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The Price of Convenience: Developing a Framework for Analysing Privacy Sensitivity in the Adoption of Wireless Applications

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Abstract

This paper reports a preliminary cycle of structured case analysis of personal privacy sensitivity in respect of wireless applications. This empirical cycle, interposed between the theoretic development of a conceptual framework which we have called the “Price of Convenience” Model (Ng-Kruelle, Swatman, Rebne and Hampe 2002) and a series of socio-technical studies in the field which will form the main body of our research programme, comprises a qualitative content analysis of a sample of reports published within the practitioner and public media over the period 1999-2002. The aim of this cycle of research is testing and refinement of the Price of Convenience model as a conceptual framework for our continuing study.

Keywords: *Wireless applications, privacy, adoption of innovation, attitudes and behaviour, information systems research.*

1. Introduction

Wireless and the mobile Internet are today significant drivers for the Information Age. The negative sentiment over information and communications technologies (ICT) in general and overhyped 3G mobile services in the last 2 years will delay but not stop the overall world-wide growth in this industry. Instead, the wireless/mobile technologies and applications will gradually lead the information society further into the world of pervasive and ubiquitous computing. These are driven by various factors, among them,

the increased adoption of “smart” handheld devices (e.g. PDAs and mobile phones), the rapid evolution (and continuous usage of) SMS¹ to EMS and MMS, the growth of highspeed-broadband technologies, and the emergence of mobile “anytime-anywhere” applications (EITO 2002). The continuous upward forecast of growth is an indicator of its potential economic value for telecommunications service providers, as well as an indicator for consumers that wireless network will continuously be exploited for the better, the more effective way of service delivery.

As location-positioning technology continues to improve, so expectations for more accurate, localised services increases. From the consumer’s perspective, mobility brings the benefits of flexibility of connectivity, anytime and anywhere, with personalised services. From a mobile service operator’s perspective, wireless applications such as mobile location services will provide the advantages of increased revenue, improved customer loyalty and of service differentiation.

Using handheld computing and communication devices with the wireless network, consumers and business employees are able to access information (location and/time specific) and other mobile applications. After the “wireless hype” peaked in the early 2000s, and as reality and more down-to-earth expectations begin to sink in, one obvious issue remains – in some ways the most important –the handling of individual security and information privacy.

The single distinctive characteristic of “wireless”, when compared to that of traditional fixed Internet, is the nature of information – instead of being static, it is now real time, location specific with context aware. Mobile information systems have the capacity to change not only lifestyle but also society, work and human thinking.

Privacy legislation, business best practice, and privacy enhancing technologies are part of a holistic mechanism which may be applied in the protection of user privacy. However, mechanisms should also exist in the promotion and development of businesses, perhaps similar to the EU’s multi-faceted programs in bringing existing member countries and accession countries into the new global information society. On the one hand we observe aggressive moves to take advantage of the Internet, on the other hand we fear negative consequences with social, economic and/or environmental implications.

Legal bodies such as the EU Commission is a social institution that helps “social actors” such as the various business entities, and user communities to coordinate and control their interactions towards a more socially and economically viable adoption of a mobile ICT innovation. Other informal mechanisms should also exist hand in hand to facilitate innovation and yet provide a socially acceptable long-term adoption of this innovation. However, privacy itself is a complex multi-dimensional issue, the importance placed on which by potential adopters and users of such an innovation has been argued (Rebne, Ng-Kruelle, Swatman and Hampe 2002) to change according to the context.

Exactly how the context of innovation adoption and use develops over time, the making of decisions – and the impact of context on these decisions – is not well understood. It is these issues, in respect of wireless applications such as nomadic computing, mobile location services and smartcards, which form the core concern of our research programme. We have argued that a conceptual analysis of individuals balancing the conveniences of the being mobile against the associated loss of privacy and the potential implications of that loss, may be usefully considered through a metaphorical lens which

¹ Short Message Service (SMS) is based on the techniques of Time Division Multiple Access (TDMA). It allows exchanges of short messages over digital control channels. It also supports data and fax up to 9.6 Kbps. Source: EITO (2002). European Information Technology Observatory 2002. Frankfurt, European Information Technology Observatory.

we call the *price of convenience* (Ng-Kruelle, Swatman et al. 2002; Rebne, Ng-Kruelle et al. 2002) (Figure 1).

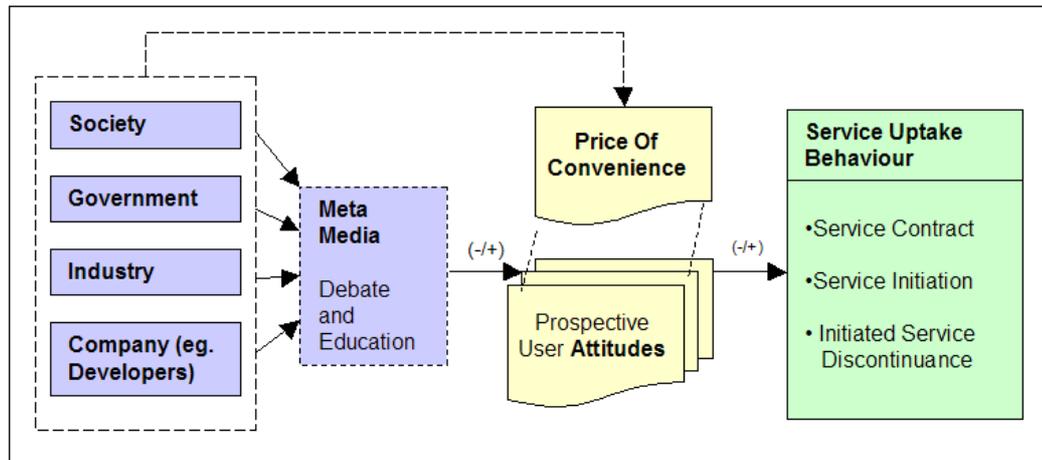


Figure 1: Conceptual Framework MØ: the Price of Convenience (PoC) Model

The context of individual adoption behaviour is in constant flux under the first order effects of the key contextual actors: society, government, industry, and company which are complemented by a second order effect of the media. We consider the media an inter-institutional *venue* that is inseparable from an understanding of individual PoC due to its influence on the shaping of debate and education on wireless application and privacy. In our view, an individual's *PoC* calculus is constantly modified by the dynamics of influence from the four broad institutional sources and the sense made of these forces via media representation. Attitudinal analysis is central to the model for two reasons (Rebne, Ng-Kruelle et al. 2002). First, as has been demonstrated by research on the privacy issue in fixed-internet context, attitudes and behaviours do not co-vary strongly and so each behavioural phenomenon requires analysis in its own right. Second, if the link between institutional and media effects is, indeed, stronger in relation to PoC-related attitudes than behaviours, the former (intermediate) outcome becomes still more important as a measure of the impact of policy-oriented interventions (regulatory, managerial or technical) on the part of the various institutional actors.

The contribution of this paper is twofold. By conducting an extensive (but not exhaustive) content analysis of a sample of media reports relating to the wireless privacy issue and analyzing them through the lens of the Price of Convenience model:

- we are able to derive an empirically and theoretically based general understanding of the wireless environment, its associated dynamics, and its implications on individual privacy sensitivity. The interactions of privacy related concerns between the end user and the various system actors will assist the business community and the policy makers in better addressing specific privacy concerns.
- We may test and extend the Price of Convenience model as a cognitive framework to guide our future cycles of Structured Case research.

The structure of the rest of the paper is structured as follow:

- Description of the problem domain, then

- Outline of our research approach both for the programme as a whole and for the research cycle (cycle ϕ) which forms the focus of this paper;
- Description of cycle ϕ and analysis of the data gathered;
- Drawing conclusions and stating implications for the research cycle 1 which will be reported in a subsequent paper.

2. Characteristics of the Problem Domain

2.1 The “System”: An Evolving Innovation

The “system” study takes the form of a generic wireless application, mobile location services. Because mobile technologies and applications are still in the state of continuous evolution, they have been aptly described by (Orlikowski 1992) as “under continuous (re)development, social (re)construction,” and that the “IT itself tends to have high interpretive flexibility”, differing according to context in study, and is continuously reinvented and refined with different users (Orlikowski 1992; Rogers 1995; Iivari and Janson 2001). Innovation of this kind has been recognised by scholars of innovation to be an interactive, rather than a one-off process. This also implies that user experience and needs that are related to new technology are not static, but continues to co-evolve with the new technology (Iivari and Janson 2001). Other contextual issues of adoption are variables such as: the type of innovation-decision, the characteristics of the communication channels, the nature of the social system and the extent of change agents' promotion efforts (Rogers 1995).

In order to understand the interaction between the end user, the innovation and the environment within which the interaction occurs, it is necessary for researchers to think in terms of *systems*, a web of relationships rather than individual element held in isolation (Lundvall 1999). Empirical studies have shown that this interactive process occurs as “feedback from the market, such as knowledge inputs from users,” that “interact with knowledge creation and entrepreneurial initiatives on the supply sides” (Lundvall 1999). We propose that our conceptual model, *Price of Convenience*, can assist in developing understanding of this web of relationships, in particular, those factors influencing contextually-based decision making in which personal privacy may be traded for convenience (Ng-Kruelle, Swatman, Rebne and Hampe 2002). In our overall research programme, we investigate privacy and the adoption/use of wireless applications at an individual level, aiming to produce a structured understanding of human motivation, attitudes and behaviour the metaphorical lens of price of convenience. The concept “*price of convenience*” (PoC) was introduced as a metaphor for understanding prospective user attitudes and behaviour in relation to wireless applications such as nomadic computing and location-based services. Our assessment of the wireless privacy issue suggests the possibility of an analysis balancing the conveniences of the services against the associated loss of privacy and the potential implications of that loss. The influence of PoC can be separated according to different stages in innovation deployment: adoption and implementation stage. This allows the identification of how a “positive” innovation uptake may over time have a negative outcome (or vice versa). Therefore, allowing possible actions to be identified in order to maximise the positive outcomes - the *conveniences*. In order to ensure that all elements of influence are identified, we adopt the Activity Theory, in particular the model of collective activity system in conceptualising the system of study. Activity Theory (AT), known also as *cultural-historical activity theory* is a descriptive tool used for analysing and understanding human activities (Helsinki University 1998). It has its origin in psychology but its main focus was later

extended from psychoanalysis and behaviourism, to *artifact-mediated* and *object-oriented* action (Bannon 1997). Moving beyond the purely psychological realm, AT has found loyal followings in the IS community, where it has taken the form of a more general approach for social and organisation oriented problems in understanding the dynamics of activities (Bannon 1997). Examples of its application may be found in the literature on computer supported cooperative work (CSCW) and human-computer interaction (HCI), where AT has been used as a mean for integrating theories and concepts (Barthelmess and Anderson 2002; Miettinen and Hasu 2002; Redmiles 2002).

AT functions as a holistic device to provide a broad conceptual framework to describe the structure, development and context of tasks. In addition, AT also stresses the importance of social and environmental context of the ICT use. AT contributes to the class of problems which might also be addressed through of Soft Systems Methodology (Checkland 1981; Checkland and Holwell 1988; Checkland and Scholes 1989) or Stakeholder Analysis (Vidgen 1997). All assist in highlighting perspectives that are different from the conventional “production oriented” view, and focuses instead on the process view. Where as the collective activity model conceptualises the entire environment, the PoC illustrates how the web of interactions will affect the development of the prospective user attitude towards innovation uptake, and at the deployment stage: actual adoption and implementation explained through the three distinct adoption decision categories of *contracting*, *initiating* and *discontinuing*.

The PoC model focuses on the anticipated attitudes and behaviours of individual prospective users of wireless innovations. The PoC model acknowledges a multi-faceted environment and supports both socio-economic and technical perspectives. We identify five discrete contextual factor-sets (first order effect: society, government, industry, company and the second order effect of the media—each of which are likely to contribute significantly to an understanding of prospective adopters attitudes and, in consequence, actual behaviour towards a given wireless application. We further the PoC model on the classical Weberian analysis of human action (Weber 1978). Through the use of a socio-economic perspective, we developed a model of *categorical* variation in attitudes and behavioural predispositions (Ng-Kruelle, Swatman, Rebne and Hampe 2002; Rebne, Ng-Kruelle et al. 2002). The purpose is to obtain a theoretically grounded mechanism shifting the level of analysis according to discrete social groups. This is to provide explanations for broader patterns of attitude formation, resulting in an understanding of how and why a privacy-loss risk would be seen as “rational” by some and “irrational” by others.

2.2 Framework for Privacy and the “System” Requirements Analysis

Requirements capture, analysis and definition are recognised as important stages in a systems development process towards quality information systems (Darke and Shanks 1997; Vidgen 1997). A typical requirements definition involves the following activities: requirements acquisition, the elicitation and accumulation of information on the application domain, its environment and the requirements for an information systems, and requirements modelling (Darke and Shanks 1997). Over the years, many efforts and strategies were made to better manage this process, the most important, probably, is that of *collaboration*. This refers to various techniques for more effective communication and interaction between various stakeholders. Human nature, being complex as it is, further drove this to the development of techniques for structuring and formally defining information systems requirements. Many advances have been made in this area of research. However, in comparison to a “social” system, that is, a system not exactly bound to illegally or formally set-up organisational structures, we observe the complexity suddenly increasing by threefold or more.

Privacy requirements capture, analysis and definition may not, therefore be such an easy and clearly defined tasks in a “systems” sense. Surveys such as (IBM Corp 1999; Nilsson, Lindskog and Fischer-Hübner 2001; USHouseOfRepresentatives 2001) have shown that individuals are known to shift privacy requirements according to context, and often display contrasting opinions on privacy concern and actual behaviour. Thus, attitudinal expression of concern is unlikely to constitute objective protection in itself due to the discrepancy between general attitudes and specific behaviour (Rebne, Ng-Kruelle et al. 2002). The balancing of the “concern for privacy” and the “benefits of a consumer society” depends on individual behaviour and attitude, experience and trust in the system (Nelson 2000; USHouseOfRepresentatives 2001). In addition of not being homogeneous or static, it is also a multi-faceted issue covering everything from identity fraud and discrimination to embarrassment. Erosion of privacy is often at the time not clear to the victim, becoming evident only when the accumulated knowledge is used against the victim.

Although the EU member-states offer some level of protection by maintaining relatively strict legislation on the processing of personal data, broader mobility incurs risks associated with trans-border data flow via countries devoid of public-policy interventions in support of personal data protection. Realising that respecting personal privacy is crucial to long term mobile service innovations, industry analysts concur in viewing the privacy issue as being central to the evolution of location-based services. Until the development of privacy standards and privacy enhancing technologies mature, mobile location services may almost always be offered on an optional basis (PricewaterhouseCoopers 2001).

It becomes necessary therefore to understand how privacy requirements from the end user works, and how the basic privacy principles² can be best adapted for business development strategies to achieve consumer satisfaction, that means achieving it through *fair* usage of location information. In this instance, it can be best described by looking at the communication/education channel – the **media**, that is the extent the end user are exposed to privacy-related issues, which will either result in the increase in privacy sensitivity or privacy habituation. The end-user's level of privacy sensitivity will help to explain the degree of self-control over the use of personal data. This is probably best explained through the introduction of "appealing benefits" for the user, in exchange of advertisements. On the one hand the end-users would be willing to receive localised and personalised “spam”, on the other hand, the supposedly well-informed end-user would like to retain control of her/his own privacy, such as the option to block and filter, when necessary. However, it is not clear that a majority of end users are aware of the availability of user-controlled options to deploy privacy-enhancing techniques. They are most of the time unaware of the nature and degree of personal data-*cum*-information they are constantly transmitting or receiving during passive use of mobile devices (e.g., a mobile phone which turned on but not in use, or a mobile phone that is turned off). Often, they do not know who legally owns the personal data (the end user), who has access to these data and when, and how persistent data-collection activity can be, or how data-mining techniques are used to provide localised-personalised services.

² The EU Directive on Data Protection and the OECD Privacy Guidelines are two most important international initiatives in the protection of the right of informational self-determination. Under the EU directives (95/46/EC and 97/66/EC), while each country may have a different expression of data protection, personal data must be: (1) obtained fairly and lawfully; (2) used only for the original specified purpose; (3) adequate, relevant and not excessive to purpose; (4) accurate and up to date; (5) Accessible to the subject; (6) Kept secure; and (7) Destroyed after its purpose is completed. Banisar, D. (2000). Privacy and Human Rights 2000: An international survey of privacy laws and development. Washington D.C., Electronic Privacy Information Center.

3. Research Program - Research Cycle Design

Interpretive research has today emerged in the information systems community as a credible alternative approach to research. Best suited for situations that are complex and pluralistic in nature, it provides researchers with techniques for deriving valuable insights into social-organisational phenomena. Originally rooted in anthropology, phenomenology, and hermeneutics, some principles for undertaking and evaluating interpretive studies include: the fundamental principle of the hermeneutic circle, of contextualisation, of interaction (between researchers and the subjects, e.g. action research), of abstraction and generalisation, of dialogical reasoning, of multiple interpretations and of suspicion (Klein 1999). These examples of principles for interpretive studies, are to a certain extent, interdependent and complementary.

In this study, we apply the methodology of structured-case for theory building, guided by the principles of soft systems. We will illustrate in the following section, the usage of this methodology to derive understanding in an investigation of context-based privacy requirements in an evolving “system” (wireless applications).

3.1 Structured-Case

The structured-case methodology for qualitative information systems research was introduced by (Carroll and Swatman 2000) as a technique for deriving structured understanding of a problem issue within an interpretive paradigm. As the name “structured” and “case” imply, it uses a formal process model applied to an area of study (it is applicable not just to a traditional case per se, but in a broader sense, for example, to a process, system, an individual or an organisation). It is built on existing qualitative research work, but has been extended to provide a systematic approach for addressing subjective, vague problems, poorly understood phenomena or simply for inducing new ideas.

The three main components of structure-case are: the conceptual framework, a pre-defined research cycle (planning, data collection, analysis and reflection), and theory building grounded on literature-based scrutiny of research findings. The core contribution of this technique is its iterative nature of building theory from qualitative data, resulting in series of updated conceptual frameworks, displaying a “spiral towards understanding” (Refer Figure 2).

There is an ongoing refinement of the initial research questions and constructs, with continuous comparison of data with emerging themes, the literature and of external expertise. By going through a series of refinement, followed by documentation at each cycle, the dynamics of the research area in study and thereof, theory building, can be captured (Carroll and Swatman 2000). The documentation involved in structured-case will highlight “links between the research themes (in the conceptual framework), data (observations and interpretations in the field), the data analysis (coding using the concepts in the conceptual framework, and emergent themes) and the theory and knowledge accumulated through the research process the series of conceptual frameworks”.

In this paper, we will describe the development of a Research Cycle Ø. The objective is to obtain an overall understanding of the research problem, to define the Conceptual Framework 1, and consequently determining the method of investigation (planning), data collection method, coding and data analysis, and finally the generation of hypotheses and new research themes to be addressed in the next cycle – Research Cycle 1.

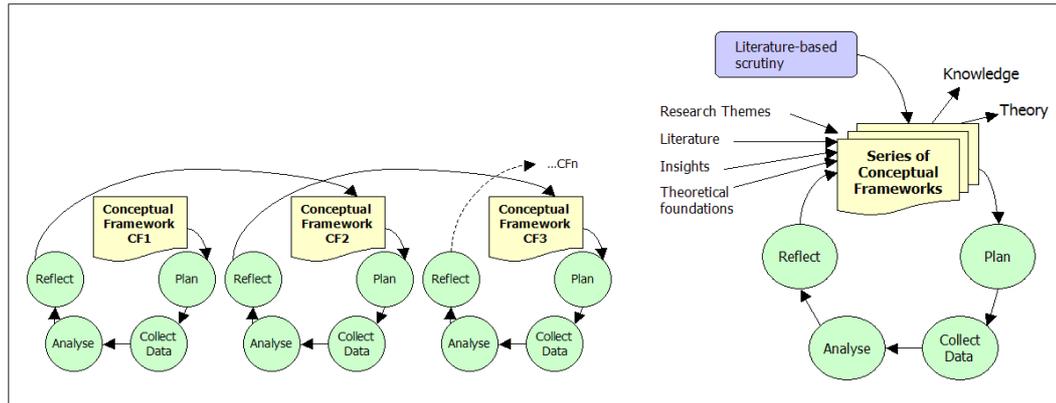


Figure 2: Structured-case Methodology for Theory Building³

3.2 Soft Systems Methodology

Soft-systems methodology (SSM) is based upon systems theory (Checkland 1981; Checkland and Scholes 1989) that differs from (but nevertheless complements) the conventional reductionist scientific methodology. Systems theory is used as a method of investigation by taking a holistic view of the environment – which comprises of inter-related entities. The traditional systems approach can generally be categorised into 3 types - hard (objectivist, positivist, scientific), soft (subjective, interpretivist) and a hybrid of hard/soft (such as socio-technical like analysis) (Checkland and Holwell 1998). The choice of which approach to be adopted greatly depend on various factors, such as the complexity (and the objective) of the system of study, level of formalisation (structure and definition) and the focus of study (whether the emphasis falls on the human side of the system or on “scientific methods”.) Naturally, these are causes for differentiation between a "physically" man-made system to a "soft" organisational system, where the behaviour of the former is more predictable than the later due to the complexity of human behaviour, organisational problems and the existence of variables (Avison and Fitzgerald 1988).

SSM has been used and often recommended as a means of evaluating complex environments (Presley, Sarkis and Liles 2000). The methodology uses a flow of phases to elicit information from complex and vague real-world processes, practices, and information, to develop models of these systems. Its epistemological premise is the usage of conceptual models of human activities structured by the systems theory and the comparison of the models' unstructured perception of the real world (Rose and Haynes 1999). The models are theoretical constructs that attempt to represent the real-world system. The process of developing the models is done according to the systems principles and predefined internal logic. As they are neither descriptive nor normative – although may display characteristics of both, SSM is about applying systems principles to look at a “problem” in a structured way. The investigative nature of SSM is obtained from the epistemological power of a set of systems concepts, rather than from an ontological view of a systemic world (Avison and Fitzgerald 1988; Rose and Haynes 1999). A problem area can be modelled taking different perspectives, with different perceptions and even different interpretations. By obtaining different versions of potential realisable system, the models can be compared with each other and the real environment. Its philosophical

³ From Carroll, J. M. and P. Swatman (2000). "Structured-case: a methodological framework for building theory in information systems research." *European Journal of Information Systems* 9(4): 235-342.

foundations are interpretative, not objectivist. Thus, it focused upon qualitative issues, which can also be participative in nature.

The core of SSM is “action research”, where the researcher takes part in the change process within the area of investigation. It follows a seven stage model, where the framework of ideas (the conceptual Framework - CF) which guides our investigation is first defined together with the methodology of research (M) to investigate an area of application (A) (Checkland and Holwell 1998). In this sense, it is almost similar to the approach of structured-case, except for the intervening role of the researcher in the subject of research. In soft systems, the consequences of change can be a result from participation of the researcher. The role of the researcher in structured-case is a little bit different. Acting merely as an observer, with minimal participation (that is, participation limited to attempts for clarification of issues), we would therefore be able to obtain a “less-contaminated” view of the problem space. Using the technique of structured-case with selected principles of soft systems, is, we find, suitable for an exploratory study such as this, for inducing research issues to be used in the next research cycle.

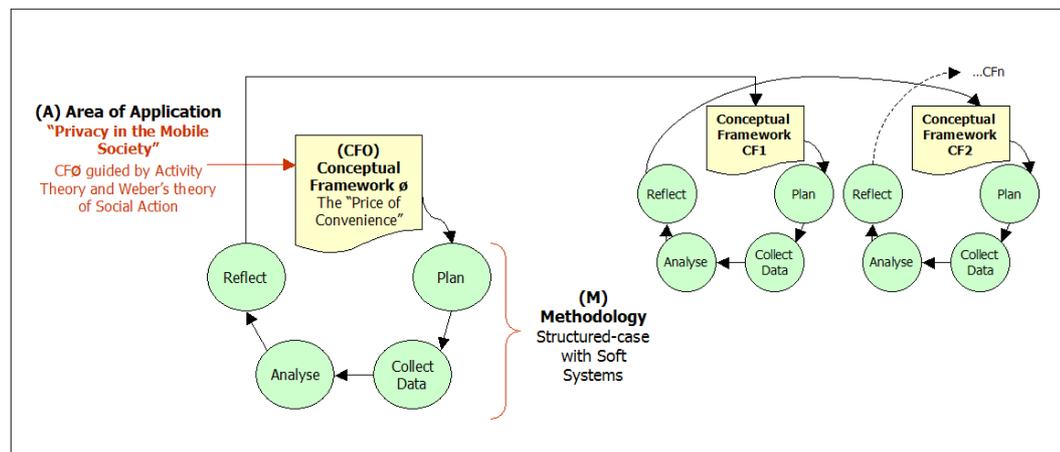


Figure 3: Framework for Research Analysis

Figure 3 outlines the framework used in the analysis of privacy in “systems” analysis. Guided by the principles of soft systems methodology, it follows the classical flow of action research knowledge capture minus the “intervention” step of the researcher with the subject. The framework of ideas (F) is based on the Price of Convenience (PoC) Model – MØ (Ng-Kruelle, Swatman et al. 2002; Ng-Kruelle, Swatman et al. 2002; Rebne, Ng-Kruelle et al. 2002) supported by the principles of Activity Theory and Weberian theory of social-action. The concretised situation is that of an arbitrary wireless/mobile/location-based service. The methodology (M) is content analysis underpinned by SSM.

This study is based primarily on published literature and focuses on the role of the public/professional media. This paper reports a study environment of wireless services to derive an understanding of the interfaces between the end user (consumer or business) on the adoption/rejection of an on-going evolving innovation, within the context of privacy. In Cycle Ø, we focus on existing published materials within the public and professional (non-academic) literature to build our picture of the developing "problem space", the area of application (A). Structured case encourages us, at the same time, to induce from the data we collect modifications and refinements to the guiding conceptual framework - that is to develop CFØ into CF1 which will, in turn, guide cycle 1 of our research.

4. Research Cycle Ø

The essential starting point for this study of our “system” (A) and the privacy issue involves the identification of the central factorial sets of influences on individual price of convenience attitude-formation and, thence, key behaviours related to the chosen (A). As shown in Figure 1, above, five discrete contextual factor-sets were identified, comprising of society, government, industry, company and media - each of which are likely to contribute significantly to an understanding of prospective adopters attitudes and, in consequence, actual behaviour towards a given mobile service.

4.1 The Conceptual Framework Cycle Ø

We begin our investigation by deriving a Rich Picture of the study context. The rich picture is an established soft systems methodology technique to provide a graphical and a diverse representation of complex and “messy” situation. Figure 4 is thus developed to illustrate the salient features of wireless privacy concerns, based on the Conceptual Framework CFØ: the *Price of Convenience (PoC) Model*, which will guide the coding for analysis.

The Methodology (M)

The framework considers the media as the most important intermediary agent between other system actors, where information (or debate) and public "education" of an issue occurs. The role of media is often regarded as a mediating factor that can either break or make an innovation's successful adoption (Tellefsen and Takada 1999). Although media do occasionally manipulate the sub-consciousness of the society, it is typically a good indicator of the current general public concern. Studies of news event diffusion have indicated an inter-media process in which the media stimulate interpersonal communication among the audience, which in turn can stimulate behaviour change (Rogers 2000). Instead of focusing directly at the interface of the media and the audience, we will derive reaction and feedback from secondary data from news reported back in the media. The PoC model (Conceptual Framework CFØ) is used to guide this research. This preliminary empirical analysis is based on content analysis of a selected website, of which the results of analysis will be used towards strengthening the development of *Conceptual Framework (CFI)*.

The content analysis is conducted based on reports published by a professional online media. We will investigate the interactions between the media (extracted) through the news published on a selected online channel maintained by PRIMEDIA Business Magazine & Media⁴ with relations to legal, technical, societal, and business related wireless-privacy issues. PRIMEDIA is a targeted B2B media company that connects "sellers" with "buyers". It manages more than 80 business-to-business publications, nearly 130 Web sites, over 25 trade shows, and more than 450 books and directories, addressing 20 market sectors (including mobile communications, telecommunications, and security).

⁴ Source: <http://industryclick.com>, keywords used: "privacy" and "wireless".

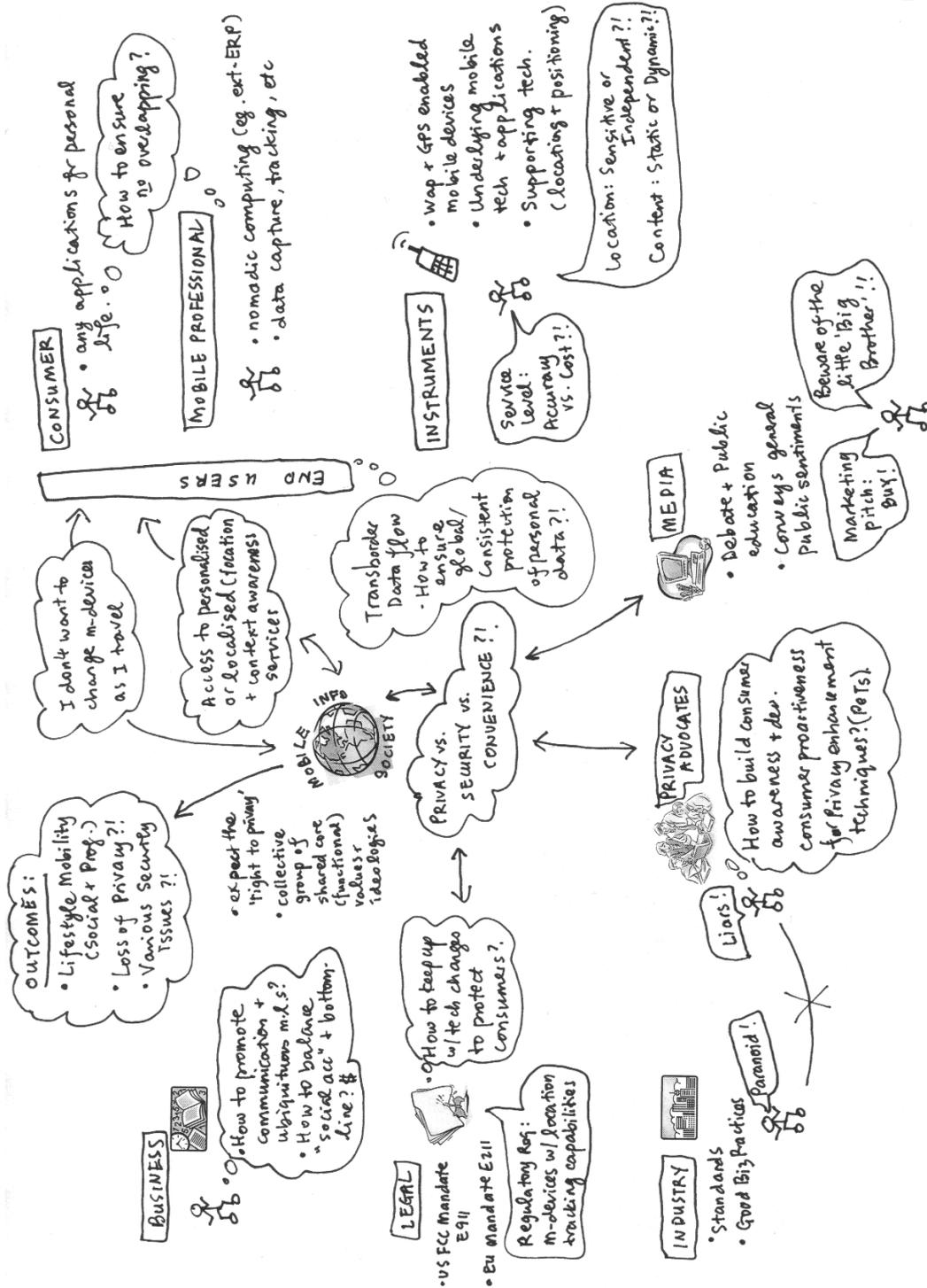


Figure 4: A Rich Picture Showing Context-Based Privacy Requirements in an Evolving "System" (wireless/mobile/location-based services).

It's diverse portfolio provides a rich coverage of technology issues, from business trends to current consumer concerns. The diversity of industry represented also indicated a diffused audience of different communities. Instead of a "general public" concern, this "specificity" may highlight contextual-based communication. In addition, the single source of information will also ensure consistency over the period covered by this study.

Based on the online content analysis guidelines as stipulated in (Weare and Lin 2000), the sampling frame for this exercise will be guided by a selected collector site. Collector sites are found to be useful for analyses of sites from particular sources, or concerning specific topics. In addition, they are considered to be more comprehensive than search engines, although (Weare and Lin 2000) warned that due to the lack of standardisation, they can be incomplete and biased.

The study focuses on news published from the period of January 1999 to December 2002. The unit of analysis will be that of the news article, while the categorisation of the news pages is based on the frequency an issue appeared in the message. As it is based in the US, we are assured of culturally controlled issues, presented solely from the American point of view. The research question is "what are the contextual factors that changes privacy concerns (attitudes) as opposed to the adoption of new mobile innovations (behaviour)"? The sources of information at this stage of conceptual framework of development - Research Cycle Ø, is purely based on "news articles" published on the websites maintained by PRIMEDIA.

During the period of 4 years a total of 185 news articles were selected based on their relevance during the issue of wireless privacy; and take the form of legislative reports, consumers feedback, industry reactions and company concerns. Each article was examined for a range of related wireless privacy issues. The first round of reading was done according to an initial categorisation set. Once the first round was completed, and new and evolving issues added, resulting in amendments to the initial categorisation scheme – that is, unrepresented issues were eliminated, and new issues added. Themes of interest to this study were chosen based on the changing tone of the content over time. In order to derive a contextual understanding of each issue, the articles were then filtered according to the topics, and the sequence of time, to obtain a better view of the underlying factors behind the evolving issues.

Figure 5 shows the summarised results of the frequency of news articles appearing at each quarter of the year in study. Before we provide a more elaborated analysis of the content, it is necessary keep in mind the two major events that may have possibly skewed the graph: the September 11 terrorist attack in 2001, and the dot.com bust together with the *disappointment stage* of the mobile industry from 2000 to 2001. Based on the content analysis, we will concentrate on the following specific issues in our analysis:

- Information privacy: known also as "data protection" involves the collection and handling of personal data such as credit information, medical and government records, and now in the advent of ubiquitous computing - location information privacy.
- Telecommunications privacy: covers privacy and security of emails, mails, wired-wireless telecommunications, etc.
- Privacy vs. security: the tipping of scale between privacy rights against security.

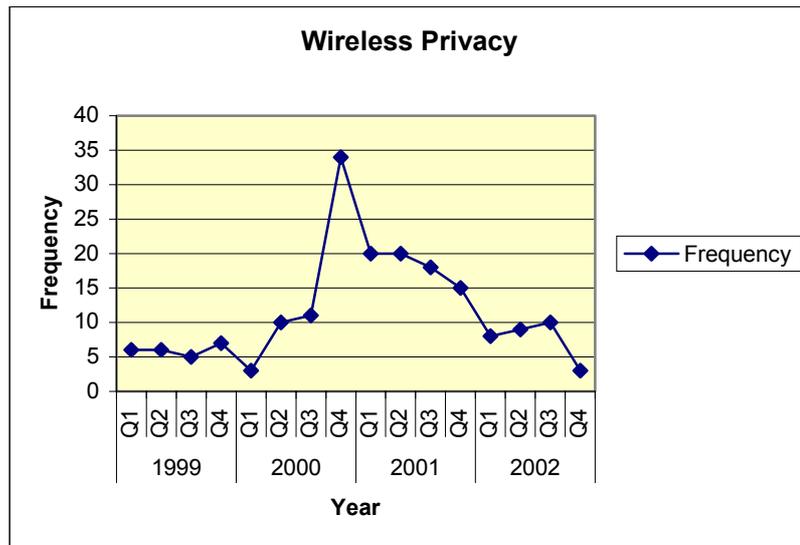


Figure 5: Frequency of News Articles on “wireless privacy” from Jan 1999 to Dec 2002.

Figure 5 illustrates a general growing interest in wireless privacy issues. It is worth mentioning here that the sudden spike of interest in the fourth quarter of 2000 is mainly caused by individual privacy infringement concerns of as a result of governmental legislations such as the E911⁵, CALEA⁶ and the general discussion about the importance of the handling of consumer privacy in offering wireless services.

4.2 Research Cycle Ø Outcomes

In this section, we draw together an analysis following a time line of four years. We will first present a descriptive findings based on the text, followed by an analysis of the findings. The focus is on illustrating the changing privacy attitudes and innovation uptake behaviour, with respect to the three specific issues as stipulated above. Figure 6 shows the frequency of news articles appearing addressing the three issues. It is important to mention here that although the graph intends to show the three privacy concerns as independent issue, there are overlaps between news articles. This mean, an article that has location privacy as core issue, may also contain, for example debate, on the price of security – individual privacy.

⁵ The wireless Enhanced 911 (E911) rules seek to improve the effectiveness and reliability of wireless 911 services. There are two phases of implementation. Phase I requires carriers, upon appropriate request by a local Public Safety Answering Point (PSAP), to report the telephone number of a wireless 911 caller and the location. Phase II requires wireless carriers to provide more precise location information, within 50 to 100 meters. The deployment requires the development of new technologies and upgrades. The Federal Communications Commission (FCC) established a four-year rollout schedule for Phase II, beginning October 1, 2001 and to be completed by December 31, 2005. Source: <http://www.fcc.gov/911/enhanced/> (Accessed on: Feb 12, 2002).

⁶ CALEA was passed in 1994 as a response to rapid advances in telecommunications technology (e.g. the implementation of digital technology and wireless services) that have threatened the ability of law enforcement officials to conduct authorized electronic surveillance. Source: <http://www.fcc.gov/calea/> (Accessed on: Feb 12, 2002).

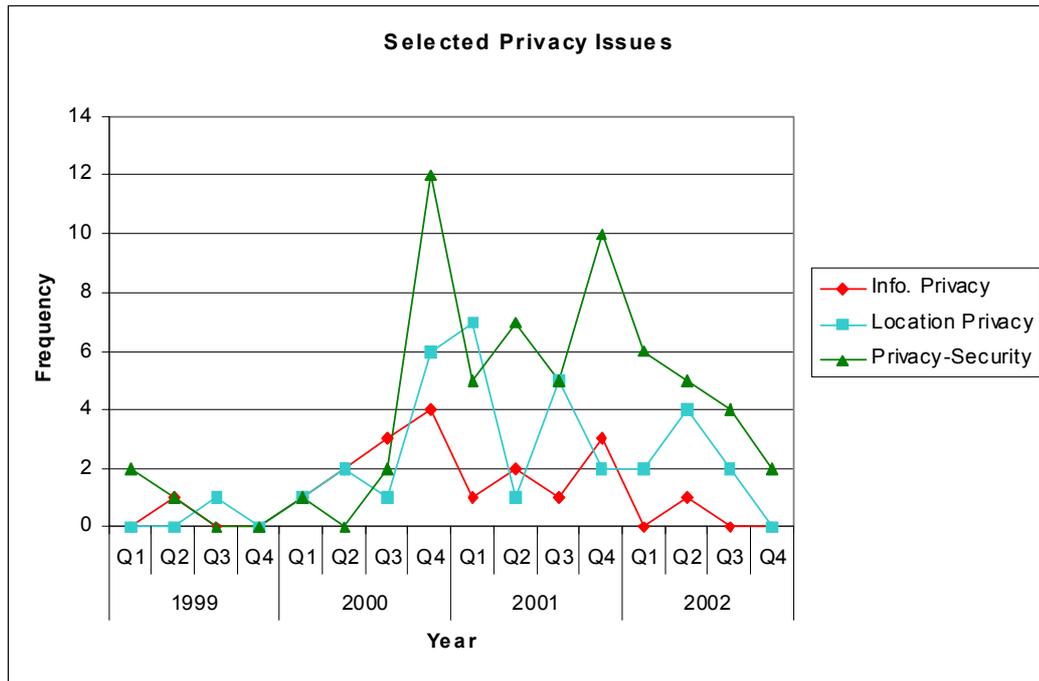


Figure 6: Frequency of Selected News Articles on "wireless privacy"

Findings: Descriptive

Information Privacy: Location Information

The dot.com bust between 2000 to 2002 has provided wireless industry valuable lessons on personal privacy. The relationship between a mobile device is known to be closer to the subscriber that a PC to him (Kridel 2000). Wireless privacy is an even taller order because of location technology – driven even further by the E911 Phase II implementation dateline (Holt 1999; Young 2000; Hendrey 2001; Rockhold 2001). In addition, global roaming would make the lines even fuzzier because of the diversity of privacy laws. International harmonisation of privacy legislation has proved to be a difficult venture, mainly due to cultural and historical differences. Until this happens, end-users would have to rely on telecommunication carriers and services operators to abide by the general guidelines – either regulatory enforced or by the industrial “codes of good practice”.

The wireless industry has been blamed in the news for "everything" (from brain cancer to road accidents!). Before consumer advocates put fears into the hearts and minds of consumers that wireless location technology will strip them of their privacy, industry groups such as the CTIA (Cellular Telecommunication Industry Assoc) have taken the initiative in formulating and disseminating through the media, positions on privacy protection - to show that the wireless industry is aware of the concerns. In November 2000, CTIA submitted location-based services privacy principles to the FCC in an effort to set industry standards for consumer privacy. It was intended as new wireless location information privacy rule to govern the notice, consent, security and integrity of consumer data. However, it was rejected by FCC in Aug 2002, on the basis that the current legislation was “adequate”. This reaction is quite peculiar, looking at the fact that FTC has in June 2000, submitted a report to the Congress on Internet privacy, stating that self-regulation alone isn't adequately protecting consumers, and that legislation is a necessary

supplement to guarantee basic protections. The contrasting reaction in the case of wireless services seems quite confusing. The fixed Internet is, of course, important but wireless promises to be the next wave of change. For consumers to adopt mobile services, it will be necessary to establish trust, grounded upon privacy and security. On the other hand, the terrorist attacks in the United States on September 11 may be a possible explanation on why governmental bodies are “hesitating” to go all the way out in enhancing individual privacy rights, while the means for internal security - including any forms of surveillance on telecommunications seems to be a “more important” goal.

Telecommunications Privacy

The September 11 had a tidal wave effect on privacy issues, at least in the first six months of the occurrence of this incident. Controversial surveillance and communication interception legislations such as CALEA (Communication Assisted Law Enforcement Act 1994) and CARNIVORE⁷ – both providing means for gathering intelligence from wireless and wireline phones – had earlier generated countless heated debates amongst various parties: privacy advocates, communications services providers, the telecommunication carriers, and industry groups, suddenly found individual privacy (and freedom) taking a backseat to patriotism and internal security. However, as the immediate effects of the September 11 attacks begin to fade, awareness of the possibility of the increase privacy invasion, as a result of heightened national security concerns which appear to overshadow individual privacy rights, begin to rise again. This indicates, that - tragic, as it was - the terrorist attack had only a short term impact on the individual privacy/societal security debate within the media (and, presumably, the community). After a period of national shock, privacy related debates returned, although not with the same aggressive intensity, but with indications of a constant alertness to privacy issues, at least from various non-governmental parties. Realising that instilling consumer/end user confidence is important to successful adoption of mobile services, carriers, industry groups and companies are faced with the difficulty of complying with CALEA and E-911 Phase II –the former allowing interception of digital communications while latter allows for positioning of mobile devices - and yet convincing end users that their personal privacy would not be compromised.

Privacy vs. Security

Consumers often realise that a level of personal privacy must be given up for conveniences of mobile services (or security). However, confidence and trust in the systems need to be developed if the wireless industry expects long term economic viability of investment in this area. It is believed that Internet users, in general (and, we extrapolate from the Internet to the wireless world) are not fully aware of the extent of privacy threats of location information, as they are generally not aware of the potential of technology itself.

Reports by specific groups of interest such as the privacy advocates are not always considered to have equivalent weight to privacy matters reported via other means – they are often deemed as over-reacting or being paranoid. Based on this assumption, in October 2000, a report by the only free and anonymous Certificate Authority (BusinessWire 2000) was released on the danger of email theft. It is written to "wake-up

⁷ Carnivore is a computer-based system designed to allow the FBI (in cooperation with Internet Service Providers) to comply with court orders requiring the collection of certain information (emails) or other electronic communications to or from a specific user targeted in an investigation. Source: <http://www.fbi.gov/hq/lab/carnivore/carnivore2.htm> (Accessed on: Feb 12, 2002).

consumers and business” to what privacy advocates have been trying to communicate for more than 3 years – that email is an easy target for interception. Many people have chosen and, indeed, continue to choose simply to ignore the problem. The average Internet user doesn't understand how or why this can happen, leading to an "ignorance is bliss" attitude.

In addition to using “general media channels” for better public reach, certain events are also effective. For example, the installation of face-recognition technology in Tampa has overnight moved a technology previously cloistered within the technical community into the international limelight, generating enormous public awareness and interest (Colatosti 2001). In the case of wireless services specifically, the recent reporting of Acme Rent-a-Car's use of GPS technology for tracking renter's driving habits has generated considerable concern over privacy and business ethics.

The aftermath of September 11 has also raised the incentives for alternative security enhancing techniques - an important example being biometrics.. Although this technology is often perceived to be invasive (to a certain extent, it is) individuals have been shown to be willing to give up some privacy if, for example, it would help streamline and improve airport security. Other tools like smart cards are options in verifying identities, strengthened by possibilities that biometrics and/or smartcards are capable of increasing the nation's security by ensuring the integrity of citizen's identification documents. But privacy advocates, vigilant as ever, pre- or post- September 11, has already begun the debate over the price one may have to pay for ensuring collective security.

5. Analysis: Habituation or (De)sensitisation of Privacy Sensitivity

The a content analysis provided us with a contextual understanding of each issue, and how it changes over time. Specifically, we observe a continuous “bargaining” in respect of personal privacy and the accepted value in return, as an exchange between the user and the provider of services. Exactly how an individual adopts an evolving innovation, as in the case of mobile application services, remains an interesting quest for answers which we attempt to address through the PoC model, explained in the context of privacy desensitisation and habituation over time.

Desensitisation of specific individuals to the privacy issue can occur over time. The gradual feeling of indifference can be attributed to various factors: constant positive feedback from interactions with any one of the system actors; increasing adopters in the innovation that the user has been apprehensive about; and the lack of information leading to a feeling of “false security”. By *habituation* we meant the way in which an individual, based on previous habits and experience will continue to either reject or accept an innovation without indulging in much pre-thought or structured decision making. In either case, as the PoC model proposed, an individual's attitude and innovation uptake behaviour will continue to change and evolve over time. Whereas Activity Theory conceptualises the innovation uptake environment, in earlier work (Ng-Kruelle, Swatman et al. 2002; Rebne, Ng-Kruelle et al. 2002) we used Max Weber's social action theory in deriving archetypes to describe the prevailing, general attitudes as the individual undertakes goal-directed action. As the (USHouseOfRepresentatives 2001) report indicated, the PoC-Sensitive segment of users will decline as some this population is initiated to Internet usage, thus obtaining greater exposure to both fixed and mobile Internet applications. This is based on the well-established understanding of behavioural researchers that there is often a discrepancy between expressed behavioural intentions at a given time and actual behaviours in the future (Ng-Kruelle, Swatman et al. 2002).

However, without having an understanding of the bases upon which individuals engage in service uptake and utilisation behaviours, the expanded range of privacy-loss risk-drivers attending this domain may perturb any anticipated pattern of de-sensitisation in the years ahead. These conditions suggest the need to link the Weberian *attitudinal* archetypes to important PoC-related *behaviours* in the mobile services domain⁸.

A Weberian analysis posits four universal bases of goal-directed action—the Affective (based on emotion), the Value-rational or *<wertrational>* (based on values), the Means-end rational or *<zweckrational>* (based on calculation), and the Habitual or traditional (based on habit). We relate our PoC concepts to Weber's bases of goal oriented action as follow: PoC Sensitivity as Affective and Value-rational Action; PoC Calculativeness as Means-end Rational Action; and PoC-Insensitivity as Habitual Action. It is however still not clear that one would expect that an individual's innovation-specific archetypal characterisation would remain to be static. Intuitively, amongst adopters of an evolving innovation, one might expect to observe a general habituation effect and possible desensitisation of the privacy issue. It would be interesting to investigate the extent of how habituation and desensitisation of the privacy issue may operate in developing the innovation further. Both issues will over the long run modify the type of service uptake, and in parallel determine the dominating service uptake behaviour: contracting, initiating and discontinuing. In any case, the PoC Model proved to be a useful mechanism in mirroring the dynamics and the complexity of the issue in study. In order to carry this work further, we propose here a three-part theory:

"(1) The demand for conveniences of mobility is contextually based, therefore resulting in non-static decision making behaviour. (2) The context is complex - represented by the interactions of the many system actors. (3) Publications and professional media plays a strong role in linking the results of this interactions, by weaving all into a tapestry of a context".

The specific conceptual propositions to be addressed:

- "Mobility" will be characterised by the dependency of individual on wireless devices for professional-personal-social use, than will relatively non-mobile users.
- Within any "community" of users, an individual's privacy sensitivity will be characterised by previous experience with fixed Internet, relationship with the media, and through continuous interactions/contacts with the external environment (i.e. the system actors).
- Privacy sensitivity level will continuously go through a series of contextual evolutionary phases – displaying characteristics of being *locally erratic* but *broadly evolutionary* for a still evolving innovation such as wireless application, and this evolutionary process may be broadly predictable from the equivalent process in respect of fixed-wired applications.
- People who give up a "little" personal privacy (e.g. accepting wireless advertisement) in exchange for benefits (e.g. lower subscription rate) will be more easily persuaded to sign up for future "privacy invasive" location services.
- Privacy sensitivity is contextually dependent, changing according to the intensity of media reaction and focus on specific "cases".

⁸ For further discussion on this issue, please refer to Rebne, D., G. Ng-Kruelle, P. Swatman and F. Hampe (2002). Weberian Socioeconomic Behavioral Analysis and Price-of-convenience Sensitivity: Implications for M-Commerce and Location-based Applications. 2002 COLLECTeR (Europe) Conference on Electronic Commerce, Centre de Congres, Toulouse, France.

- Mobile services which are more personal because devices are less shared and more personal - users are therefore more sensitive to personal privacy issues.

6. Conclusions

This study is based on qualitative empirical work, conducted using the method of content analysis. Although it covers the period of only four years (Jan 1999 to Dec 2002), it is in itself adequate to strengthen our understanding of the context for adoption decisions in relation to wireless/mobile/location-based services and to further develop our contextual framework for future research cycles. From this empirical exercise, we derive the following understanding:

- The actors: government, the industry groups, companies, and consumers are important participants in the development of the context in study – the context within which privacy sensitisation-desensitisation-habituation (attitudes) occurs with the implementation of a wireless innovation. This indicates the appropriateness of the PoC Model as a mechanism in describing the context, as well as a tool for eventual coding of the information in fieldwork. The PoC Model should be thought of as a model within which each of the actors act independently, and yet, interacts to develop the context for understanding the price and the convenience of privacy and mobility. The analysis also highlighted the necessity to include an additional actor to the model – the consumer pressure group, which would be analogous to the industry group, but representing the interests of the end-users.
- The role of the media is a crucial one. By conducting a longitudinal empirical study on selected wireless privacy issues, the media has proven to be a suitable means for providing insights into the changes that occur. It uncovers the context of which (continuously) evolving end-user's decision-making occurs, in demand for wireless services. It also indicates how time will effect habituation and privacy sensitivity (both positive or negative in nature) as a result of interplay between the system actors. In addition, although each system actors have different agenda and goals in addressing personal wireless privacy, the media mediates their interactions, and to a certain extend is able to presents a general feeling of what is going on, back to the public.
- The study also indicates the impact of specific incident on the evolving nature of privacy debates, with manipulative nature to the context. Some events display limited localised impact, while others of broadly evolutionary.
- For wireless industry to thrive, it is crucial to remember that while wireless and mobility is “convenience” for the consumer, it comes with responsibility from the industry, companies and government alike, and that the “cost” of this convenience should be minimised. It is important for all system actors to align short, medium and long term goals that would not only result in commercial gains, but also advantageous end-user benefits. All actors are responsible in managing the context in an efficient way. As implicated in the PoC Model, an invisible thread of dependency exists to hold all actors together. Each of which are capable of influencing the end-user, but it is the accumulated effects – while being mediated by the media, that will continuously shape an individual's evolving privacy sensitivity.

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