) were corrected by the TS Advisers themselves and 22.2% occurrences needed the involvement of moderators. In order to avoid misinforming users TS Advisers need to (a) make sure not to leave important steps out of the process, (b) provide all necessary information and (c) not assume the user is familiar with the subject matter and terminology.

P9.2 Avoid misunderstanding user's requirements

Misunderstanding in this context is when one person in an interaction has the wrong perception of the other person's idea.

In a forum, users misunderstand TS Advisers due to:

- a) The TS Advisers implying one thing and mean another: For example, in this indicator, the instruction was ambiguous as to whether to implement it or not, which leads to misunderstanding "*I think you want me to <Name> and run it but since you didn't say so I didn't do it as I don't want to mess up things.*" (P107:f201:s188)
- b) The TS Advisers have not explained in detail: TS Advisers realise this and explain with more specific instruction (e.g. "*I should have been more specific.... (proceeds to expand)*" (P71:f126:s032)).
- c) The TS Advisers using technical words: For example, users could not understand because of the technical words used (e.g. *I'm sorry, but can you explain to me what cmos is? (p14:F21:S54), I don't know what an ethernet driver is (p9:f17:s166)* and users are forced to assume (e.g. "*I just ASSUMED that*" (p119:f213:s289)).

These misunderstandings can be reversed by the TS Advisers acknowledging the problem, for example, *"I think you misinterpreted my post, but I'll try to help you out with that"* (p46:f101:s093). Sometimes moderators may become involved when the misunderstanding continues *"You are being advised correctly"* (p47:f102:s140); *"The above suggestion is best and user-friendly, provided you follow all instructions word-for-word"* (p50:f105:s65).

Out of 22 occurrences of users *misunderstanding*, 72.7% end up 'successful' but among those, 22.7% needed moderators' involvement. 27.3% of users *misunderstanding* communication issues lead to the 'unsuccessful' ending. Thus it is important to understand user requirements before TS provide any information, and to present that information clearly and concisely.

P9.3 Do not confuse user with multiple solutions

Confusion, in this context, is the uncertainty of accepting the advice or suggestions provided, or the hesitation in performing instructions to solve the problem. In a forum, *confusion* can occur due to the following reasons:

- When more than one TS Advisers is involved during TS service. For example, the involvement of the moderator in this incident highlights the disadvantage of more than 1 adviser being involved *"As it's counterproductive to have more than one person working on the same issue, I've passed on the information to ..."* (p11:f19:s157).
- When users are provided with different opinions for the solutions: e.g. *"Given two options what will be the right one to follow?"* (p106:f200:s252); *"Which method is best? I'm alittle confused"* (p65:f120:s107).

In a forum, out of 12 occurrences of user *confusion*, 58.3% of this *confusion* arose because of multiple responses from one TS Adviser and 41.7% of confusion occurred because of the involvement of multiple TS Advisers. The average messages per thread were 19.45 across all the collected datasets. However,

among the 12 where *frustration* occurred 75% of the threads are longer than the average message threads. Thus, TS Advisers in the communication handling process should avoid responding to or providing alternatives to queries that another adviser is dealing with.

P10: Manage Emotions

TS Advisers should be trained to understand the emotional state of the user by examining the written submissions provided by the user. The data suggests that it is better for a TS Adviser to address the emotions before providing further instructions to solve the problem.

P10.1: Calm down an annoyed user

Anger is one of the emotions triggered by the communication issues. There are different circumstances observed in TS forums that trigger users' *anger*, for example,

- Incorrect instruction offered to the user as shown in the user reply "*Please reread your "instructions" before you say that weren't followed*" (p2: f10: s041)
- Promoting products where, in response, the user wrote: "*it's <Name> Standard Edition 2003. Stupid piece of crap*"(p70:f125:s39), "*<Abusive Word> tricked me*"(p21:f29:s151)

TS Advisers tend to try to calm down the annoyed user by directly asking them to e.g. "*Please tone down your language*" (p45: f100: s50)) or by showing them the consequences of continuing in the same vein e.g. "*If you want help, be nice, or go elsewhere. If you continue with this attitude, then I will ban you*" (p82:f137:s170).

Out of the 12 occurrences of user *anger*, 33.3% occurred because of TS Advisers *misunderstanding* the user's question, 41.6% of *anger* occurred because the *clarification* process took too long and 25% occurred because users were angry with vendors before they posted their query in the forum. The GT empirical study

shows that failing to calm down an annoyed user led to 12 ‘*unsuccessful*’ outcomes. Among these bad outcomes, 42% included evidence of user *anger*.

P10.2: Respond quickly and give a high priority attention to frustrated user

Frustration is defined as unfulfilled expectations or dissatisfaction of users. Users are *frustrated* either by the product performance they were using (e.g. “*Very frustrated and need help!*” (p50:f105:s7), “*Got frustrated and called on some help*” (p30:f52:s4) or when the outcome of the clarification or diagnosis process does not bring any outcome which satisfies their expectation (e.g. “*this has been too much hassle*” (p14:f21:s622), “*I think I need to take it to a tech bc this is way over my head...*” (p22:f3:s064)). Among the 18 occurrences of users’ *frustration* in the communication handling process 38.9% occurred because of the *clarification process* taking longer (e.g. explanations took many interactions over several days, or detailed instructions took time to process) and 61.1% occurred because users were *frustrated* by the product performance before they came to the forum.

When *frustration* occurs in the communication process the user may lose confidence in the TS Advisers, and may leave the thread prematurely and this consequently leads to an ‘*unsuccessful*’ ending. However, by giving the user high priority and empathizing, the user may rebuild confidence in the service. These TS responses seemed to work: “*I understand you're frustrated*” (p45:f100:s50) and “*The task will be time consuming and frustrating but doable.*” (p110:f12:s082) are good examples of practice that seems to lessen frustration.

For instance, among the 28 occurrences of user *frustration* during communication, ultimately 64.3% ended up ‘*successful*’. However, not giving high priority attention to *frustrated* users often resulted in ‘*unsuccessful*’ threads, for example 35.7% of 28 occurrences of user *frustration* ended up ‘*unsuccessful*’. Most of these lacked a speedy response and among the 35.7% occurrences of user *frustration*, 70% of users left the TS service.

P10.3: Remove inappropriate users after warnings

The empirical data shows that some users insult TS Advisers which can be demotivating and upsetting, and may lead to the TS Advisers also becoming offensive. Users use capital letters to express *insult* in a text based communication. For example, indicator “*You seem to think that everyone thinks as you, well, <<Name>> we don't GO AND PLAY WITH YOUR TOY!!!!*” (p82:f7:128) is a good example. Among the 5 occurrences of insulting user behaviour, I found that 40% were annoyed because the TS Advisers did not establish and handle a user’s *level of expertise*, 40% of TS Advisers *misunderstood* the users and 20% occurred because users were *frustrated* by the clarification process.

On the other hand, TS Advisers insulted the users in 68.5% of cases because the user *misunderstood* them (e.g. “*It's hard to soar like an Eagle when you are flying with Turkeys*” (p33:f6:s080)). The empirical data in the forum shows that when TS Advisers *insult* users, *moderators intervene* in the communication. For instance, among the 19 occurrences of TS Advisers *insulting* behaviour, 31.5% times *moderators* intervened. *Moderators* calm down the situation by warning the TS Advisers and users not to insult each other and by warning inappropriate behaviour is not acceptable in the TS forum (e.g. “*I don't like your attitude in this thread. If you want help, be nice, or go elsewhere. If you continue with this attitude, then I will ban you*” (p82: f137: s170); “*Please refrain from being rude to other members when posting. There is absolutely no need for such behaviour and it will not be tolerated*” (p67:f122:s230)).

5.2.1 Conclusion

Characteristics and practices identified in the empirical study are highly interconnected; various characteristics when combined with a range of practices are shown to have successful outcomes in the communication handling process. *Personalisation In Practice* also includes unsuccessful practices that can suggest

ways to turn them around to be successful. As such TS Advisers need to establish user *level of expertise*, user expected perceived value of the service, and user *privacy* and security requirements from the user's query. If the query is not clear enough TS Advisers need to prompt user to provide individual context using the *clarification* process and avoid premature response with respect to the problem context.

After performing the practices to establish users' requirements, TS Advisers can provide a response augmenting step-by-step procedural instruction and/or signify the main point of the instruction depending on the user experience. Additionally, TS Advisers need to build users' *trust* through good communication and reputation and provide different options with regards to *affordability* of the service to the user.

Furthermore, TS Advisers need to develop their skills to manage any *third-party* software that is related or involved to their product. During their communication handling process TS Advisers need to monitor for misinformation, misunderstanding or situations where they confuse the user. They should be particularly aware of confusing users through providing a 2nd alternative or by latching on to another adviser's 'client'. If the communication process goes wrong and user emotions are manifested, TS Advisers need to manage them by calming *annoyed* users down and responding quickly and giving high priority attention to *frustrated* users in order to satisfy user requirements.

There are some cross cutting practices such as a moderator's involvement that are beneficial in many scenarios. Moderators become involved when recommendations have not been followed by the user, or when the TS adviser is unsure of how best to help the user. Moderators are shown to be important in resolving any disagreements, or in adding clarity where needed. The involvement of moderators can turn an unsuccessful interaction between the user and TS Advisers into a successful interaction. It could be implemented in the context of company based TS for example when TS Advisers are doubtful about the communication handling process: they can use a moderator or indeed pass a

query onto an expert in another area of knowledge. This is fairly transparent to the user in a text based scenario, where the interaction is asynchronous, and short delays between interactions are expected.

It is the position of this thesis that this integrated set of practices specifically facilitates personalised communication handling process in TS in a more targeted manner. The practices enable TS Advisers to individualise their TS services and satisfy user requirements.

5.3 Results of the Survey

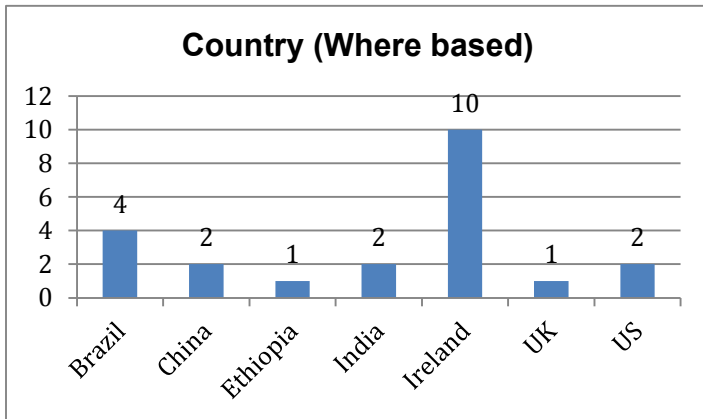
This section describes the results of the survey which validate the work-practices proposed by *Personalisation In Practice*. Having derived these guidelines, it is important that they are evaluated. This was undertaken in the form of a survey and this survey is now reported upon.

5.3.1 Background Characteristics of Participants

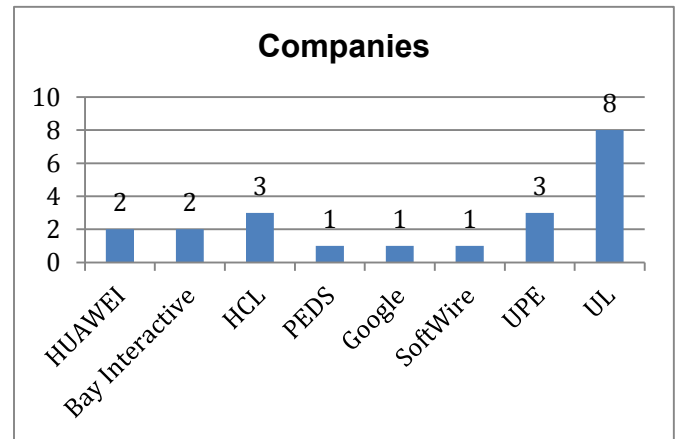
A total of 45 participants participated in the survey. Among them, 22 were TS Advisers and 23 were TS Users. TS Advisers and TS Users were diversified, coming from different countries and companies throughout the world. For example, TS Advisers responded from seven countries, six software companies and two universities. Figure 5-2 (a & b) shows the frequency distribution of countries and companies from where TS Advisers provided a response.

The TS Advisers knowledge skills were assessed by examining proxy measures of their work experience in TS and IT related educational level as shown in Figure 5-2 (c & e). Additionally, a TS Adviser respondent's experience was assessed by examining their role in the software company as shown in Figure 5-2 (d). Similarly, the survey assessed the TS Users' knowledge skills and familiarity with IT and TS by examining how often they use IT TS, familiarity in TS and what kinds of communication channels they have used, as shown in Figure 5-3 (b ,c & d).

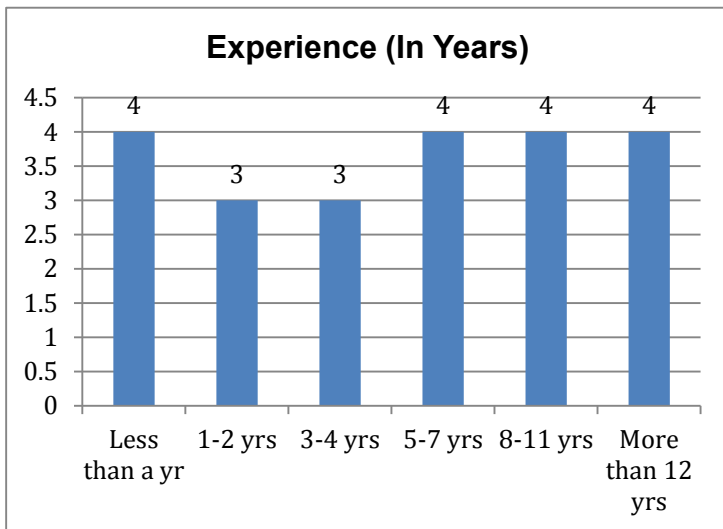
Figure 5-2: TS Adviser Demographics (#22)



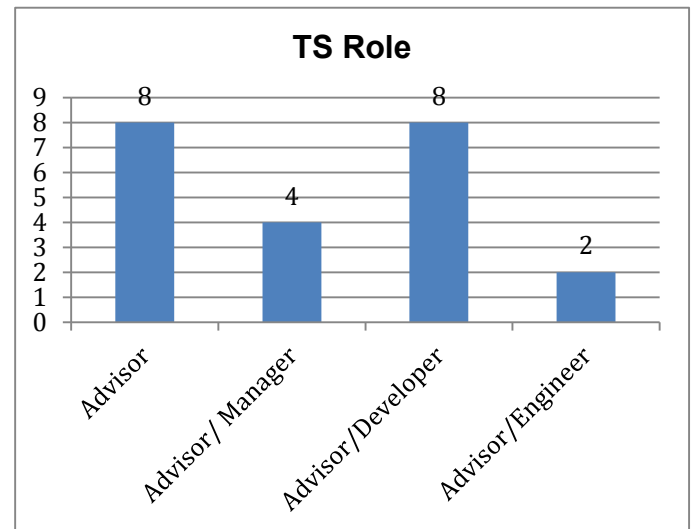
(a)



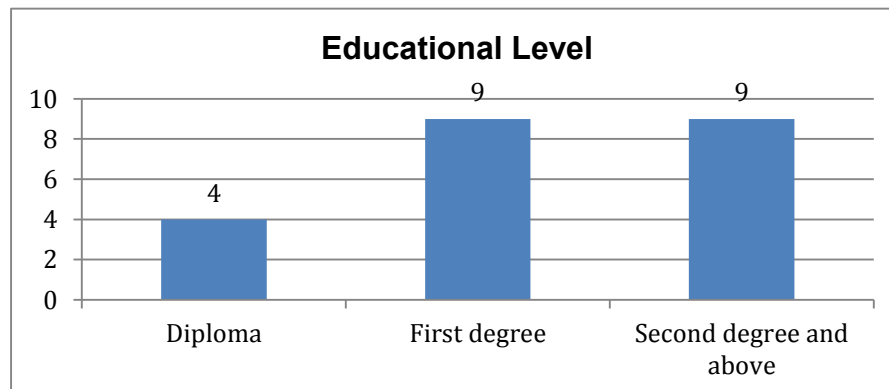
(b)



(c)

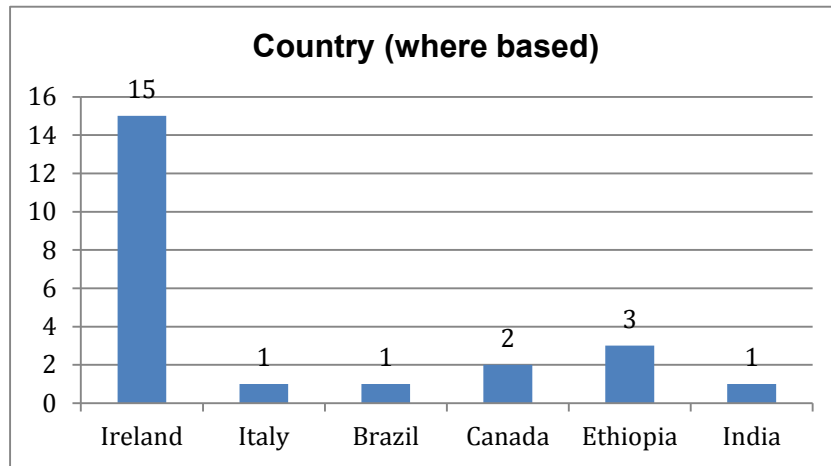


(d)

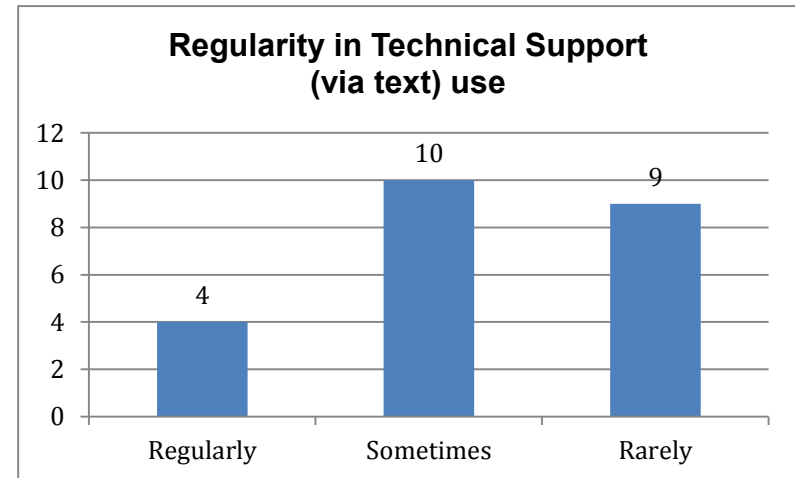


(e)

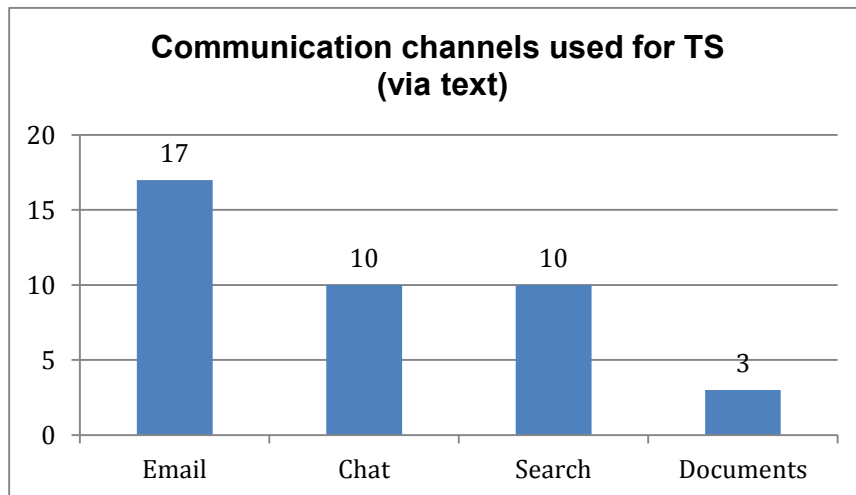
Figure 5-3: TS User Demographics (# 23)



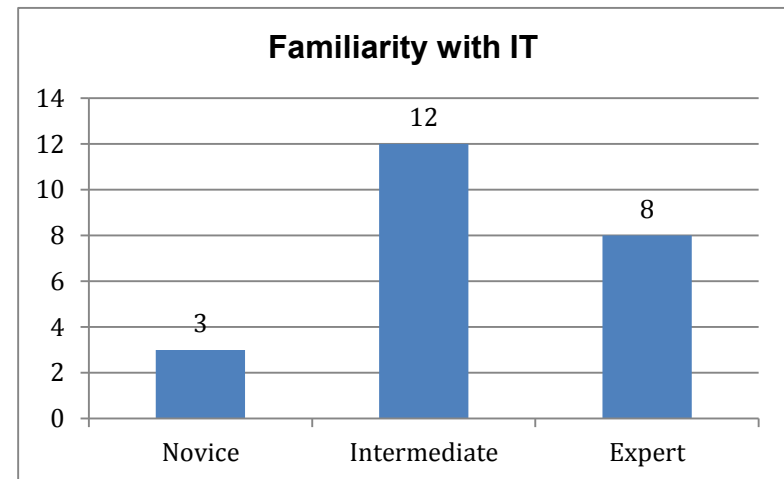
(a)



(b)



(c)



(d)

The country and company variable was not used in the analysis of the study since the objective was instead to get TS Advisers with a variety of TS roles, experience and educational levels and TS Users whose familiarity with IT TS and text based communication channels varied.

5.3.2 *Personalisation In Practice Success Criteria*

The eight success criteria stated in Appendix E are tested against the responses from the survey. The results are discussed in this section.

- **Criteria 1: Establish and handle user level of expertise**

TS Advisers were asked how often they try to establish TS Users' level of expertise (see Table 5-2). This result supports the importance of establishing users' level of expertise. They show that the majority of TS Advisers believe the importance of establishing user level of expertise at least sometimes and that those that do not stated that sometimes they derive it from past history. Even when they do not know the user's level of expertise they are conscious of it as a factor, stating that, in those instances, they presume a novice user. However they do not have proper definitions and guidelines on this in their companies. Interestingly though 7 out of 22 did not believe the importance of establishing user level of expertise suggesting that a 1/3 do not believe in the importance of establishing experience explicitly.

Table 5-2: TS Adviser Practises in identifying User Level of Expertise

When dealing with a user using text based communication how often do you establish their level of experience before offering help?						
	Always	Sometimes	Never	Total		
Frequency	4	11	7	22		
Do you have any practices for dealing with different levels of expertise?						
	Yes	No	Don't Know	No Response	I treat all users the same regardless of their experience level	Total
Frequency	8	4	2	2	6	22

Table 5-3: TS User Practices in Expressing their Level of Expertise

TS Advisers were asked to elaborate on their response as to how often they

Do you think expressing your IT experience to the TS Advisers is important?					
	Yes	No	Don't Know	Not Relevant	Total
Frequency	15	4	3	1	23
When dealing with TS Advisers, how often do you express your level of expertise?					
	Always	Sometimes	Never	No Response	Total
Frequency	0	14	3	6	23

establish TS Users' level of expertise. The responses indicate that TS Advisers establish user level of expertise mainly for the following reasons:

- 1] To narrow down the problem: *"Try to help the user to solve the problem faster and for better understanding, knowing the level of experience of the user gives you an idea of what the problem might be – an experienced typically will have tried the easy solutions"*.
- 2] To customise the help they provide (as suggested by the framework): *"So that TS Advisers can determine the level of help they should provide, So TS Advisers know how to explain things better, it allows often to focus help support to users need rather than wasting time on stuff users may already know"*.

On the other hand, as stated above, several TS Advisers provided a response which stated they do not establish users' level of expertise: *"we have to troubleshoot regardless of users competency, We do not have any definition on the user level of experience; I tend to use my own knowledge of the user level of experience based on the history of our communication, I automatically assume they have no experience"*.

However, this quotation suggests that TS Advisers need a clear definition/guidance on how to handle different level of expertise of the users.

TS Advisers were also asked whether they deal with different user level of expertise in different ways (see Table 5-2). One third of TS Advisers agreed that they have some experienced-based practice whereas one third of the TS Advisers confirmed that they do not deal with the different levels of user expertise differently. Among TS Advisers who do not deal with users levels of expertise, some of them stated that they treat all users the same regardless of their expertise level and

some stated that they do not know if they subconsciously deal with different user levels.

The TS Advisers who did have practices for dealing with different levels of expertise were asked about the different practices which they implemented. As a result practices such as: *step-by-step procedure, highlighting the main points and (non-italicised), taking users through the basics by relating to examples they would experience and using screenshots* were stated as used for inexperienced users. Practices such as: *explain the solution directly, use more technical language in describing problems, and let users describe the process of operation* are some of the practices noted for experienced users. As can be seen, these practices overlap considerably but do not mirror exactly the findings from the empirical study carried out on the TS forums. Most TS Advisers seem aware that they need clear definitions and guidelines on how to handle different user levels of expertise: definitions and guidelines that the responses suggest are not usually provided by companies. The evaluation of the GT empirical study with the survey analysis provides a useful starting point in the derivation and refining of these guidelines.

Surprisingly TS Users may not express their level of expertise (see Table 5-3) as they do not want TS Advisers to skip any steps, because of the adviser's conception of their level of expertise. The following response from the user side provides evidence for this perspective "*because I don't want TS Advisers to skip on a process that they think I know and I don't*".

Criteria 2: Establish user perceived value to build user trust and loyalty

TS User loyalty was assessed from TS Users' perspective only (see Table 5-4). However, the trust issues in the communication handling process were measured from both TS Advisers and TS Users' perspective (see Table 5-5 and 5-6). Firstly, users were asked about their willingness to move to a different product to measure their loyalty. The vast majority of TS Users seemed reluctant to move to different

products/services if they believed it to be of good quality as shown in the Table 5-4.

Table 5-4: Loyalty-User

How often does your faith in a specific brand/product affect your willingness to move to a different brand/product as a suggested fix?				
	Always	Sometimes	Never	Total
Frequency	8	15	0	23

At a more detailed level TS Users were asked the factors that prevent them from accepting the guidance and/or suggestions of TS Advisers. The following indicators are some of the factors that influence accepting suggestions from TS Advisers:

- *The trustworthiness of the product in which is being offered*
- *Bias, Sales pitches*
- *If it is well known that the product in question ranks poorly compared to its competitors. It will be pointless to spend time with TS.*
- *I tend to stick with the way and product I have been familiar with due to ease of use.*

This result shows that loyalty and product perceptions have a big impact on willingness of the users to accept solutions from the TS Advisers. Again the alignment of empirical findings and survey results are apparent with bias negatively affecting users and trust in the product very important.

TS Users stated that they trusted TS Advisers for reasons like: *“Was friendly and helpful, the approach was professional, TS Adviser has enough knowledge about the service and product, Ability to listen to my needs, Ability to manage my expectations, Ability to clearly communicate a diagnostic, Ability to effectively fix the problem”*.

TS Users were also asked which skills of TS Advisers increased their trust in the product and TS service most. Almost all TS Users considered that both

communication and knowledge skills of TS Advisers increased their trust (see Table 5-5).

Table 5-5: Building Trust- TS User

Did you trust TS Advisers you were dealing with?						
	Yes	Partially	No	Total		
Frequency	13	10	0	23		
Does the communication skill of TS Advisers increase the credibility of the product?						
	Yes	No	Don't Know	Not Relevant	No Response	Total
Frequency	18		1	3	1	23
Does the knowledge skill of TS Advisers increase the credibility of the product?						
	Yes	No	Don't Know	Not Relevant	No Response	Total
Frequency	18		1	3	1	23

Furthermore, when TS Advisers were asked how often they take steps to build users' trust, two third of them stated that they took explicit measures, at least sometimes (see Table 5-6). TS Advisers confirmed the benefits of building users' trust as shown in the following indicators: *"To encourage them to stay using the technology, So they feel that they are getting a high level of support, Building users' trust in the communication is the most important and fundamental thing. We will probably lose the customers if not do that, They will doubt what we say. They even doubt our product performance can't reach the requests. Then the competitors will take over the position"*. Obviously this is a bias introduced by having commercial TS Advisers in our sample, while the GT study focused on advisers who were not necessarily employees of a TS company for commercial products.

Table 5-6: Building Trust- TS Advisers

How often do you explicitly take steps to build users' trust?				
	Always	Sometimes	Never	Total
Frequency	7	8	7	22

TS Advisers, who did not take any steps to build users' trust, explained that the reason was that they usually have a pre-existed relationship and no real need for

trust building: Sometimes, the only people that contact for TS assistance already know TS Advisers and trust is assumed if they are coming to TS Advisers for help. In general, according to the response, some of the practices which TS Advisers perform to build trust are:

- *Always speak the truth about the problems and possible solutions, always leaving the user having choices and pointing out the most technically stable.*
- *Explain impacts of changes, explain possible solutions and why I choose a specific one, Explain the chain of responsibility to fix some issues that involves third-party*
- *Relay problems quickly + honestly*
- *Give as much info as possible through specific questions. Respond using step by step details , videos and links*

This result shows the importance of building trust and that the TS Advisers practices to build users' trust are similar to those proposed in the *Personalisation In Practice* theory, where TS Advisers were also found to improve their communication skills as shown in section 5.2, P2. However, several more emerged from the survey which should be considered in future work.

- **Criteria 3: Be aware of security concerns**

The practices of preserving users' privacy and security were assessed. Over two thirds of TS Users confirmed that during their TS encounter they were taking necessary measures to preserve their privacy (see Table 5-7). For example, one user indicated the importance of security to him/her especially: *"To keep my business private, Privacy is key to me. I feel like all the TS Advisers needs to know is I am indeed a user of the product and nothing more than that, Never share any kinds of credentials with TS Advisers"*.

Table 5-7: Preserving Security and Privacy-TS User Perspective

How often do you make specific efforts to preserve your privacy and security?				
	Always	Sometimes	Never	Total

Frequency	8	8	7	23
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TS Users take the following procedures in order to preserve their privacy and security:

- *Inform TS Advisers what they only need to know*
- *Requesting info on what TS Advisers do with the info accessed on user device and accepting or declining on their response*
- *Do not give out personal details*
- *Sometimes, the service providers give user name and password to provide the assistance, during this time I will keep the communication confidential.*
- *Check if the connection is encrypted.*

However almost one third of TS Users did not taken any measures to preserve their security and privacy (see Table 5-7), surprising findings given the empirical emphasis on this attribute. These TS Users indicate that the reason they have never taken any measures is because they trust TS Advisers to take measures for them with respect to their data. The following response seems to confirm this belief: *“As I contacted the relevant TS, I trust they will take actions to preserve privacy and security of my personal data, I tend to trust TS Advisers”*.

Furthermore, there was a follow up question to the users asking which practices of the TS Advisers is considered important to preserve users’ privacy and security. Accordingly they think that TS Advisers should take the following measures to preserve users’ privacy and security:

- *Only using information that is relevant and helps solve the problem*
- *TS Advisers sometimes provide a one to one secured channel that is protected by user name and password*
- *Informing the users not to reveal passwords to the TS Advisers, when receiving emails from a system, informing to not respond. Requesting certain letters of my password or characters*
- *By automatically assigning the user a codename, ask security verification questions*

- *On several occasions they express their policies towards personal data protection.*
- *The chat is emailed at the end of conversation.*
- *I get to keep the evidence on the talk*
- *Shouldn't ask for sensitive data*
- *Requesting (only) part of my card number*

This result shows most of the practices and measures taken by both TS Advisers and users to preserve the security and privacy of the user. The results are similar to the findings of the GT empirical study. However, some of the practices identified here did not emerge in the findings of the empirical study. For example practices such as automatically assigning the user a codename and asking security verification questions were not identified during the analysis of the TS forums. This is probably because the TS Users and advisers in the survey are different from the communities observed in the GT study. Specifically they are reflective of more commercial TS when unique identifiers, passwords and codes are common. It should be noted that little data was collected regarding the security perception of users with regard to the recommended products offered by TS Advisers, or the level of security advice offered by TS Advisers. Hence no observations can be made regarding these 2 aspects of security that were to the fore in the GT study findings.

- **Criteria 4: Understand user's affordability concerns**

The willingness of TS Users to pay for individual follow up and one-to-one services is assessed here. Almost two third of TS Users were willing to pay for individualised services at least some of the time (see Table 5-8). Among those TS Users who would like to pay for individualised services, most of them would pay for *long-lasting solutions to problems*. However one third of TS Users do not want to pay

for the services ever. These TS Users suggest that after sales service should always be cost-free because most of the time it is prompted by the flaws of the product and these flaws should be solved at the cost of the company providing the product. Additionally, according to the TS Users' responses, one-to-one TS services are usually offered at an unnecessarily high cost.

Table 5-8: TS User Attitude Towards Individual Service

When dealing with TS Advisers do you consider one-to-one services (<i>individualised follow up, quick access to and response from TS support, reliable service level agreement regarding fast problem solution</i>) worth paying for?				
	Always	Sometimes	Never	Total
Frequency	2	13	8	23

Providing different options with regard to the affordability of the service was also assessed from the TS Advisers perspective. Among the 22 TS Advisers who participated in the survey, only 7 responded to the question on whether users were willing to pay for the service (see Table 5-9). Among these 7 TS Advisers, 5 believed users were willing to pay for individualised TS services under some circumstances, but the low response rate probably indicates their inability to assess the motivation of users.

Table 5-9: TS Advisers' Attitude Towards Individual Service

Does your company provide paid individualised services?					
	Yes	No	Don't Know	Not Relevant	Total
Frequency	4	11	2	5	22
How often are users' willing to pay for these services?					
	Always	Sometimes	Never	Total	
Frequency	1	4	2	7	

Open answers suggested that payment was only acceptable when improvements in the service and individual services are provided.

- **Criteria 5: Manage relevant third-party products**

One of the success criteria demanded in *Personalisation In Practice* is handling *third-party* software products where the product of the company involves third-

party software. In order to assess how TS Advisers handle third-party software products when users asked for their support, TS Advisers were asked whether they provide support for third-party software involved with their company products. More than two thirds of TS Advisers do support third party software products some of the time (see Table 5-10). Less than one third of TS Advisers never handle third-party software.

Table 5-10: Preserving Security and Privacy- TS Adviser Perspective

How often do you handle third-party software products that are required for your product?				
	Always	Sometimes	Never	Total
Frequency	4	12	6	22

According to their responses, if TS Advisers are handling third-party software, they do ask whether the warranty is still in effect or not, and depending on the warranty, inform the user that the problem needs to be escalated to the third-party vendor. Alternatively they themselves can contact third-party software vendors by phone or email and report the solution of the problem to the user. These results align with the empirical study in that they show that TS Advisers should know which third-party software are involved in their product and have a knowledge or ability to solve issues related to third-party products.

- **Criteria 6: Generate visually appealing material**

In order to test the importance of preparing visually appealing material for TS Users, TS Users were asked to measure the importance of visually appealing material in a 5 point Likert scale. Almost all TS Users respondents agreed with the importance of visually appealing material, some stated it was very important and some stating it was moderately important (see Table 5-11).

According to the response of TS Users, visually appealing material helps them to understand the information provided faster, to make it more readable and easy, to avoid misunderstandings and to solve problems more easily. TS Advisers also agree with TS Users about the benefits of making visually appealing material. On the other hand few TS Users considered visually appealing material as a distraction to concentration on the objective of fixing the problem.

Table 5-11: Visually Appealing Material- User

How important is it for you that the material is visually appealing?						
	Very Important	Important	Moderately Important	Neutral	Not Important	Total
Frequency	11	6	3	2	1	23

TS Advisers stated that they make the material visually appealing to emphasise the main point of discussion and to remind the TS User of the important points covered. Sometimes visual appealing techniques are used to express TS User and advisers anger and to express their frustration during a text-based communication.

Table 5-12: Visually Appealing Material Practices-User

Items	Practices
Emphasise the main point of discussion	Underline, Bold, Upper case letters, Font size, Colour, Italics, Multiple choice, place on the box, Symbols
Remind important points covered	Star, Bold, Bullet points, Red, colours, Capitalising, Check lists, Italic
Express Anger	Bold , Capitals, Emoji pictures, The use of swearing text, Red colour, Font size,
Express Frustration	Bold , Capitals, Emoji pictures, Italics,
Others	Soft languages, Diagrams, Screenshots

TS Users noted the use of similar techniques as per the findings of the GT study (see Table 5-12). However in the survey users mentioned a few practices such as

emoji pictures, screenshots and diagrams which were beyond the scope of the GT study.

Additionally, TS Advisers were asked how often they make the material visually appealing. More than two thirds of TS Advisers attempt to make the material visually appealing at least sometimes, when they think it important, as shown in Table 5-13. However, very few TS Advisers *never* practice making the material visually appealing. These TS Advisers responded that making the material visually appealing is a time consuming process and is not seen as a requirement in the companies where they are involved with.

Table 5-13: Visually Appealing Material Practices-Advisers

How often do you tailor instructions to make the material visually appealing?				
	Always	Sometimes	Never	Total
Frequency	3	14	5	22

This result shows that users like the materials provided by TS Advisers to be visually appealing and this implies that there is a need for TS Advisers to make the materials visually appealing. But TS Advisers' efforts seem to be largely based on their own experience in an *ad hoc* fashion and it is sometimes not seen as a requirement in software companies.

- **Criteria 7: Monitor the communication flow**

One of the success criteria in *Personalisation In Practice* is the practice of monitoring (and thus being in a position to solve) and solving communication issues when they occur. Among 23 respondents, most of TS Users stated they had experienced communication issues although most not often, as shown in Table 5-14. On the other hand almost all TS Advisers also agreed that communication issues sometimes occurred during the communication handling process, as shown in Table 5-14. Only 4 TS Advisers had no experience of any communication issues.

Causes of communication issues were examined. Both TS Users and TS Advisers explained that misinformation, misunderstanding, different culture and language, and confusion are the main causes of communication issues, mirroring the findings in the study largely, as shown in section 5.2, P9, with the exception of differing culture and language. This additional consideration should be considered for future inclusion in the substantive theory.

Table 5-14: Communication Issues

How often do you experience communication issues-TS User?				
	Frequently	Seldom	Never	Total
Frequency	3	16	4	23
How often do communication issues occur- TS Advisers?				
	Always	Sometimes	Never	Total
Frequency	0	21	1	22

Both TS Advisers and users indicated that the following practices helped them to handle the communication issues:

- *Clearly identifying the problem*
- *Try each suggestion step by step to get focused in the communication process*
- *Laying out what the cause to the problem might be from the user's side. And asking for ways to solve that problem.*
- *Ask the TS Adviser if they understood my query, and repeat in my own words the ideas that the TS Adviser provided*
- *Rephrasing the communication issue and asking the TS Advisers to confirm.*
- *Use different channels. Change to telephone if chat is not effective for that case or vice versa.*
- *Involve more people in the communication. They may be helpful.*
- *Find the point where we have deviation in understanding. Aim at it to explain and discuss amply*
- *Rewriting the requests before providing a solution, Asking if they are happy with the explanation or solution*

This result shows that the practices in order to handle communication issues are similar, and slightly more specific practices, to the findings of GT empirical study, as shown in section 5.2 (Monitor the communication flow).

- **Criteria 8: Manage Emotions**

In order to assess managing emotions, TS Users were asked about any emotional aspects of their last encounter with TS Advisers. Most TS Users considered their TS Advisers were friendly to differing extents (see Table 5-15). A few TS Users stated that their adviser was neutral. TS Users were also asked whether they experiencing negative emotions in their past interactions. The results were fairly mixed with almost half of TS Users experiencing negative emotions sometimes during communication. However when TS Advisers were asked whether they experienced negative emotions during their interactions with TS Users, over half of TS Advisers had never experienced negative emotions (Table 5-15).

TS Users were also asked the conditions where they experience negative emotions and factors that lead to negative emotions:

- *Language has a lot of technical jargon*
- *User can't understand what TS Advisers are explaining*
- *TS Advisers do not understand users' problem or keep referring you to someone else*
- *The problem has not been fixed*
- *Some TS Advisers are not happy about what they are doing and give out a negative energy*
- *Sometimes the waiting time is long.*
- *Users keep repeating themselves and the TS Advisers do not understand*
- *Poor communication skills of TS Advisers*

Table 5-15: Manage Emotions

What kind of behaviour did the TS Advisers demonstrate during your interaction with him/her- Users?							
	Very Friendly	Friendly	Not Sure	Somewhat Friendly	Not at all Friendly	Neutral	Total
Frequency	7	12	1	1		2	23

How often do you personally experience negative emotions such as frustration, and/or anger with the TS Adviser or the TS Process- Users?				
	Always	Sometimes	Never	Total
Frequency	0	10	13	23

How often do you find yourself dealing with the users' emotions-TS Advisers?				
	Always	Sometimes	Never	Total
Frequency	3	14	5	22

TS Advisers deal with emotions when users misunderstand, or when users are upset or frustrated. The general practices which TS Advisers take to deal with user's emotions are:

- *Human empathy and an understanding that they are very upset with them until they have calmed down*
- *Firstly TS Advisers should keep a friendly manner, keep smiling throughout the communication. Secondly, TS Advisers should describe and explain slowly and clearly. When users' have some questions, TS Advisers should explain patiently*
- *Explain the chain of responsibility for some issues, elaborate the possible lack of expertise on some problems that need to be escalated to third-party*
- *Let them know you understand their concerns and it is something we are looking to rectify instantly*
- *Need to apologise for misleading or misunderstanding*

The above practices are similar to the findings of GT study managing emotions which is described in section 5.2, P10. For example, practices such as 'calming an annoyed user' are similar to 'understanding that they are very upset and calming down'. Also the practice 'let them know you are looking to rectify instantly' is also similar with the findings of the GT study to 'respond quickly and give a high priority'.

These practices confirm the importance of managing emotions as success criteria, in agreement with the findings of the GT empirical study; and can be tailored to suit different user characteristics and emotional situations.

5.3.3 Conclusion of the Survey

In this section the survey process and findings have been reported on seeking congruities and incongruences with the findings in section 5.2.

The following points summarise the evaluation results of each success criteria that were empirically derived in the GT empirical study:

- Criteria 1: The findings in section 5.2 suggested that establishing user level of expertise is one of the PIP practices which TS Advisers should consider during the communication handling process. However findings related to handling user level of expertise practice overlap in the survey but do not mirror the findings from the empirical study. In the survey, TS Advisers suggested that they needed clear definitions and guidelines on how to handle different user levels of expertise. But the findings of the GT study provide a useful, more specific starting point in the derivation of the guidelines.
- Criteria 2: Establish user perceived value to build user trust and loyalty. PIP practice in section 5.2 suggested that TS Users appreciate honest responses and trustworthiness of the TS Advisers/product. Trust has a big impact on the willingness of the user to accept solutions from the TS Adviser and become loyal to the product. Similarly TS Advisers from the survey results agree with the practices from the findings of the GT study and largely validate the results.
- Criteria 3: The empirical data in chapter 5, section 5.2 shows that users' security and privacy requirements are one of the important factors of TS

communication handling process. The findings suggested that TS Advisers should be aware of users' security concerns since security is a central concern for end users in computer systems. The survey results were similar to the findings of the GT empirical study. However practices to preserve user security such as: automatically assigning the user a codename, and asking security verification questions were not identified during the analysis of the TS forums, possibly based on the more commercial nature of the data sources in the survey. The need for the TS Advisers to ramp-up on security was not probed by the survey.

- Criteria 4: According to the empirical study section 5.2, TS Users would like to have different options with regards to the affordability of the service. Users are particularly willing to pay if there is improvement in the service and an individualised service exists. Similarly in the survey, TS Advisers agreed with providing different options with regard to the affordability of the service.
- Criteria 5: The findings from section 5.2 suggested that it was important to offer support in third-party software and this was borne out by the findings from the survey. Specifically, the majority of TS Advisers offered third-party software support, although the nature of that support differed in the 2 studies. In the grounded study, the advisers tried to offer direct support. But the findings from the survey illustrated that TS Advisers were more likely to seek TS support from the provider of that software, or point the TS User to that support.
- Criteria 6: The empirical data in section 5.2 suggested that generating visually appealing materials increases the clarity of information and helps the users to correctly perform the instructions provided. Thus TS Advisers spent much time in making the information visually appealing. However the survey result shows that TS Advisers efforts to make the material visually appealing are more *ad hoc* and it is not always seen as a required practice.

Hence the findings from the GT study could help drive one of the more important practices in order to satisfy user requirements in TS.

- Criteria 7: In the findings from section 5.2, communication handling issues such as: misunderstanding users' requirements, misinforming users and confusing users are some of the issues which may occur that threaten the successfulness of TS. The GT empirical study findings suggest that TS Advisers need to take necessary measures such as: Not leaving out important steps, not providing unnecessary information, not to assume the user is familiar with the topic and technical words and thus avoid these communication issues. Like the findings, the results of this survey align with the practices which avoid communication handling issues.
- Criteria 8: Managing emotions is one of the *Personalisation In Practice* work-practices which is empirically derived in the GT study. The empirical data suggested that TS Advisers need to address emotions by practices: calming down an annoyed user, responding quickly, giving high priority attention to a frustrated user and removing inappropriate users after warnings. These practices also validated the survey results, confirming the importance of these practices in order to handle emotional situations of the user.

5.4 Summary

Based on the empirical study of 8 open source forums and based on the assessment of the findings with respect to the real world TS, this chapter presents successful and unsuccessful practices for TS forums. Ten recommendations were presented in this chapter and also presented in the SPICE 2016 conference in Dublin (Gizaw S., Buckley J. Beecham S., 2016). The result of the survey

assessment with respect to these practices by real world TS participants was presented in EASE 2016 conference in Limerick (Gizaw S., 2016).

All recommendations are highly interrelated and re-enforce each other in several ways, leading to a better understanding of the user-TS Adviser communication handling process. The recommendations also include reasons why unsuccessful practices occur and what can be learnt from these practices in future TS Adviser/user interactions in a company-based context. The idea is that by applying the recommendations of the successful threads, the user will have a better experience, and the number of unsuccessful outcomes will be reduced.

There are some cross cutting practices such as moderator's involvement and practices that may not be feasible, for example dealing with an abusive user. In the context of a company based scenario TS may need to be more tolerant of such users and they (companies) needs to have a policy or strategy. Moderators are involved when practices in the recommendations have not been followed in order to solve the argument between the user and TS Adviser. As shown in the recommendations the involvement of moderators often turns around the unsuccessful interaction between the user and TS Adviser towards success.

Chapter 6

Discussion

CHAPTER 6

6 Discussion

This chapter discusses the findings of the GT empirical study. This is done by comparing the *Personalisation In Practice* theory with the literature in the area. This chapter is organised into two sub-parts. The first part (6.1) connects the *Personalisation In Practice* theory with the wider personalisation and TS literature: My research findings and the wider literature are discussed. The second section (6.2) highlights key aspects and discusses the main findings of the research.

6.1 A Comparative Analysis of *Personalisation In Practice* and Literature

The purpose of developing a substantive theory through grounded theory is to create a theory as a starting point for discussion, research and action and to find points of connection with other literature and theories (Strauss and Corbin 1990). Thus, once the findings were sufficiently grounded and developed, the literature on TS, personalisation and other communication handling processes was compared with my findings. The purpose of this comparison is to discuss the similarities and differences between the research findings and the literature and to relate the theory through the integration of ideas (Strauss and Corbin, 1998).

Table 6-1: TS Practices Supported by the Literature

No	Personalisation In Practice		Practices from the literature	References
P1	Establish and handle user's level of expertise	P1.1 Establish user level of expertise	Standards Platform for Privacy Preferences (P3P) standard categorises (novice, expertise) under its professional and personal data category	(Cranor 2011)
			Frameworks Miceli et al. (2007) categorise (novice, expertise) in the knowledge category in their conceptual framework from an interactive personalisation perspective	Miceli et al. (2007)
			Literature Adaptive Hypermedia (AH) : Interactive service based on level of expertise (novice, intermediate, expertise) for the adaptive selection, sequencing and presentation of categorised content and interactive service (Magoulas and Dimakopoulos, 2006) (Solheim, 2009) Adaptive User Interfaces for lower literacy users (novice)	(Magoulas and Dimakopoulos, 2006) (Solheim, 2009)
		P1.2 Handling novice user queries	Procedural, explanatory, or narrative texts suggested by the literature for low level literacy users (novice) in eLearning Adaptive Hypermedia system	(Magoulas and Dimakopoulos, 2006) (Solheim, 2009)

				(Novak et al., 2000), (Şah and Wade, 2010)
		P1.3 Handling experienced user queries	Overview, summary or specialised texts suggested by the literature for high level literacy (experienced) users in Adaptive Hypermedia eLearning system	(Solheim, 2009) (Novak et al., 2000), (Şah and Wade, 2010)
P2	Establish user perceived value to build user trust and loyalty		This personalisation framework defines trust and loyalty as beliefs and attitudes	(Ralph and Parsons, 2006),
			Loyalty is user's degree of passion and commitment to the brand in the B2C (Business to Consumer) conceptual framework	(Jin, 2010)
			The ability of TS Advisers to convey trust and confidence is one of factors that affect user satisfaction in TS	(Parasuraman, 2000, Parasuraman et al., 2005), Steehouder (2007)
P3	Be aware of security concerns		Enabling the user to feel free from danger, risk or doubt including financial security and confidentiality is a core concern	(Bart et al., 2005) (Jiménez Torres and San Martín Gutiérrez, 2007),
			Security and privacy is one of the attributes in the data personalisation framework for user profile knowledge and management	(Bouzeghoub and Kostadinov, 2007),
			Security and privacy is considered in personalised privacy preservation and user modelling in AH educational systems	(Xiao and Tao, 2006), (Martins et al., 2008)

P4	Understand user's affordability concerns		Users' willingness to pay for an individualized and better TS service is noted in this literature	(Raninen et al., 2015)
			Availability of different prices for different TS service is important	(Holloway and Beatty, 2008), (Xiao and Tao, 2006)
			The extent to which the user can determine and compare the service price is noted as a concern	(Parasuraman, 2000, Parasuraman et al., 2005)
P5	Manage relevant third-party products		-In TS literature, managing third-party products depends on the possession of the required skills and knowledge by the TS Adviser to perform the service.	(Ramasubbu et al., 2008)
P6	Generate visually appealing material	P6.1 Augment Step-by-step procedural instructions	-Numbered or bulleted lists of instructions to save time, reduce error and improve clarity -Screenshots for each task	(Instone, 2004), (Novak et al., 2000),
		P6.2 Signify the main point of the instruction	Highlight the main point of ideas to guide users to the main point of discussion	(Rossi et al., 2001), (Negash et al., 2003)
P7	Clarify individual context		The problem analysis phase is where questions by the TS Advisers probe any lack of clarity in the question.	Steehouder (2007) (Fan et al., 2004)

			<ul style="list-style-type: none"> -The literature notes the importance of TS Advisers understanding the information to fulfil users' needs -The literature notes the problems associated with not asking clarification questions. 	(Parasuraman, 2000, Parasuraman et al., 2005)
P8	Avoid premature response with respect to the problem context		<ul style="list-style-type: none"> -It is important to understand users' IT environment before any response -It is important to understand user needs and requirements before any response -It is important to ask clarification questions -It is important to give the user individual attention 	(Heras et al., 2009), (Parasuraman, 2000, Parasuraman et al., 2005) (Van Velsen et al., 2007)
P9	Monitor the communication flow	P9.1 Avoid misinforming users	<ul style="list-style-type: none"> -Communication skills are important in order to inform users in a language they are able to understand and also required is the ability to listen to users -Advisers should not imply one thing and mean another 	(Na et al., 2010) , (Tsai and Lu, 2009), (Sureshchandar et al., 2002) (Berge, 1995)
		P9.2 Avoid misunderstanding users requirements	<ul style="list-style-type: none"> - The literature notes the following important points: -Do not assume the other person knows what you are referring to -Do not use nebulous words -Do not leave important steps out of the process -Learn good communication skills 	(Van Velsen et al., 2007) (Negash et al., 2003) (Ramasubbu et al., 2008), (Berge, 1995)
		P9.3 Do not confuse user with multiple solutions	<ul style="list-style-type: none"> - Provide the right (accurate) solution to the user's request -Do not give the user unnecessary information 	(Berge, 1995) (Van Velsen et al., 2007)

			-TS Advisers are advised to finish their thoughts rather than leave them incomplete, in order to avoid user confusion	
P10	Manage Emotions	P10.1 Calm down annoyed user	Improve the relationship between TS Advisers and TS Users through: -Politeness -Introducing mediation (the involvement of moderator)	(Na et al., 2010) , Rosenbaum (2008)
		P10.2 Respond quickly and give a high priority attention to a frustrated user	-Invite experts to respond -Learn how to turn frustrated situation around through improved interaction skills -Present a useful alternative to solve the user's problem	(Berge, 1995) (Shih et al., 2014) (Negash et al., 2003)
		P10.3 Remove inappropriate users after warnings	-Expect flames may occur -Do not ignore bad discussant behaviour -Escalate the case to deal with the bad behaviour and warn the user -Remove inappropriate user	(Berge, 1995) Rosenbaum (2008)

In the literature, similar practices to *Personalisation In Practice*, albeit, not empirically evidenced and presented in isolation have been found, as shown in Table 6-1. The similarity and differences between the *Personalisation In Practice* and the literature is discussed in more detail below.

6.1:P1: Establish and handle user's level of expertise

According to the personalisation literature, user characteristics such as *level of expertise* have been studied in depth (Rossett 1987, Steichen and Wade, 2010, Conlan et al., 2002, Magoulas and Dimakopoulos, 2006, Solheim, 2009, Bart et al., 2005, Ralph and Parsons, 2006, Xiao and Tao, 2006). Typically, some researchers recognise three levels of expertise: novice, intermediate, and expert (Rossett, 1987). According to Rossett (1987), intermediate level of expertise includes all users who know something, but not everything. Hence it is so widely scoped that guidelines for practice are very hard to decipher. Regardless, the findings of the GT empirical study categorised user level of expertise in a comprehensible and manageable way into *novice*, *intermediate* and *experienced* as shown in section 4.1 and Table 4-1.

Another interesting comparison is in the terms used. Here the terms used are *novice* and *experienced* to reflect a dimension based on exposure to the domain. In other works *novice to expert* is selected to reflect a dimension of knowledge (as explicitly noted in Miceli et al. (2007)). This most probably is an artifact of the grounded approach employed here, which seemed to catch more exposure-reflecting utterances than knowledge-reflecting utterances. Thus *experienced* and *expertise* are terms which are used interchangeably when discussing the framework.

Similar to the findings of the GT study, as shown in section 4.1 and Table 4-1, user level of expertise (novice, intermediate and experienced) are categorised as one of the personalisation attributes in standards (Cranor 2011) and personalisation conceptual framework Miceli et al. (2007). Additionally these user level of expertise (novice, intermediate experienced) attributes are also implemented in Adaptive

Hypermedia to generate a content according to user level of expertise and literacy (Solheim, 2009).

Furthermore, to handle user level of expertise, different content has been generated with the following criteria (Steichen and Wade, 2010, Martins et al., 2008, Novak et al., 2000, Şah and Wade, 2010): Procedural and explanation texts have been deemed suitable for novice users (Magoulas and Dimakopoulos, 2006), (Solheim, 2009), (Novak et al., 2000), (Şah and Wade, 2010) whereas overview, summary and specialised texts were deemed more suitable for experienced users (Magoulas and Dimakopoulos, 2006), (Solheim, 2009) (Novak et al., 2000), (Şah and Wade, 2010). Thus the theory-based literature largely reflects the empirical findings in these regards.

6.1:P2: Establish user perceived value to build user trust and loyalty

According to the personalisation and TS service literature, building trust through good communication and reputation, in order to enhance credibility of the service, is one of the important factors for users, and is one which TS service providers should consider seriously in their communication handling process (Negash et al., 2003, Bart et al., 2005, Jiménez Torres and San Martín Gutiérrez, 2007). These practices come from the consumer marketing literature. Consumer marketing strategy is a pre-sale activity directly connecting to consumers, which makes the consumers feel more valued and makes the consumer's first experience more personal. The empirical findings of the study identified and showed a similar practice extended during TS service (post-sale service).

In contrast to the study, Negash et al., (2003), Bart et al. (2005), Jiménez and Gutiérrez, (2007), suggest that perceived value is more retrospective than pre-formed (see Section 5.2). The empirical data showed that both the company's brand name or reputation (a pre-formed trust) and users' perception of a product/service has a big impact on users' trust. Establishing users' perceived value of the product/service before suggesting anything creates a good communication process and builds trust. Therefore, to provide better post-sale service, TS

Advisers must establish users' expected perceived value of the product and work to enhance their value of the service.

According to research, practices of building users' trust arise in two ways: cognitive and affective-based (Eisend, 2006). Cognitive trust is based on rational or calculated results of an evaluation of evidence of performance reliability. It can also be based on competence assessments on the product/service by the user. Affective-based trust is based on emotional ties with the TS Advisers, as the result of the social bonds developed in a reciprocal relationship in which there is genuine care and concern for the user. Some recommendations from the literature suggest similar findings to the study, as shown in section 5.2, are: being responsive; being patient; using informality; inviting experts; and maintaining flexibility. Similarly the empirical data shows that monitoring the communication flow by avoiding premature responses, avoiding misunderstanding user requirements, avoiding misinforming users, and involving moderators or skilful TS Advisers when it is needed, are some of the practices which helped to build user trust.

6.1:P3: Be aware of security concerns

In the personalisation literature, security and privacy of the user are considered one of the major attributes of importance (Bart et al., 2005, Jiménez Torres and San Martín Gutiérrez, 2007). Similarly according to the TS literature, making the user feel safe when using the TS service is one of the major practices, where TS systems must provide protection over the user information (Parasuraman, 2000, Parasuraman et al., 2005). Thus literature from TS and personalisation align with the importance of enabling the users' to feel safe and preserve users' privacy and security requirements during TS services, as shown in section 5.2. However the empirical data shows that, apart from the level of privacy and security of TS service systems with respect to user data, users are also concerned that a solution provided by the TS Adviser or software used to diagnose the problem might introduced security concerns. Therefore in this context the finding augments the literature. Even though the empirical data shows security is one of the important

factors of user requirements, it is not well supported in TS forums and this needs to improve as shown in section 5.2.

6.1:P4: Understand user's affordability concerns

Personalisation literature describes the importance of affordability of the service to the user at a high level. It affects the choice of service and price competition has a great impact on the preferences of services where this literature assumes that the cheaper the service, the more sought after it will be (Miceli et al., 2007, Vesanen, 2007). However Raninen et al. (2015) and Holloway and Beatty (2008) suggested in their study that users are willing to pay for individualised and better TS services which shows a user openness to different prices for different TS services. TS services can therefore offer company revenue.

The findings here on the impact of affordability of the service on the preferences of the user aligns with Raninen et al. (2015) and Holloway and Beatty, (2008) where *Personalisation In Practice* suggests that affordability of the service to the user works both ways: they want not only cheaper alternatives but also more expensive alternatives (with better service) too. Providing different options with regards to the affordability of the service to the user had a big impact on the preferences in the forums in the GT empirical study.

6.1:P5: Manage relevant third-party products

In the study, the data shows that TS Advisers provide support for *third-party* products from the domain where the forum dedicates its support. However in the TS literature there is no explicit description about *third-party* products support. According to the literature, TS dedicates its efforts to improving the diagnosis process and solving the problem accurately. However there is no explicit mention in the literature of efforts with respect to *third-party* products and managing them.

In TS literature there are however *indications* that TS systems provide or capture information about *third-party* products, particularly in FAQs and Knowledge

Management Systems (KMS), which are used for problem-solving systems (Heras et al., 2009).

6.1:P6: Generate visually appealing material

Even though Novak et al. (2000) suggested narrative text is suitable for novice users, the results of the empirical study suggest that procedural step-by-step sequences of instruction, either numbered or bulleted, is more suitable to novice users (see Section 5.2 , P1.2)). Thus, the literature and study align in suggesting that generating a visually appealing procedural content with a numbered or bulleted list is one of the practices which helped the user to correctly perform the instruction to solve the problem.

The other practice, which was identified in the GT empirical study, is emphasis being used to signify the main point of discussion. The empirical data shows that TS Advisers *emphasise* important parts of the content by making bold, italics or changing the colour of the part of the message. There are no explicit implementations; recommendations or guidelines in the TS literature which suggest using *emphasis* to highlight the main point of ideas and to better convey information. There is an indication that contents existing on the web have used html tags such as: bold tag () and the colour attribute in the font tag () (Rossi et al., 2001), but the purpose of these tags are stated as only formatting the GUI. The findings from the GT empirical study showed that emphasising content has a bigger purpose and meaning during text-based communication handling processes. Additionally, during text-based communication both TS Advisers and users can emphasis a part of a text to show their emotions such as anger, frustration, insult etc.

6.1:P7: Clarify individual context

When the intended purpose of the question or the goal of the question from the TS User is not clear, then the study suggests that TS Advisers often trigger a

clarification process in order to understand what the question means. The findings of the GT empirical study, as shown in section 5.2, also indicate that the first and main practice of TS Advisers before responding prematurely ought to be *clarifying* the question, in order to understand the core of the question.

The literature suggests a similar approach: TS Advisers should prompt users to provide individual context through a *clarification* process during the problem analysis phase (Steehouder 2007). The problem analysis phase is where questions by the TS Advisers probe any lack of *clarity* in the question. The *clarification* step may be presented through simulating the problem that has occurred, interrogating the user or asking for a narrative explanation of the problem. Thus this *clarification* process is similar to *Personalisation In Practice* findings which point to the importance of prompting users to provide individual context towards more successful outcomes.

6.1:P8: Avoid premature response with respect to the problem context

The recommendation from *Personalisation In Practice*, to avoid a premature response with respect to the problem context, does not have explicit similar practices in personalisation and TS literature. However, according to the TS literature, there was a similar practice during the diagnosis phase to address this issue: TS Advisers may ask for a detailed description of the symptoms of the problem, which the user observed (Heras et al., 2009). This phase may include a discussion about steps that the user has been taking to analyse the problem, followed by a discussion and ends in a conclusion as to the problem. Additionally, Parasuraman et al., (2005) suggested that TS Advisers need to understand the users' IT environment, needs and requirements clearly before providing any response. (Van Velsen et al., 2007)

There were similar recommendations in the online facilitators' field of study (Berge, 1995). According to the literature, the recommendation to be patient suggests not rushing in to fill the silence of the participants. This also aligns with avoiding a premature response with respect to the problem context.

6.1:P9: Monitor the communication flow

In TS and personalisation literature, no practical steps have been identified for monitoring the communication flow during the communication handling process. Instead, monitoring communication flow practices was addressed more in the literature dealing with online facilitator communication and marketing relationship theories: For example, Kasper-Fuehrera and Ashkanasy (2001), in their work on online facilitator communication suggest implicitly that help may be needed wherever users have greater difficulty understanding computer-mediated conversation rather than face-to-face communications.

Likewise, according to the marketing relationship theory literature, communication issues may be more prevalent in virtual communication because of diversity of context and increased possibility of *misunderstandings* and/or *misinformation* via technology (Axtell et al., 2004). Among many issues that affect the communication causing *misunderstanding* and *misinformation* are the various types of knowledge and skills of the participants in the communication (Light, 1989), reflecting the data studied here. When communication issues, such as *misunderstandings*, *misinformation* and *confusion* occur, our work suggests that TS Advisers monitoring the communication flow can help, as shown in section 5.2.

The empirical findings suggested several practices to prevent the communication issues occurring such as: avoiding premature response with respect to the problem context (Section 5.2, P8), avoiding misinforming users (Section 5.2, P9.1), and not confusing users with multiple solutions (Section 5.2, P9.3). Additionally the empirical findings also suggested several practices to manage the communication flow if the communication issues occur. For example, TS Advisers should apologise for leaving important steps out, quickly analyse and realise where the communication issues occur, respond quickly, and involve a moderator.

Mirroring the issues found in GT empirical study, the online communication facilitator literature (Berge, 1995) states that there are ten reasons behind communication issues which the facilitators should avoid. These reasons are typically at a lower level of granularity than the issues above, the exception being

'not asking clarification questions': *leaving important steps out of the process; talking in circles; not providing necessary information; implying one thing and mean another*; speaking too softly; *talking about a topic with a familiarity the other person lacks*; not asking clarification question; using nebulous words; assuming the other person knows what the other referring to; and not finishing the thought (Berge, 1995).

6.1:P10: Manage Emotions

Of course, the occurrences of communication issues sometimes ended up in negative emotions such as *frustration* and *anger* and motivated insults whereas successful communication typically ended up in positive emotions such as *satisfaction*. But "Communication in virtual environments" research suggests that emotions may impact the way other participants respond (Keltner and Haidt, 1999). For example, my empirical study found that users addressed by angry TS Advisers tend to become angry themselves, as shown in section 5.2.

Young, (2010) supports the importance of managing emotions as a core attitude and work behaviour. Yet that is ignored in virtual communication, where TS Users and TS Advisers connect through devices such as computer or telephone without actually being together. However, there are a few practices noted in the literature which align with the findings of the GT empirical study; for example, Rosenbaum (2008) provides guidelines on how emotional support can be given and how politeness can calm emotions. Rupp and his colleagues (2008) have also defined guidelines for *anger*, and emotional regulation in their investigation.

Additionally, according to online facilitator/instructor literature, when the communication issues escalate, practices such as not ignoring bad discussant behaviour and expecting 'flaming', help to manage users' emotions.

In conclusion the practices of managing emotions are not explicitly stated in the TS and personalisation literature. However, the finding of this research on managing emotions align more with the virtual communication and online facilitator

fields of study, as shown above, both suggesting the importance of managing emotions.

6.2 Novel Research Contribution

In reference to the research questions, this research has made the following contributions:

- Established from a review of the relevant literature in the field of technical support that individualised service is seen as an important activity for users of software systems in general and TS specifically.

The literature review revealed that individualised value-added services can meet users' requests at a deeper level than that of traditional TS services by providing accurate information and processing the information to satisfy user requirements. To achieve a much better user experience, TS should consider the individual characteristics of the user. User characteristics, as depicted in the literature, exposed a diverse set of attributes that differed from source to source, and generally lacked empirical under-pinning.

The literature review revealed that the core problem with company-based TS is the neglect of user characterisation in TS. This is somewhat surprising given that the user experience can be enhanced by channelling support to meet the user's individual needs: providing an individualised response to each user is an effective user satisfaction strategy.

- Also established, from the same review, that current work in this field is inconsistent and does not have empirical grounding

The literature review revealed prevalent user characteristics for improving personalised TS services. However, the literature review has indicated that the current research in TS field applies user characterisation in an *ad hoc* fashion and

is not based on *in vivo* empirical evidence. Defining user characterisation in an *ad hoc* fashion is unreliable, unrepeatable, and can result in inconsistencies, and a weak understanding of user characteristics. The literature review identified that users are not fully satisfied with company-based TS services, partially due to lack of guidance and support on how the services assist when problems arise. The individual characteristics should be empirically derived based on *in vivo* practice to truly reflect the user needs. Without empirical grounding the characterisation efforts to individualise TS may be misguided.

Empirically derived personalised attributes could reinforce our current understanding of how to characterise users and, by taking a more inductive approach, may possibly provide perspectives and new attributes, adding innovation to the literature that may in turn improve TS interaction.

- Derived a set of relevant user characteristics in TS, through a substantial, in-vivo empirical study: the first such substantial empirical study directed at this goal.

This research study identified categories which are grouped into three core categories. The results of this work have valuable implications for personalised Technical Support services, most notably the empirically derived user characteristics, user expectations and user values (see Chapter 4, Section 4.1). The categories representing the resultant concepts are formed based on constant comparison through observing and analysing the indicators' similarities, differences and consistency in meaning, which generates an underlying uniformity.

The prevalence of these characteristics suggests that these user characteristics are applicable at persona level, where a persona (in the context of this work) is defined as a way of creating a category to define attributes of personalisation, where groups of people are aggregated into clusters based on their essential commonalities and differences. For example, prevalent concepts in this dataset are novice, intermediate and experienced. These suggest three groupings of

individuals that occur frequently and this can be taken as the basis of content that is generically appropriate to each group. A combination of user characteristics, the communication handling process, and outcomes of the communication (successful or unsuccessful), can be used to create guidelines for effective communication.

- Analysis of how these group characteristics (personas) interplay with TS communication to derive proposed guidelines on effective and ineffective TS behaviour.

This research study has empirically identified recommendations and work-practices for personalised TS from the literature, empirical research of TS forums and verification through the literature and a real-world multi-company-based survey. This has helped to develop the *Personalisation In Practice* theory which include user characteristics and work-practices for personalised TS services in a more personalised manner. *Personalisation In Practice* emerged from the data analysis to describe the ‘*successful/unsuccessful*’ practices of personalised communication handling process. In the *Personalisation In Practice* theory, each work-practice includes specific conditions, its significance and how to apply the practice. For example, handling and establishing user level of expertise described all the specific conditions, the significance of establishing and handling user level of expertise and how to handle them (see Section 5.2, P1).

- An evaluation of these proposed guidelines against the literature and against real-world TS staff, through a survey.

The grounded and developed work-practices were compared with the literature on TS, personalisation and other literature on communication handling process (see Section 6.1). As a result, some of the *Personalisation In Practice* work-practices were associated with TS and personalisation literature practices. Some of the *Personalisation In Practice* work-practices were pointed towards *communication*

theories, online facilitator/moderator guidelines and marketing theory literatures. This shows that considering work-practices from *communication theories, online facilitator/moderator guidelines and marketing theories* are useful to enhance Technical Support service towards user satisfaction. For example, work-practices such as: establishing user-perceived values to build user trust and loyalty, understanding users' affordability concerns, avoiding premature response with respect to the problem context, monitoring the communication flow, and managing emotions was found in the facilitator-communication and marketing-relationship theories literature. This shows that, in order to enhance Technical Support service towards user satisfaction, work-practices from other theoretical fields must be integrated.

The work-practices were then evaluated by TS Advisers and TS Users from the real world scenario (see Section 5.3). The survey with TS Advisers and users highlighted valuable points that support and contradict the *Personalisation In Practice*. TS Users confirmed that they agree with the work-practices that were empirically derived in the GT study. TS Advisers also agreed the importance of the work-practices for the successful communication handling process. However, the reason behind the existing *ad hoc* work-practices in areas like visually enhancing instruction, which would probably benefit from a more formal approach, is due to lack of definitions and guidelines in company based scenarios. A few new practices were suggested by TS Advisers from the responses of the survey such as alternative solutions through telephone communication, communication using emoji pictures, graphics or screenshots which are beyond the scope of this study.

6.3 Summary

This chapter discusses the similarities and differences of the research findings with the TS personalisation and other bodies of literature. Compared to the *Personalisation In Practice* findings of the GT empirical study in section 5.2, TS

and personalisation literature (Chapter 2) promote similar practices to establish and handle user's level of expertise, be aware of security concerns, generate visually appealing material, and clarify individual context. However, even though the GT empirical study and the literature promote identical categories of user level of expertise, the handling of these user levels of expertise differed slightly. The literature suggests abstract approaches to handle all ranges of user level of expertise including intermediate. In contrast the GT empirical study only provides evidence on how to handle novice and experienced user level of expertise but does so at a more concrete level, specifying the format of instruction to provide for those users. This chapter also discusses the resulting contributions of this work.

Chapter 7

Conclusion and Future Work

CHAPTER 7

7 Conclusion and Future Work

7.1 Overview

This chapter summarises my key findings in context with my stated research objectives. The research questions that identify the study are revisited. Furthermore this chapter describes the contribution of the study and its implication to research and practitioners in the Technical Support (TS) field of study. Finally the limitations of the study are discussed and potential areas of future work are suggested.

7.2 Answering the Research Questions

The original thesis questions from Chapter 1 are now revisited with a brief discussion of the results. The fundamental research question this study aims to answer is:

- How can we improve TS systems to satisfy user requirements in a more targeted, personalised manner?

This, in turn, is based on the following four specific questions:

- RQ1: What are the user characteristics found in TS?
- RQ2: What are the communication handling processes observed in TS?
- RQ3: What can we learn from the successful scenarios in TS with respect to user characteristics and communication handling?
- RQ4: What can we learn from the unsuccessful scenarios in TS with respect to user characteristics and communication handling?

To answer these questions, a GT analysis on a total of 115 threads and 3064 messages extracted from different open source forums across IT technical support

was carried out. Subsequently, a survey evaluating the results of the GT empirical study and a comparative analysis of the GT empirical findings with the wider literature were undertaken as reported in Chapters 4, 5 and 6 respectively. Overviews of the results are now presented:

RQ1: What are the user characteristics found in TS?

The grounded theory (GT) analysis result suggests seven attributes of user characteristics identified in TS forums, shown in chapter 5 (see Table 5-1). There are two main subcategories: a) *Level of expertise* that contains attributes that define the participants' level of knowledge and/or experience in the specific field and b) *User Values* which contains attributes that determine users' judgments on products/information provided. Similar to GT analysis, the literature identified users' characteristics at greater depth, but in isolation and without empirical evidence. For example, Xiao (2006) and Teltzro et al.'s (2004) study about user privacy characteristics in a personalisation preference and privacy preservation study. However, in GT, user characteristics identified in the empirical study are interconnected in several ways to improve the personalised TS handling process. Furthermore, the survey analysis identified similar user characteristics to the findings of the GT empirical study. For example, TS Users who participated in the survey ranged from novice through intermediate to experienced. However the survey analysis noted that TS Advisers do not have clear definitions and guidelines on how to handle these user characteristics. But the GT empirical study suggested how to handle novice and experienced user level of expertise.

Specifically, the GT empirical study indicates that users can be characterised not only according to a level of expertise, but also according to the values they place on the service, such as system security, credibility of the service, and different options with regards to affordability of the service available to them. These emerging user characteristics can be considered during company-based TS system development to enhance the service in a more targeted, personalised manner. The successful communication handling process, based on these

emerging user characteristics, suggests a degree of manageable individuality with economies of scale based on *persona clusters* of these characteristics.

RQ2: What are the communication handling processes observed in TS?

The analysis of the result of the GT empirical study suggests eight attributes of communication handling identified in TS forums, as shown in Chapter 5 (see Table 4-1). The *communication process* category has four subcategories: a) *activity* that defines actions performed by the participants during communication; b) *communication issues* that define problems that occurred during the communication process; c) *technical issues* that define the technical problems which affect communication and d) *emotions* that define the emotional conditions of the participants during the communication process.

The communication handling in *Personalisation In Practice* passes through different workflow phases such as: clarification, diagnosis and instruction (see Figure 5-1). Similarly all these phases are described in the literature (Section 2.1.3). In *Personalisation In Practice*, communication flows are open and informal; flexibility is built in, where more than one TS Adviser participates to fit user's requirements and experience level. However, according to the survey analysis results, communication flow is formally designated to TS Advisers regardless of their different personas. Additionally, the communication handling process was determined by the communication skills of the TS Adviser in both the GT empirical study and the survey (see Section 5.3).

The GT empirical study showed that different content is presented for different personas in different conditions according to users' prior knowledge and other characteristics of users. In *Personalisation In Practice*, TS Advisers are collaborative in their guidance and support, provide opinions, seek help in resolving their concerns and take into account the variations in each users level of experience and preferences, such as perceived quality, the affordability of the service and the credibility of the service provider to the user. In the literature we found different findings. For example, documentation and FAQs in TS service

come in the form of one-size-fits-all where users often find the information is difficult to follow due to their diverse characteristics, as described in section 2.1.4.1.

Communication handling processes have a variety of outcomes or consequences. The analysis result suggests 3 subcategories of outcomes identified in TS forums as shown in chapter 4 (see Figure 4-1): a) *successful* which contains the positive consequences or outcomes of the communication handling process. b) *unsuccessful* which contains the negative consequences or outcomes of the communication handling process. And c) the third category *indeterminate* which contains threads that ended up with a status of “undeterminable”.

RQ3: What can we learn from the successful scenarios in TS with respect to user characteristics and communication handling?

Empirical analysis of the TS forums shows that most of the action/interaction that makes the communication handling process successful in satisfying user requirements is as the results of a set of integrated *practices* (*Personalisation In Practice*). The empirically-derived ten practices help to handle and improve the quality of TS through focusing on the communication flow observed within TS forums. For example, users can be identified according to groups of characteristics such as level of expertise. Once grouped in terms of personas suggested by the characteristics identified, the communication can be adjusted accordingly. For example, the GT study and survey suggested that procedural instructions (a fixed step-by-step sequence of activities) were appropriate for novices. They also suggested mainly declarative answers (stating only facts) for expert users. In addition the literature suggested a mix of both for intermediate users.

The analyses of the GT empirical study were also compared with the wider literature, as shown in section 6.1. As a result some practices were similar to the findings of the GT empirical study. However, some practices were not well supported in the personalisation and TS literature, these practices, such as monitoring the communication flow, point towards online facilitator communication literature and marketing relationship theories literature.

Furthermore the survey evaluated whether these practices reflected the needs of TS Users as shown in section 5.3. As a result some practices like 'be aware of security concerns' were similar to the findings and a few new additional activities such as: automatically assigning the user a codename, and asking security verification questions were found which have not been identified in the GT empirical study. This is probably because the TS Users and advisers in the survey are different from the communities forums observed. Additionally few practices like 'manage relevant third-party products' have no explicit description and are more likely to seek TS support from other providers (see Section 5.3). Additionally some practices such as 'establishing and handling user level of expertise' overlap with the survey analysis but do not mirror the GT empirical findings.

There are some cross cutting practices such as a monitoring communication and moderator's involvement that are beneficial in many scenarios. Moderators become involved when recommendations have not been followed by the user, or when the TS Adviser is unsure of how best to help the user. Moderators are shown to be important in resolving any disagreements, or in adding clarity where needed. The involvement of moderators can turn an unsuccessful interaction between the user and TS Adviser into a successful interaction. It could be implemented in the context of company based TS for example when TS Advisers are doubtful about the communication handling process: they can use a moderator or indeed pass a query on to an expert in another area of knowledge.

RQ4: What can we learn from the unsuccessful scenarios in TS with respect to user characteristics and communication handling?

The GT study also observed reasons why unsuccessful practices occur and what can be learnt from these practices in future TS Adviser/user interactions in a company-based context. These findings were further evaluated in the survey. Additionally these unsuccessful practices, which are viewed as '*avoid*' recommendations for TS Advisers, were compared with the wider literature and evaluated with the survey. The GT empirical study, survey analysis and literature comparison agree that practices such as treating all users the same in terms of not

establishing a user level of expertise, not respecting different requirements for user privacy and security, and offering a premature response, have a big impact on the outcome of the communication handling process and problem solving. Absence of such practices found important to successful outcomes (described in RQ3) can lead to miscommunication and confusion, which may cause the user to feel uncertain about the information provided, create communication difficulties and loss of confidence in the service, and delay in reaching a solution.

Emotions may change the communication handling process, and influence the output. For example, the results of GT empirical study and survey analysis show that sarcasm or insulting TS Advisers leads to tangents and spirals into anger rather than reaching a resolution, and the frustration of the user may lead to insults and anger from both parties as typified by an unsuccessful ending of the thread.

One scenario of note is when the user is abusive. This is perhaps also an example of where dealing with users in an open source forum varies from a company based scenario. In open source forums, I found that some abusive users were banned from participating. The context of the forums is different to a company-based service agreements and therefore the abuse policy needs to be discussed in the company. Where for example, rather than banning a customer, the company may choose to escalate the thread to a manager. Furthermore the survey analysis, where TS Advisers were from a company-based scenario, suggests that a company needs to have a policy about how to deal with abusive users; creating such policies is outside of the scope of this study.

The GT data analysis found few unsuccessful threads (around 15%). However despite this low number of observed failures, I was able to establish that breakdown in communication can occur anytime during the interaction. The most common point of failure occurring was during initial clarification (29.4% of threads), followed by diagnosis (23.5% of threads) and especially during instruction (47.1% of threads). This result shows that TS Advisers need to be aware that breakdown in communication can occur any time during the communication, especially when giving instructions.

7.3 Research Contribution

This research has made a number of contributions as follows.

- The contributions are:
 - A set of user characterisations and personas
 - Explication of their interaction with successful and unsuccessful threads in TS forums and
 - An evaluated set of guidelines for effective TS behaviour

The final output is a set of empirically derived user characteristics which are applicable at a persona level for personalised TS services enhancement. The empirically derived *Personalisation in Practice* theory is a set of Requirements and work-practices for text-based personalised TS service enhancement for communication handling process and problem-solving systems. These are the first set of recommendations that have been empirically derived from TS forums and evaluated with potential TS users and TS advisors in the field.

7.4 Limitations

This research is limited by the choice of forum datasets, which in turn were in some ways limited by access to them. Specifically, the characteristics of online forum users may differ from the users that will interact directly with a development organisation as may the handling they can expect. For example in on-line forums users can be expelled but this is not always the case in commercial TS offerings. While, data collected from the 8 selected forums (comprising 116 conversation threads from 116 different users) allowed me to identify characteristics across a

range of different user types, I do not suggest that these findings can be generalised outside of the context of 8 Open Source forums. Future work might include a triangulation of data sources to include interviews with the TS experts giving advice, as well as the users asking for advice in other on-line and commercial TS services.

Some practices identified as leading to success in an Open Source forum (such as multiple responders engaging with the user at run time) may not be feasible in a company based TS scenario. Among the identified communication handling process a few practices drawn from the theoretical categories (as derived from the forums) may not be applicable to an In-house TS scenario, for example the practice of removing inappropriate users after warnings, since it affects a company's customer retention strategy. Future work is required to add confidence to my findings through a comparison of company-based datasets to produce more externally valid results.

Additionally, since the success of a given interaction is determined by a clear sign-off from the user, there were many threads that were indeterminate (I class this outcome as 'undeterminable'). While I was careful not to use these data in my analysis, it may contain patterns of communication that run counter to my findings.

Data derived from the TS forums contained different types of expression such as texts, symbols, gestures and abbreviated words. This research only concentrated on analysing text since the core purpose of this research is text-based communication in TS. The other expressions (such as emails, telephone calls, gestures and symbols in the text) have not been collected or analysed in this empirical study. These complementary expressions could be included in future studies to find a more concrete and rich set of individualised characteristics.

The forums in this research are selected randomly from IT technical support forums only having in mind the inclusion of the smallest and largest number of messages in a thread. The forum datasets from which the theoretical categories were derived was small compared to the existing forums when the requirement of theoretical

saturation was met. Different diversified datasets could be included to produce more externally valid results.

Personalisation characteristics can be found in users' personal profiles in forum registration records. However, in forums, recording personal profile information is optional; users may or may not provide this personal information. Hence it is difficult to get demographic data, such as age, country of residence, nationality, and their language preferences. In addition, few forums collect personal profile information. Again users are not obliged to provide this information when they register and most of the time they leave it blank (in line with their security concerns as noted in this thesis), provide unnecessary or irrelevant information or provide anonymous information. As a result, it is difficult to define personalised characteristics directly from these forums. Hence, the research tried to define the characteristics of personas using information that emerged from the content dataset only, by analysing the messages posted from the participants.

My origin is from Ethiopia and my mother tongue is Amharic and as a result there were analysis issues in my ability to interpret the colloquial messages in the forums, since English is my second language. However, frequent discussions with the research supervisors about emerging codes, concepts and categories provided a more balanced view. Presentations were made at the various Localisation Research Centre (LRC) meetings at the University of Limerick (UL), the Action week for Global Information Systems conference New Delhi, India, December 2010 and the Centre for Next Generation Localisation (CNGL) scientific program autumn meeting 2010, which were subject to peer critique gaining the experts' feedback.

There were also five peer-reviewed¹ publications published at various stages of the study that helped build confidence in the validity of the emerging theory, as presented at (all papers are attached at the end of the thesis):

¹ The focus of each publication with respect to the Thesis is made explicit in the list of PhD publication list and in the summary of the chapters.

- The proceedings of a conference on Human Language Technology for Development (HLTD) in May 2011, in Alexandria, Egypt, (Gizaw, S. & Buckley, J., 2011, March. Taxonomy of personalisation for Generating personalised content in Technical Support Forums. In Conference on Human Language Technology for Development, (pp 169-175))
- EASE' 14 proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering 2014, (Gizaw, S., 2014, May. An empirically derived personalisation framework for technical support. In Proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering (p. 55-59). ACM.)
- HuFo 2015 on the Human Factors in Software Development Process International workshop and proceedings of the 16th international conference on Product-Focused Software Process Improvement, (Gizaw, S., Buckley, J. and Beecham, S., 2015, December. Characterising users through an analysis of on-line technical support forums. In International Conference on Product-Focused Software Process Improvement (pp. 528-545). Springer International Publishing.)
- 16th International SPICE Conference on Process Improvement and Capability dEtermination (SPICE 2016), Dublin, Ireland, 9-10 June. Springer-Verlag, (Gizaw, S., Buckley, J. and Beecham, S., 2016, June. Empirically Derived Recommendations for Personalised Text-Based Technical Support. In International Conference on Software Process Improvement and Capability Determination (pp. 316-333). Springer International Publishing.)
- 20th International Conference on Evaluation and Assessment in Software Engineering (EASE '16), Limerick, Ireland, June 2016, (Gizaw, S., 2016, June. Personalised technical support for text-based interactions: a validation study. In Proceedings of the 20th International Conference on Evaluation and Assessment in Software Engineering (p. 8-12). ACM.)

As shown above the five publications are peer-reviewed. Thus the emerging codes, concepts and categories were deemed plausible. Other researchers with different backgrounds, and speakers of different languages could build on the work I have presented in my thesis, and the next section explores some areas that could benefit from further exploration.

7.5 Future Work

Additional research is needed to further examine *Personalisation In Practice* which is relatively new in its integration of the personalisation and localisation process. In this work, core categories empirically identified users' characteristics with different requirements and communication patterns that enable users' satisfaction. But three major future works can examine *Personalisation In Practice* as shown below:

7.5.1 Exploring Language and Cultural Importance

Data derived from the technical support forums indicate that there may be different cultural, locale and language differences. Further studies could explore this in more detail to empirically assess the significance of cultural diversity, which is beyond the scope this research.

Even though it was difficult to get information about users' demographic data such as age, country of residence, nationality and their language preferences, there was some indication that stakeholders are from different nationalities and speak different languages in the forums under study. A couple of examples of this come from transcripts p28:f50:s285 and p115:f209:s524 when an adviser and then a user says:

"I am Brazilian and my friends here in Brazil had the same problem yours, I see that I can solve your case (I have several solutions to this problem, I put one that I deleted your need, but if my hint does not work I put other, OK). I'm sorry if you could not read what is

written, correctly, that I use google translator service, as it is not efficient kkkkkkkkkk! !!!!! More that's not the case.”

Transcript: p28:f50:s285

“I am a people who speak a foreign language and is inside a completely strange problem first time. This is not a reproach for I appreciate you very much, but a testimony of my experience, I am over the Gauss average in I.Q.”

Transcript: p115:f209:s524

As shown in the above examples the user and TS Adviser are from different locales and are different language speakers. Even though it is difficult to rely on incomplete information, there is an indication that a user can communicate irrespective of their locale and language preferences which contextualise different Personalised characteristics. But that does not mean that the communication is optimal without some cognisance of their cultural personas that lead to successful TS outcomes as shown in section 5.2. Therefore there needs to be more detailed research done to find empirical evidence of this comparison.

7.5.2 Implementing *Personalisation* In Practice

This research describes *Personalisation* In Practice as well as the action/interaction of technical support forums and communication patterns. Personalised customer support implementers may consider this guidance, trail the guidelines and employ them if needed to satisfy user requirements by improving the system. Future studies could use this research theory as a guideline to build a Personalised Technical Support (PMS) system towards satisfying user requirements.

7.5.3 Developing Conceptual Personalised Data Models

There are different data models of database structure in software engineering such as hierarchical, network, relational or object oriented models. The complexity of

the process of *Personalisation In Practice* shows that contents are organised and delivered according to user requirements: This makes it successful and it might be difficult to define them in a relational manner. There is an indication from this research that contents are structured in a conceptual and semantic manner. Future studies in personalised customer care could consider having an ontological structured content, and guidelines that will provide an easy way to generate well-organised and structured content.

7.6 Concluding Remarks

The thesis represents the highlights of the exploratory work defining and categorising the theoretical concepts in technical support forums in IT. It can be used as a starting initial guideline for implementation rather than an end. The action/interaction resulting from conversations among participants and the meaning of the core theoretical categories should be taken as an indication that there is much more to be done.

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Appendix A- Glossary of Terms

Term	Definitions
Behaviour	The interest and involvement of the user in the product or services provided

Call centre	A dedicated operation in which TS Advisers receives telephone calls (Howard et al 2002)
Content preference	The type of content required by the user such as procedural , explanations or overview
Content type	The description to enable categories and manage content
Demographic make-up	The identity of the user such as age, gender
Documentation	A printed or electronically available manuals that provide instructions for using computer device programs or procedures that help maintain technical issues on the program (Lau et al 2004, Henry and Ashwani 2005)
Educational	The level of advancement, interactive type and interactive level of the educational material prepared to categorise users
Email-driven communication	An asynchronous text based communication channel that consists of interactions between people who may each play different roles in the TS process (Marco and Hans 2012)
Expositive	A detailed statement or explanation by demonstration
Frequently Asked Questions (FAQs)	Pre-stored question/answer pairs used in TS systems (Moreo et al 2013)
Hedonic	A characteristics that are devoted to pleasure

Knowledge state	The knowledge level of the user in the product or service
Online community forums	A place where users are able to share their bad or good experiences on various products or services with a large number of unknown people (Young and Rasik 2012)
Orientation	The mind-set of the user on the product or services provided
Pro-active actions	An action that takes place before the activation stage of software, where the activation stage is a stage where software is activated after installation using license number or certification process
Process type	The description of how each process is executed
Product state	Sometimes it is called the state of the process and it is the stage of the process that a user of the product currently needs help on
Re-active actions	An action that takes place on the reactivation state of software, where reactivation is a stage where the activation state is occurring for the second or more times because of the first activation time span ends or other software failure issues cause reactivation again
Remote troubleshooting	Online TS service by connecting to the device remotely (Janaka et al 2011)

TS Advisers	When a problem is reported by the user, TS Advisers will provide a series of suggestions to the users to implement or check as a means of rectifying the reported problem. TS Advisers are labelled differently in the literature: analysts (Kemal and Birgit 2000), operators (Heras et al 2009, Rajeev et al 2008) and advisers (Ann and Asa 2013), computer support specialist (Mira 2003) and service engineer, (Alexandra and Kelly 2010).
TS system providers	TS systems are a software system that encompasses communication, providing a platform for receiving queries from the user and manage the resources, response and delivering information. TS systems are responsible for receiving inquiries from their users using any communication channels and are managed by firms who are known as the service providers (Das 2003)
User values	The preferences of the user in the product or services provided
Users	As one of the stakeholders in TS systems, users report technology problems, issues or faults (Luz et al 2005). Users engage with TS systems adopting different information seeking strategies to address their issues, as described in section 2.1.2. Users are given different labels in the literature, such as 'client' (Sheng-Pao et al 2014), 'customer'(Shaw et al 2012), 'end-user' Ann and Asa 2013) where in this thesis I will use the term user.

Utilitarian	A characteristic that value things with usefulness rather than beauty.
Video conferencing	A communication channel with the ability to use video calling applications such as Skype, Google Hangouts and other applications to make calls and connect to see and hear each other (Tim et al 2012)
Urgency	The consequences of the increased time pressure and the speed of resolution are occurring.
Severity	A critical condition of the problem where the process of finding the solution to a problem is difficult.

Appendix B: Literature Review Protocol for Technical Support

1. Introduction

This Technical report contains the procedure followed to perform systematic literature review based on the systematic literature review protocol stated for Software Engineering (Beecham et al 2009). This technical report explains the selection of journals and proceedings and validation process. The literature review investigates the state of the art in Technical support while identifying the gaps in the current researches and implementations in software engineering Technical Support stream.

2. Research Questions

The fundamental question that the research tries to answer is: The fundamental question that the research tries to answer is: How can we improve technical support systems to satisfy user requirements in a more targeted, personalised manner? To answer this main question, 11 questions were derived as follows:

RQ1: How is Technical Support defined in Software IT?

RQ2: What empirical studies exist in literature for Technical Support in Software IT?

RQ3: What framework exists in literature for Technical Support in Software IT?

RQ4: What are the different types of Technical Support of business model?

RQ5: What kinds of services are provided by Technical Support?

RQ6: What are the pros and cons of each type of Technical Support Systems?

Pros and cons, type, Technical Support, System

RQ7: What are the tasks involved in Technical Support?

The tasks involved, process, workflow, Technical Support,

RQ8: Who are the stakeholders involved in Technical Support?

RQ9: What is the problem-solving techniques used for each task involved in Technical Support?

RQ10: What are the pros and cons of each problem-solving techniques used in Technical Support Systems?

Pros and cons, problem-solving techniques, Technical Support

RQ11: What are the quality metrics of Technical Support in Software IT?

3. Search String

The search string is derived from the research questions by extracting terms from the questions. The search string also identified alternative spellings, synonyms and use quotation marks (") to enclose phrases or word strings. The search string contains logical operators such as 'OR' and 'AND' to merge search strings.

4. Data Source

The search was performed in the following digital databases:

- ACM Digital Library
- IEEEExplore
- ScienceDirect

The search strings were prepared and applied in each digital database. The results of the search are exported and stored in the Excel in CVS format. The URL links for each database, including the result messages are shown as follows:

- ACM Digital Library

<http://dl.acm.org/results.cfm?query=Technical%20Support%20or%20Customer%20Support%20or%20Help%20Desk&querydisp=Technical%20Support%20or%20Customer%20Support%20or%20Help%20Desk&start=1&slide=1&srt=score%20dsc&coll=DL&dl=ACM&source disp=&source query=Owner%3AACM&since m>

[onth=&since_year=&before_month=&before_year=&termshow=matchall&range_query=&dimval=4294966048&CFID=374993044&CFTOKEN=43608106](http://ieeexplore.ieee.org/search/searchresult.jsp?refinements%3D4291944822%2C4291944246%2C4294965438%2C4292516310%2C4294329967%2C4284073622%2C4292261119%2C4293572042%2C4292410675%26ranges%3D2000_2014_p_Publication_Year%26matchBoolean%3Dtrue%26searchField%3DSearch_All_Text%26queryText%3D%28%28%28%28%22Technical+Support%22+OR+%22Customer+Support%22+OR+%22Help+desk%22+OR+%22Customer+Services%22%29+AND+%28%28%22Information+Technology%22+OR+IT+OR+Software%29+OR+%28empirical%29+OR+%28Framework%29+OR+%28In-house+OR+outsourc*%29+OR+%28Documentation+OR+FAQ+OR+Telephone+OR+%22Call+cent*%22+OR+Email+or+Web-based%29+OR+%28Process+OR+workflow+OR+task%29+OR+%28Actors+OR+Operators+OR+role+OR+Advisers+OR+stakeholder*%29+OR+%28Problem-solving+or+metrics+OR+improve%29+OR+%28Quality+OR+Effectiveness%29%29%29%29&refinements=4294956274&refinements=4284335831&refinements=4292246061&refinements=4294951614&pageNumber=1&resultAction=REFINE)

- IEEEXplore

http://ieeexplore.ieee.org/search/searchresult.jsp?refinements%3D4291944822%2C4291944246%2C4294965438%2C4292516310%2C4294329967%2C4284073622%2C4292261119%2C4293572042%2C4292410675%26ranges%3D2000_2014_p_Publication_Year%26matchBoolean%3Dtrue%26searchField%3DSearch_All_Text%26queryText%3D%28%28%28%28%22Technical+Support%22+OR+%22Customer+Support%22+OR+%22Help+desk%22+OR+%22Customer+Services%22%29+AND+%28%28%22Information+Technology%22+OR+IT+OR+Software%29+OR+%28empirical%29+OR+%28Framework%29+OR+%28In-house+OR+outsourc*%29+OR+%28Documentation+OR+FAQ+OR+Telephone+OR+%22Call+cent*%22+OR+Email+or+Web-based%29+OR+%28Process+OR+workflow+OR+task%29+OR+%28Actors+OR+Operators+OR+role+OR+Advisers+OR+stakeholder*%29+OR+%28Problem-solving+or+metrics+OR+improve%29+OR+%28Quality+OR+Effectiveness%29%29%29%29&refinements=4294956274&refinements=4284335831&refinements=4292246061&refinements=4294951614&pageNumber=1&resultAction=REFINE

((("Technical Support" OR "Customer Support" OR "Help desk" OR "Customer Services") AND (("Information Technology" OR IT OR Software) OR (empirical) OR (Framework) OR (In-house OR outsourc*) OR (Documentation OR FAQ OR Telephone OR "Call cent*" OR Email or Web-based) OR (Process OR workflow OR task) OR (Actors OR Operators OR role OR Advisers OR stakeholder*) OR (Problem-solving or metrics OR improve) OR (Quality OR Effectiveness))))))

- ScienceDirect

http://www.sciencedirect.com/science?_ob=ArticleListURL&_method=list&ArticleListID=619832858&_st=5&filterType=&searchtype=a&originPage=rslt_list&origin=&multType=&md5=4cfe6624dacde5ad631fb2fae0f63a34

Search results: 1,643 results found for pub-date > 1999 and (((("technical support" or "customer support" or "help desk" or "customer service") and(("Information Technology" or IT or Software) or(empirical) or (Framework) or (In-house or outsourc*) or (Documentation or FAQ or Telephone or "Call cent*" or Email or Web-based) or (Process or workflow or task) or (Actor* or Operator* or role* or Advisers or stakeholder*) or (Problem-solving or metric* or improve) or (Quality or Effectiveness)))) AND

LIMIT-TO(cids, "271506,271670,271653,271515,271709,271625","Expert Systems with Applications,Information & Management,Decision Support Systems,Computer Communications,Computers & Operations Research,Information Sciences").

5. Inclusion and Exclusion criteria

To be included in the literature review, the study must focus on Technical Support in SE. Each paper is assessed in degrees of detail as shown in Table 8-1, from search step 1–5; the final set of 89 papers all appear to focus on TS in SE. The research process eliminates paper that does not address the research questions. The search adopted the following inclusion and exclusion criteria:

Inclusion criteria:

- Papers that directly answer the research questions
- Peer Reviewed
- Be dated to between 2000 to date
- Relate directly to the technical support in the software domain
- Only Journals and proceedings
- Empirical studies
- Frameworks

Exclusion Criteria:

- That does not answer the research questions
- Out of software domain, such as medicine etc.
- Published before 2000
- Textbooks, overhead presentations, posters, lecture notes
- In progress studies
- Theoretical reports

6. Conduct the search

The searching process conducted using many processes as shown in this section. The general search strings are applied in all three digital databases selected. Few inclusion and exclusion criteria such as date range are applied before downloading the results. All search results are downloaded in the spreadsheet in CVS format. After downloading and removing the duplicates, examining titles and abstract process continued. Each inclusion and exclusion criteria are applied in order to categorise the papers as either *accepted* or *rejected* or *maybe*. The accepted papers are further examined by reading the full article. Finally the papers accepted after reading the full articles will be used to describe the literature review.

7. Results

After performing the search strings on the digital databases a total of 3713 journals and proceedings was identified. The inclusion and exclusion criteria were applied to the title and abstract, which results 157 papers. The result shows after the duplicated journals and proceedings are removed as shown in the Table 8-1. Finally, after reading the 157 papers, 89 papers are accepted.

Table 8-1: TS Literature Review Process

Appendix C- Literature Review Protocol for Personalisation frameworks

Search Step	Selection Criteria Applied	Data Bases Searched			Total	Validation ² (supervisors)
		Science Direct	IEEEExplore	ACM		
1	Search String ³	2063	1063	587	3713	(after 3 iterations, string agreed)
2	Only Publications and Journals between 2000-2014	1643	829 ⁴	194 ⁵	2666	Inclusion and exclusion criteria
3	Title	300	196	14	510	Every 20 th paper selected for agreement
4	Abstract	61	82	14	157	Every 10 th paper selected for agreement
5	Full paper	37	38	14	89	Every paper checked – between supervisors

1. Introduction

The main objective of this Literature Review is to identify personalisation frameworks. Details of these personalisation frameworks will be investigated to analyse the following three questions: (1) How is the personalisation framework constructed? (2) What attributes are included in the framework? And, (3) what are the sources of these attributes?

I have formulated the search key terms with the synonyms of personalisation and synonyms of frameworks. The search key string is the intersection of synonyms of personalisation and synonyms of frameworks.

2. Search key

((Personalisation OR Personalization OR individualization OR Individualisation OR Customization OR Customisation OR Persona) AND (Framework OR Model OR

² Validation process: Random Selection of papers given to supervisor to check agreement.

³ Search String: {

((("technical support" OR "customer support" OR "help desk" OR "customer service*") AND (("Information Technology" OR IT OR Software) OR (empirical) OR (Framework) OR (In-house OR outsource*) OR (Documentation OR FAQ OR Telephone OR "Call cent*" OR Email or Web-based) OR (Process OR workflow OR task) OR (Actor* OR Operator* OR role* OR Advisers OR stakeholder*) OR (Problem-solving or metric* OR improve) OR (Quality OR Effectiveness))))

}
⁴ Duplicates removed

⁵ Duplicates removed

Metamodel OR Meta-model OR groundwork OR Scheme OR Schema OR “frame of reference” OR Structure OR ontology))

- **Inclusion and exclusion criteria**

Check1: the process of selection of papers includes the following inclusion and exclusion criteria (see Table 8-2)

- **Inclusion criteria**

- Publication Year: 2001-2014 to identify the changes in TS over the years
- Publisher: IEEE, ACM, Scopus
- Content type: Conference publications include only peer reviewed papers which are reliable and that reflects the thinking of the time of publication, Journals
- Publication Title: which are related with the main objective

- **Exclusion criteria**

- Published before 2000
- Not IEEE publisher
- Books and magazines
- Publication Title: Which are not related to the main objective

Check2: Based on Title

- **Exclusion Criteria**

- Which are not related to the main objective
- Not personalisation framework

- **Inclusion Criteria**

- Which are related with the main objective
- Personalisation framework
- Conceptual framework (Ontology, Schema, Model)

Check 3: Based on Abstract

- **Exclusion Criteria**

- Which are not related to the main objective
- Not personalisation framework
- Mathematical (Algorithms, XML Schema, Ontology)
- Software Architecture
- Duplicates

- **Inclusion Criteria**

- Which are related with the main objective
- Personalisation framework
- Conceptual framework (Ontology, Schema, Model)

Check 4: Based on Full Paper

- **Exclusion Criteria**

- Not personalisation framework
- Mathematical (Algorithms, XML Schema, Ontology)
- Software Architecture

- **Inclusion Criteria**

- Which are related with the main objective
- Conceptual framework (Ontology, Schema, Model)

Table 8-2: Personalisation Literature Review process

Check	Selection , Search Criteria Applied	Databases Searched			Total
	Based On	Scopus	IEEE X	ACM	
1	Search	177	82	47	306
2	Title,	37	17	24	77
3	Abstract	12	7-2 Duplicates =5	10- 3 Duplicates = 7	23
4	Full Paper	2 additional paper from	2	1	5

		ScienceDirect and European Journal of Marketing			
--	--	--	--	--	--

3. Databases

I have applied the search keys into three databases: IEEExplore, ACM and Scopus. Each database has different syntax on how to apply search keys on different content types such as: Title abstract, key words etc. Thus each search key with syntax on each databases are stated as follows:

- **IEEExplore**

For IEEExplore two different syntaxes are applied:

Syntax 1: Searching for title

(("Document Title": Personalisation OR "Document Title": Personalization OR "Document Title": Individualization OR "Document Title": Individualisation OR "Document Title": Customization OR "Document Title": Customisation OR "Document Title": Persona) AND ("Document Title": Framework OR "Document Title": Model OR "Document Title": Metamodel OR "Document Title": Meta-model OR "Document Title": groundwork OR "Document Title": Scheme OR "Document Title": Schema OR "Document Title": "frame of reference" OR "Document Title": Structure OR "Document Title": Ontology))

Link:http://ieeexplore.ieee.org/search/searchresult.jsp?refinements%3D4291944822%2C4291944246%2C4293104691%2C4292225731%2C4293572221%2C4293410151%2C4293326433%2C4293115415%2C4293109775%2C4292516310%2C4292142328%2C4283192402%2C4294932029%2C4294285445%26ranges%3D2000_2014_p_Publication_Year%26matchBoolean%3Dtrue%26searchField%3DSearch_All_Text%26queryText%3D%28%28%28+p_Title%3APersonalisation+OR+p_Title%3A+Personalization+OR++p_Title%3Aindividualization+OR++p_Title%3AIndividualisation+OR++p_Title%3ACustomization+OR++p_Title%3ACustomisation+OR++p_Title%3APersona%29+AND+%28+p_Title%3AFramework+OR++p_Title%3AModel+OR++p_Title%3AMetamodel+OR++p_Title%3AMeta-model+OR++p_Title%3Agroundwork+OR++p_Title%3AScheme+OR++p_Title%3ASchema+OR++p_Title%3A%E2%80%9Cframe+of+reference%E2%80%9D+OR++p_Title%3AStructure+OR++p_Title%3Aontology%29%29++%29&refinements=4294289673&refinements=4294035632&refinements=4293796753&pageNumber=1&resultAction=REFINE

27 Results returned

Syntax 2: Searching for Abstract

(("Abstract": Personalisation OR "Abstract":Personalization OR "Abstract":individualization OR "Abstract":Individualisation OR "Abstract":Customization OR "Abstract":Customisation OR "Abstract":Persona) AND ("Abstract":Framework OR "Abstract":Model OR "Abstract":Metamodel OR "Abstract":Meta-model OR "Abstract":groundwork OR "Abstract":Scheme OR "Abstract":Schema OR "Abstract":“frame of reference” OR "Abstract":Structure OR "Abstract":ontology))

Link: http://ieeexplore.ieee.org/search/searchresult.jsp?refinements%3D4291944822%2C4291944246%2C4294932029%2C4294946999%2C4293949459%2C4292516310%2C4294329967%2C4293103244%2C4293423549%2C4293982982%26ranges%3D2000_2015_p_Publication_Year%26matchBoolean%3Dtrue%26searchField%3DSearch_All_Text%26queryText%3D%28%28%28+p_Abstract%3APersonalisation+OR++p_Abstract%3APersonalization+OR++p_Abstract%3AIndividualization+OR++p_Abstract%3AIndividualisation+OR++p_Abstract%3ACustomization+OR++p_Abstract%3ACustomisation+OR++p_Abstract%3APersona%29+AND+%28+p_Abstract%3AFramework+OR++p_Abstract%3AModel+OR++p_Abstract%3AMetamodel+OR++p_Abstract%3AMeta-model+OR++p_Abstract%3Agroundwork+OR++p_Abstract%3AScheme+OR++p_Abstract%3ASchema+OR++p_Abstract%3A%E2%80%9Cframe+of+reference%E2%80%9D+OR++p_Abstract%3AStructure+OR++p_Abstract%3Aontology%29%29%29&removeRefinement=4293982982&pageNumber=1&resultAction=REFINE

54 Results returned

Total $27+54 = 81$

- **ACM Digital library**

(Title:Personalisation OR Title:Personalization OR Title:Individualization OR Title:Individualisation OR Title:Customization OR Title:Customisation OR Title:Persona) and (Title:framework OR Title:Model OR Title: Metamodel OR Title:Meta-model OR Title:groundwork OR Title:Scheme OR Title:Schema OR Title:“frame of reference” OR Title:Structure OR Title:Ontology) and (PublishedAs:journal OR PublishedAs:proceeding)
Found **47** within *Publications from ACM and Affiliated Organizations*

Link: <http://dl.acm.org/results.cfm?within=%28Title%3APersonalisation+OR++Title%3APersonalization+OR+Title%3AIndividualization+OR++Title%3AIndividualisation+OR+Title%3ACustomization+OR+Title%3ACustomisation+OR+Title%3APersona+%29+and+%28Title%3Aframework+OR+Title%3AModel+OR+++Title%3AA+Metamodel+OR+Title%3AMeta-model+OR+Title%3Agroundwork+OR+Title%3AScheme+OR+Title%3ASchema>

[+OR+Title%3A%E2%80%9Cframe+of+reference%E2%80%9D+OR+Title%3AStructure+OR+Title%3Aontology%29+and+%28PublishedAs%3Ajournal+OR+PublishedAs%3Aproceeding%29&CFID=502273728&CFTOKEN=48297193&adv=1&COLL=DL&qrycnt=3&DL=ACM&termzone=all&allofem=&anyofem=&noneofem=&peoplezone=Name&people=&peoplehow=and&keyword=&keywordhow=AND&affil=&affilhow=AND&pubin=&pubinhow=and&pubby=&pubbyhow=OR&since_year=2000&before_year=2015&pubashow=OR&sponsor=&sponsorhow=AND&confdate=&confdatehow=OR&confloc=&conflochow=OR&isbhow=OR&isbn=&doi=&ccs=&subj=&Go.x=28&Go.y=9](#)

- **Scopus**

Link : (TITLE-ABS

KEY ((personalisation OR personalization OR individualization OR individualisation OR customization OR customisation OR persona)) AND TITLE-ABS-KEY ((framework OR model OR metamodel OR meta-model OR groundwork OR scheme OR schema OR "frame of reference" OR structure OR ontology))) AND SUBJAREA (mult OR ceng OR CHEM OR comp OR eart OR ener OR engi OR envi OR mate OR math OR phys) AND PUBYEAR > 1999 AND (LIMIT-TO (DOCTYPE , "cp")) AND (LIMIT-TO (SUBJAREA , "COMP")) AND (LIMIT-TO (EXACTSRCTITLE , "ACM International Conference Proceeding Series") OR LIMIT-TO (EXACTSRCTITLE , "Communications in Computer and Information Science"))

177 Found

Link: [230](http://www.scopus.com/results/results.url?cc=10&sort=plf-f&src=s&st1=%28Personalisation+OR+Personalization+OR+individualization+OR+Individualisation+OR+Customization+OR+Customisation+OR+Persona%29&st2=%28Framework+OR+Model+OR+Metamodel+OR+Meta-model+OR+groundwork+OR+Scheme+OR+Schema+OR+%22frame+of+reference%22+OR+Structure+OR+ontology%29&nlo=&nlr=&nls=&sid=A504A57452FCB79CD85C7A8A29D5642F.FZg2ODcJC9ArCe8WOZPvA%3a200&sot=b&sdt=cl&cluster=scosubtype%2c%22cp%22%2ct%2bscosubjabbr%2c%22COMP%22%2ct%2bscoexactsrctitle%2c%22ACM+International+Conference+Proceeding+Series%22%2ct%2c%22Communications+in+Computer+and+Information+Science%22%2ct&sl=408&s=%28TITLE-ABS-KEY%28%28Personalisation+OR+Personalization+OR+individualization+OR+Individualisation+OR+Customization+OR+Customisation+OR+Persona%29%29+AND+TITLE-ABS-KEY%28%28Framework+OR+Model+OR+Metamodel+OR+Meta-model+OR+groundwork+OR+Scheme+OR+Schema+OR+%22frame+of+reference%22+OR+Structure+OR+ontology%29%29+AND+SUBJAREA%28MULT+OR+CENG+OR+CHEM+OR+COMP+OR+EART+OR+ENER+OR+ENGI+OR+</p>
</div>
<div data-bbox=)

Appendix D - Transcripts

Transcript: p33:f6

005 Q: *I need to re-format my HDD. [Reasoning] I have entered cmd format C: I am being asked to enter volume label. How do I find the damn thing?*
[Questioning]

009 R1: *Are you typing that command while in Windows 7? [Clarification Question , checking the knowledge experience]*

010 *Once you format what do you intend to do for an operating system*
[Clarification Question]

Memo: *I think Even though the questioner gave a reason, it was not full reason information. The respondent making sure where exactly the action is performed and it looks in the respondents' opinion the questioner is performing the action in a wrong place.*

014 Q: *If I can ever format this thing I am going to install win 7 ultimate. [new additional reasoning] I don't have the disk yet I just want to prepare the PC*

Memo: *The questioner has given another new further reasons but this looks enough information.*

- 018 *Q: I have found the volume label. I keep getting messages that I cannot format/delete etc [changing the question]*
- Memo:** *The questioner found a solution to the first question however it leads him to other problem. I think he didn't actually solve the problem and hasn't give a full explanation for the problem*
- 022 *R2: I think you don't need type volume label [late response]*
- 026 *Q: I just want to know HOW I can format the C drive [Emphasis]. I have tried storage disk management there is no option to format or delete either partition or drive i.e. options greyed out*
- Memo:** *I think The questioner Emphasis is because he has got late response that only responds to his prior question because of negative response.*
- 033 *R3: Did you not know that when you do a fresh install, the OS disc will be used to format your drive? [Instruction]*
- 034 *The only prep you should have for your PC is getting the updated drivers (you will need them) and enough Ram to run the OS.*
- Memo:** *The respondent gave him the right response for the question*
- 038 *R1: Just boot to the Windows 7 DVD and Windows can partition and format the hard drive. As was mentioned above you may need to provide some hardware drivers. That depends on the age of your hardware.*
- Set the boot order in the BIOS (setup) to boot to the CD drive before the hard drive. Then watch the screens for a message to hit any hit to boot to the CD. Do so and then follow the on screen prompts.[Good Instruction]*
- 039
- 043 *Q: I don't have the DVD as yet I am just trying to prepare the PC for when it arrives [Low level experience response]*
- Memo:** *The questioner has responded unexpected response. I think this shows that the user doesn't have a full knowledge what he is doing*
- 047 *R1: You can't format the hard drive while you are in Windows. That is like sawing off a limb while standing on it. Why would you want to disable a working computer before it is necessary. [Insulting the questioner]*
- Memo:** *Because of unexpected response the respondent is started insulting the questioner*
- 057 *R4: would you cut off your legs while running a race?*

058 *think about it.*

059 *this is what you are asking windows to do to itself while you are in it.*

060 *There is no need to "prepare" the disk.*

061 *I would advise you not to use ANYTHING except the windows 7 dvd to partition/format the drive. [Emphasis]*

062 **Memo:** *Precise examples and emphasising to advise the questioner continues since he couldn't understand the advice provided to him*

063 *Q: Of course no one should use sharp tools when running.*

064 *I need to wipe disk to rid it of virus contamination that no anti-virus software blocked. Other than a complete clean disk, what would you suggest? install new software onto an infected disk. I think not [Reasoning]*

065 **Memo:** *At last the questioner gave the ultimate reason of the question provided on the first place*

066 *R1: When booting Windows 7 you will then have the option to format or if you wish even delete all partitions and start over again. That process is no different than what you were trying to do. [Instruction]*

067 *If you are really concerned about cleansing the disk then download killdisk and use it from the boot to wipe the drive by writing to every single sector.*

068 *At any rate as I stated before, you can't format the hard drive that has Windows installed on it while in Windows.*

069 *Had you explained what your reason was we could have advised you sooner.[Problem of stating the question properly]*

070 **Memo:** *The respondent reminded the questioner it would have been better to state the question and reason in the first place*

071 *R3: I think this poster is not reading the answers*

072 *"It's hard to soar like an Eagle when you are flying with Turkeys" [Insulting]*

073 *Q: I think that the ones answering are not reading the posts [Offended by the response]*

074 *R3: I doubt that, they have given you the best answers but you refuse to agree with them*

094 *Q: My mistake. I appreciate the advice I was just a little panic stricken about the virus attack and believe me one does not need 'I know it all types' at that moment [Apologizing]*

098 *R: So, if you intend to wipe your entire drive, what is the panic about. You evidently consider anything on the drive already gone. You never responded about whether or not your hardware can support [Instruction]*

Transcript: p58:f113

9 *Q: Hi everyone, I built this computer about a week ago:*

11 *Q: Asus P8Z68-V LX Socket 1155 Onboard graphics output 8 Channel Audio ATX*

12 *Q: Intel Core i3 2100 3.10GHz Socket 1155 3MB L3 Cache*

13 *Q: Seagate 500GB 3.5" SATA-III 6Gb/s Barracuda Hard Drive 7200RPM 16MB Cache etc...*

19 *Q: It was running great right up to today, it could easily run Photoshop, web browsing, Flash, Age of Empires 3 (almost max settings) and didn't cause any problems.*

21 *Q: Although, I noticed a high pitched squeal coming from the GPU so I searched for solutions on Google. I found that it could be a problem of the card not being placed properly so I plugged all the connections out, moved it to somewhere with good light, and reseated the GPU.*

23 *Q: When I plugged everything back in, it wouldn't turn on! No fans, no nothing. But, the light on the motherboard was on.*

31 *Q: Please help me fix this problem as I am only 16 and £350 was a lot of money to me and I don't want it wasted.*

41 *Q: A tricky one to diagnose but I will give some suggestions.*

850 *Q: This nightmare will never end. The replacement wifi card finally arrived today and I tried it in 2 PCI slots and it didnt work.*

Transcript: p118:f212

12 *Q: Someone is hacking in to my computer and silently watching everything i do..any ideas on how to stop this?*

30 *R: A few questions, just to clarify the situation:*

32 *R: How do you know she is accessing the online accounts?*

34 *R: Were you using the same password for several accounts?*

36 *R: Did she have physical access to your computers at any point?*

48 *Q: hello...well, she hacked into my aol accounts and she messed up by removing her boyfriends names from my buddy list. That's how I knew it was her. Also she hacked into my facebook account and added herself. As soon as that happened I created a new email account and within 2 minutes she was on it. No, she has no physical access to my computers. Oh and no to the question about using the same passwords.*

Transcript: p78:f133

8 *Q: I have a bluescreen error that I haven't been able to resolve.*

10 *Q: I'm running a Dell Dimension 2400 with Windows XP SP3.*

12 *Q: Initially when I turned on the PC, Windows did load and I had an active mouse pointer but all programs were unresponsive. The start menu would respond about 5 minutes after I'd clicked it but nothing else responded at all.*

- 14 *Q: After rebooting a couple of times I tried to boot from the Windows CDROM. It seemed to load at first but then gave me the bluescreen, which has appeared every time I've restarted since.*
- 16 *Q: I've tried using recovery console and booting in safe mode but nothing works and I therefore can't download any help tools or use any other programs to help or delete anything to free up space because the computer won't start in the first place. (I'm typing this from a different PC.)*
- 18 *Q: There is no actual description of the error on the bluescreen but the stop codes are:*
- 20 *Q: 0x0000007E (0xC0000005, 0xF849C2B2, 0xF894F4A0, 0xF8494F1A0) FLTMGR:SYS - Address F849C2B2 base at F8484000, Datestamp 486251da*
- 23 *Q: Can anyone help? I'd be grateful for any assistance at all, especially if it will save me from having to pay helpline fees that I can't afford!*
- 25 *Q: Thanks in advance.*
- 33 *R: lot of information about this one on the 'web, and it seems to be a filter for the file system. That pretty much points toward a corrupt or faulty hard drive. It COULD be a virus, but the fact you still get the error when booting from the Windows setup CD indicates otherwise*
- 35 *R: I think the first thing to try is to identify the hard drive manufacturer, then download the relevant bootable diagnostic CD for that drive, and then run a full set of diagnostic tests on the drive*
- 36 *R: If you post again with the make of drive we can probably point you in the right direction for the download*
- 47 *Q: Many thanks. I'll check the manufacturer and get back to you.*

49 *Q: I agree that it's unlikely to be a virus purely because I have quite a lot of decent protection, although I know that things can still get past.*

p18:f26:s44-47

- *“Using the ATI Catalyst Windows Vista driver under Windows 7 is not officially supported by AMD, and as such AMD will not provide any form of customer support for users running in this configuration.”*

p55:f110:s61-66

- *“I have asked for the solution the Canon tech support, and the service guy confirmed that it's a software problem residing on my OS installation. He advised me to create a clean account with admin rights and try to make a scan from there. This did not work, scanning head got stuck at the bottom position again.”*

p59:f114:s164-169

- *““Asus support”, they've hung up on me twice. And that's what I thought at first, but, if it was faulty why would it be detecting my old HDD perfectly fine?”*

p61:f116:s154

- *“Thank you. lol.... Asus makes some great machines, but their customer support sucks.... might take awhile.”*

p103:f158:s15-22

- *“I went to tech support at the involved sites, D-Link support, and to my ISP, and I've tried tracert & pinging, etc., but none of the results help much. Plenty of suggestions, usually “clear your cache” or “try a reboot,” but nothing that works.”*

p108:f202:s117-120

- *“I am having the same problem with elertgadget website and spent 5 hours with 5 different Comcast Tech support reps trying all sorts of fixes, none of which worked. Have any of you found a fix for this yet?”*

p111:f205:s195-197

- *“I talked with some EA Support guys, like ten times, last one said that " Your driver is not updated, please update it " I don't know what driver it is or anything.. I used program to find old drivers. It said everything is updated. Also downloaded DriverSweeper, to try remove and redownload drivers, but it was too hard to know which drivers I remove etc. So I gave up that idea.”*

Appendix E-Success Criteria

Criteria	Purpose	Quality Factors
Establish and handle user level of expertise	TS should accommodate with the different individual level of expertise of the user. It should also give individual attention.	Empathy
Establish user perceived value to build user trust and loyalty	TS experts should respect the user loyalty of a specific brand. Give a prompt service to the user. Don't provide premature response. Not relegate or promote products or service. Be competent.	Responsiveness

	Not lose the confidence of the user.	
Be aware of security concerns	<p>TS providers should make the user feel safe when using the service and do not jeopardise users security.</p> <p>TS experts should warn users to take measures from unknown security risks.</p>	Assurance
Understand user's affordability concerns	<p>Users have a willingness to pay for the product or a service by valuing other attributes implicitly linked to a purchased service like warranty or after-sales services.</p> <p>TS should provide different options</p>	
Manage relevant third-party products	When the problem needs a third-party products or service, provide alternative to solve a problem to make the service provider dependable.	Tangible
Generate visually appealing material	<p>TS providers should prepare content that has visually appearing materials by emphasising part of the text to highlight a note or reminder not to miss instruction.</p> <p>Gives users a prompt service such as a step-by-step follow up instructions.</p>	Tangible

	<p>TS experts should understand the signals of emphasis messages sent by the user such as expressing their frustration, anger or their satisfaction.</p>	
<p>Monitor the communication flow</p>	<p>TS experts should minimize the communication issues such as misinformation, misunderstanding and confusion.</p> <p>If it occurs, identify the errors and correct the mistakes. Avoid the source of communication issues such as responding prematurely, not having up-to-date information; making sure to provide accurate information.</p>	<p>Informativeness</p> <p>Responsiveness</p>
<p>Manage Emotions</p>	<p>TS experts should avoid circumstances that make the user angry, frustrate such as a long clarification or diagnosis process; aggravate the communication process; insulting the user.</p> <p>Try to have a good communications and give individual attention to the user. Improve the satisfaction of the user with the overall service</p>	<p>Empathy</p> <p>Entertainment</p>

Appendix F- Questionnaires

Appendix F1- Questionnaire for TS Advisers

[TS Advisers]

All questions relate to text-based communication. Where we state ‘user’ we mean the person you are interacting with your role as TS adviser. IT in this context means anything relating to a computer: both hardware and software, from a desk-top computer, tablet, or android phone.

I. Role: What is your role? (Please tick one of the following)

- a) TS adviser ☐
- b) TS manager ☐
- c) TS and developer ☐
- d) Other (Please explain)

II. Background Characteristics

1. How many years have you worked in Technical Support? (Please tick one of the following)

- Less than a year []
- 1-2 years []
- 3-4 years []
- 5-7 years []
- 8-11 years []
- More than 12 years []

2. What is your highest education level? (Please tick one of the following)

- a) High school leaving cert. []
- b) Diploma []
- c) First degree []
- d) Second degree and above []

III. Dealing with level of user expertise

3. When dealing with a user using text based communication how often do you establish their level of experience before offering help? (Please tick one of the following)

- a) Always []
- b) Sometimes []
- c) Never []

3.1 Please elaborate on why

3.2 Do you have any practices for dealing with different levels of expertise?
(Please tick one of the following)

- Yes []
- No []
- Don't Know []
- I treat all users the same regardless of their experience level []

3.3 If 'Yes', what are these practices?

a. For *inexperienced* users

b. For *experienced* users

3.4 Please enter any other comments dealing with user's IT experience:

4. When dealing with a user using text based communication, does your company provide paid individualised services (*individualised follow up , access to TS support advisers instantaneously, higher service level agreement of problem resolution*) customer services?

- a) Yes []
- b) No []
- c) Don't Know []
- d) Not Relevant []

4.1 If 'Yes' how often are users' willing to pay for these services?

- a) Always []
- b) Sometimes []
- c) Never []

4.2 If 'Yes', please list factors that would influence TS Users decision to pay for these after-sales TS services?

4.3 Please enter any other comments regarding paid individualized services

V. Building Trust

5. When dealing with a user using text based communication how often do you explicitly take steps to build users' trust? (Please tick one of the following)

- a) Always []
- b) Sometimes []
- c) Never []

5.1 Please elaborate on why

5.2 Please list the practices you perform to build users' trust during text based communication.

5.3 Please enter any other comments regarding practices you perform to build users' trust not sticking to closed questions so that the user feels free to embellish his answers to include other possible relevant answers.

VI. Tailored Instructions

6. When dealing with a user using text based communication how often do you tailor instructions to make the material visually appealing? (Please tick one of the following)

- a) Always ☐
- b) Sometimes ☐
- c) Never ☐

6.1 Please elaborate on why

6.2 Please list the practices you perform to tailor instructions during text based communication.

6.3 Please enter any other comments regarding practices you perform to tailor instructions

VII. Solving communication issues such as: misunderstanding, misinformation and confusion

7. When dealing with a user using text based communication in TS how often do communication issues occur (*misunderstanding, misinformation and confusion*)? (Please tick one of the following)

- a) Always ☐
- b) Sometimes ☐
- c) Never ☐

7.1 Please elaborate on why these might arise/seem to arise

7.2 Please list practices you perform to rectify the communication issues

7.3 Please enter any comments regarding practices to solve communication

VIII. Handling third-party software products with Technical Issues

8. When dealing with a user using text based communication how often do you handle third-party software products that are required for your product (E.g. Operating Systems, Software Components)? (Please tick one of the following)

- a) Always ☐
- b) Sometimes ☐
- c) Never ☐

8.1 Please list practices you do to handle third-party software products during text based communication

8.2 Please enter any other comments regarding handling third-party software product issues: find out if the user has contacted the third party as company for help.

IX. Emotion managing techniques

9. When dealing with a user using text based communication how often do you find yourself dealing with the users' emotions (e.g. *When the user is clearly upset*)? (Please tick one of the following)

- a) Always ☐
- b) Sometimes ☐
- c) Never ☐

9.1 Please elaborate on why/the causes

9.2 Please list practices you do to deal with users' emotions during text based communication

9.3 Please enter any comments about how you deal with users emotion, establish rapport by relating to the users experience of the software

Thank you for completing this questionnaire. If you have any further questions, please contact: Solomon Gizaw (Solomon.gizaw@ul.ie).

If you would like to follow up any of your responses and happy for us to contact you, please enter your email contact here:

Appendix-F2- Questionnaire for TS User

[User]

All questions relate to text-based communication. Where we state 'TS Advisers', we mean the person you are interacting with when requesting technical support for any IT issues. IT in this context means anything relating to a computer: both hardware and software, from a desk-top computer, tablet, or android phone.

I. Background Characteristics

1. How often do you use IT Technical Support (TS) services? (Please tick one of the following)

- a) Regularly (*First place I go to for help*) []
- b) Sometimes (*Every now and then*) []
- c) Rarely (*Once or twice a year*) []
- d) Never []

2. What kind of TS communication channels do you use when you need help?
(Please you can tick more than one of the following)

- a) Telephone []
- b) Chat message []
- c) Email []
- d) Written documents []
- e) Discussion Forums []
- f) Search Engines []
- g) Other, please specify:

II. Information Technology (IT) – Level of expertise

3. How familiar are you with Information Technology (IT)?

- a) I am a **Novice** user of IT: *You are new to using IT, tend to just use IT for basic word processing and email, and would prefer to ask for IT help on the phone or face to face* []
- b) I am an **Intermediate** user of IT: *You are competent in using IT for email, word processing, and using spreadsheet packages or applications needed for your job or home use (e.g. Excel); you are happy to visit online forums for IT support* []
- c) I am an **Expert** user of IT: *You are an IT professional, or you are familiar with how computer systems work (either software and hardware), you are*

happy to give advice on how to solve IT problems and usually sort out any issues you might have via forums or by problem solving []

From here onwards all questions are based on a text based communication (e.g. *email / SMS chat*) – with TS (if you have not had any interaction with TS in this way, please do not complete this survey).

4. Do you think expressing your IT experience to the TS Advisers is important?
(Please tick one of the following)

a) Yes []

b) No []

c) Don't Know []

4.1. If 'Yes', when dealing with TS Advisers, how often do you express your level of expertise? (Please tick one of the following)

a) Always (Every time I contact TS) []

b) Sometimes []

c) Never []

4.2 Please elaborate on why you think letting TS Advisers know your level of IT experience is important (or not important)

4.3 Please list the ways in which you express your IT experience to TS Advisers

4.4 Please enter any other comments about expressing your IT experience

III. Loyalty to your existing product

5. How often does your faith in a specific brand/product affect your willingness to move to a different brand/product as a suggested fix? (*e.g. moving to a different brand or application would be the last resort – you would rather try to fix the problem in your current application than invest time and effort in adapting to a new system even if TS advise you to do so.* (Please tick one of the following)

- a) I **always** want to try to fix problem in my current product rather than change []
- b) I might **sometimes** want to try a new product, depending on the pros and cons []
- c) I **never** want to fix the problem in my current product if the TS advises me to change to a new product (I don't have any real loyalty towards my current product) []

5.1 Please list other factors that may prevent you from accepting the guidance offered by TS Advisers.

IV. How you value the product (in terms of cost)

6. When dealing with TS Advisers do you consider one-to-one services (*individualised follow up, quick access to and response from TS support, reliable service level agreement regarding fast problem solution*) worth paying for? (Please tick one of the following)

- a) Always []
- b) Sometimes []
- c) Never []

6.1. If 'Always or Sometimes', please list the individualised after-sales TS services you would be willing to pay for

6.2. If your answer to question 6 is 'Never', Please elaborate on why

V. Building Trust

7. Think of the last time you interacted with TS, did you trust the person you were dealing with? (Please tick one of the following)

- a) Yes ☐
- b) Partially ☐
- c) No ☐

7.1 Please elaborate on your answer to question 7.

7.2 Does the communication skill of TS increase the credibility of the product/brand?

- a) Yes ☐
- b) No ☐
- c) Don't Know ☐
- d) Not Relevant ☐

7.3 Does the knowledge skill of TS Advisers increase the credibility of the product/brand?

- a) Yes ☐

- b) No []
- c) Don't Know []
- d) Not Relevant []

7.4. If 'Yes', what approaches used by TS Advisers or characteristics of the TS process increased credibility of the product?

7.5. If 'No', what approaches of TS Advisers and characteristics of TS process decreased the credibility of the product?

7.6 Please enter any other comments regarding practices which increase/decrease the credibility of the product (noting whether the given practice increases or decreases credibility).

VI. Privacy and Security in TS

8. When dealing with TS Advisers using text based communication, how often do you make specific efforts to preserve your privacy and security? (Please tick one of the following)

- a) Always []
- b) Sometimes []
- c) Never []

8.1 Please elaborate on why you answered the way you did to question 8.

8.2. Please list any way in which you try to preserve your privacy and security during text based communication:

8.3. Please list any way in which TS Advisers (or the TS process) helped to preserve your privacy and security during text based communication:

8.4 Please enter any other comments regarding how you and/or TS Advisers, and or the TS process could preserve your privacy and security: (noting which role you are referring to if relevant).

VII. Tailored Instructions

9. When dealing with TS Advisers using text based communication how important is it for you that the material is visually appealing? (Please tick one of the following)

- a) Very Important ☐
- b) Important ☐
- c) Moderately important ☐
- d) Neutral – don't care ☐

e) Not important []

9.1 Please elaborate on your answer to 9, why you answered the way you did:

9.2 In the list below (A-E) please explain what kind of visual cues you prefer (a visual cue is how text can be manipulated to show priorities, emphasize a key word, etc.).

A. How can text be manipulated to emphasize the main point of a discussion? [If you think this is possible, please explain how to convey this here]:

B. How text can be manipulated to remind you of important points covered during text based communication: [explain how to convey this here]:

C. How text can be manipulated to express anger? [Explain how to convey this here]:

D. How text can be manipulated to show frustration? [Explain how to convey this here]:

E. Other [Explain any other text based cues here]:

9.3 Please enter comments on how TS Advisers can make material more visually appealing in the context of a TS forum.

VIII. Solving communication Issues

10. When dealing with TS Advisers how often do you experience communication issues (*misunderstanding, misinformation and confusion*)? (Please tick one of the following)

- a) Frequently []
- b) Seldom []
- c) Never []

10.1 Please elaborate on why and when

10.2. Practices you have used when communicating with TS:

a. Please list practices that helped for a clear communication with TS

b. Please list practices that exacerbated or worsened the communication

10.3 Please enter any other comments regarding practices you know about that can solve communication issues (again just using text based communication).

IX. Emotion managing techniques

11. Think of the last time you interacted with TS, what kind of behaviour did the TS Advisers demonstrate during your interaction with him/her? (Please tick one of the following)

- a) Very friendly []
- b) Friendly []
- c) Not sure/couldn't tell []

- d) Somewhat friendly []
- e) Not at all friendly []
- f) Neutral []

11.1 When dealing with TS Advisers using text based communication, how often do you personally experience negative emotions such as frustration, and/or anger with the TS Adviser or the TS Process? (Please tick one of the following)

- a) Always []
- b) Sometimes []
- c) Never []

11.2 Please elaborate on your answer to 11.1.

11.3 Please list TS Advisers practices or TS process that lead you to have negative emotions

11.4 Please enter any other comments regarding practices, which lead to negative emotions (E.g. frustration, anger etc.):

X. Overall Satisfaction

12. Are issues raised with TS resolved to your satisfaction? (Please tick one of the following)

- a) Always ☐
- b) Sometimes ☐
- c) Never ☐

12.1 How satisfied are you with the service provided by the TS Advisers? (Please tick one of the following)

- a) Very satisfied ☐
- b) Somewhat satisfied ☐
- c) Neither satisfied nor dissatisfied ☐
- d) Somewhat dissatisfied ☐
- e) Very dissatisfied ☐

12.2. Please list practices of TS service which most seem to satisfy your requirements

12.3 Please enter any other comments regarding TS Advisers practices that raises you level of satisfaction with the service.

Thank you for completing this questionnaire. If you have any further questions, please contact: Solomon Gizaw (Solomon.gizaw@ul.ie).

If you would like to follow up any of your responses, are interested in seeing the results of this survey, and are happy for us to contact you, please enter your email contact here: