PLANNING FOR IS APPLICATIONS: A PRACTICAL, INFORMATION THEORETICAL

METHOD AND CASE STUDY IN MOBILE FINANCIAL SERVICES.

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We use information theory to justify use of a method to help managers better understand what new IT applications and features will be most valued by users and why and then apply this method in a case study involving the development of financial service applications for mobile devices. We review five methods for data gathering, analysis, modeling, and decision making and compare them with information processing methods for IS planning. Then we develop an IS planning method, an extended version of Critical Success Chains (CSC), that supports five of six of the identified information processing needs. We use this method in a project to develop ideas for mobile financial services applications at Digia, a Finland-based R & D firm. We select a group of experts and potential early adopting users. In structured individual interviews, we ask why participants prefer particular specific features the participant would expect to be part of an application. We record this data as linked chains connecting features with consequential performance and with the perceived value of such performance. The data is analyzed across participants to create network models of features, performance, and values. We conduct an ideation workshop with Digia engineers and executives to generate ideas for new systems based on the CSC models. Workshop participants created back-of-the-envelope level ideas for three new applications and business models to show graphically the flow of information, value, and revenue among parties involved in producing and using the applications. We conclude by comparing the extended CSC and other IS planning methods in terms of information theory and the information processing needs for IS planning.

Biographies

Ken Peffers, Ph.D. (Purdue, 1991) is an Associate Professor of MIS at the University of Nevada, Las Vegas. His current research focuses on making the right investments to build information systems for the firm and managing the portfolio of IS ideas and projects. He is editor-in-chief of the IS journal, JITTA, accessible at http://www.jitta.org/ and is a member of the Sault Ste. Marie Tribe of Chippewa Indians.

Tuure Tuunanen, M.Sc. (econ) (Helsinki, 2001), is pursuing a PhD degree in information systems science at the Helsinki School of Economics. His doctoral dissertation focuses on evaluating and comparing various qualitative research methods to support idea generation and software development in multi-channel environment such as 3G mobile terminals and Digital TVs.
INTRODUCTION

Firms planning financial services applications for use with next-generation wireless devices, face a familiar high-tech problem, “How do you know what features customers will want and use from a technology that hasn’t been available before now?” Many innovations work fine in the lab and even in the factory only to fall flat with customers, as managers and engineers develop applications without knowing what customers want or are willing to pay for.

The problem of innovative applications

In the past innovations required many years, from when they were first technically feasible, before users widely adopted them. For example, in the US, 10% penetration among households required, from early demonstrations, more than 40 years for television, nearly 30 years for the Internet, and 20 years for mobile telephones [31]. Of course, not all, or even most, innovations are eventually successful. Many innovative applications were never successfully adopted. For example, in the 1960’s observers thought that, by the beginning of the 21st century, most retailing would be done by machine. Now that the millennium has come, vending machines remain relegated to niche products and situations.

The case of mobile commerce

Observers are concerned about whether mobile commerce applications can be rolled out successfully, that is, whether firms will be able to develop and roll out applications that customers value sufficiently so that they are willing to pay more for them than they cost to produce and deliver. Senior executives are concerned that they don’t have a clue about what m-commerce applications customers might be willing pay for [33]. So far, marketing research suggests, the ‘killer application’ that will
make m-commerce successful has not yet been identified [24]. In Japan, for example, where 3G services were test marketed in 2001, customers, many of whom were gadget enthusiasts, seemed to be blasé about the services, suggesting that they would only be interested if it were much cheaper. Said one, “…there’s nothing new on the service that I really feel I must have [2].” Other research has reported that customers are primarily focusing on paying less for current services [15], rather than looking eagerly forward to new applications.

Recently, this lagging interest has affected the hitherto very successful i-MODE service in Japan, where NTT DoCoMo’s failed, according to test marketing [2] to interest potential customers because its third generation FOMA network service provided neither exciting new applications nor cheaper prices [12].

All of this points to the need for new methods that can identify valuable applications for which customers are willing to pay more than their cost and that can help model the ideas in such a way that they can be well understood by managers and developers.

The remainder of this paper contains six sections. In the next section we review research from the IS planning literature about the development of information about user requirements for new IS and then we explore how information theory could be applied to this issue. We apply information theory to IS planning and relate this theory to six information processing needs for IS planning that we identify. In the following section we review five representative participative IS planning methods and their objectives and discuss the efficacy of these methods in supporting the six information processing needs. Next we describe a new planning method, critical success chains (CSC) that could be applied to determining user needs, we characterize CSC in terms of its support for elements of information theory, and we use it to apply
information theory to IS planning. Next we relate the story of a case in which CSC was used to understand customer needs for applications in mobile financial services. Then we compare CSC with other participative IS planning methods in terms of information theory. Finally we relate conclusory remarks that summarize CSC’s contribution to the development of information for IS planning, comment on CSC’s support for the characteristics of information theory, and comment on implications for managers.

**HOW TO DETERMINE WHAT INNOVATIVE APPLICATIONS CUSTOMER WILL VALUE?**

*IS Planning literature*

Research in IS planning has recognized this issue. Researchers, e.g., Segars and Gover [37], have identified information systems planning (ISP) characteristics that lead to its success, including widespread participation among employees across the firm, to incorporate the ideas of many, and a focus on projects that have the most potential to be important for the firm.

For the last twenty years the conventional wisdom has been that for IT investments to help the firm to achieve its strategic objectives [10], planning should be consistent with the firm’s strategy [41] and for planning to be strategic, it must have a "top-down" perspective, i.e., be driven by information from senior managers [38]. This argument is valid to the extent that it focuses attention on the need to reserve part of the IT budget for strategic needs.

It may be hazardous, however, for executives to assume, as a top-down process suggests, that they have a knowledge monopoly about applications and features that are potentially important to the firm. Clearly, senior managers don’t have a monopoly on understanding what customers want and are willing to pay for,
particularly when it comes to applications and products that haven’t been used before. In this case it is important that planning involve effective extensive participation. Others in the organization, in the community, and among customers usually know much, individually and collectively, about what is potentially important for new systems to succeed. Where innovative applications are contemplated, gaining access to knowledge from outside the firm may be crucial, as the effectiveness of such systems is often determined by current and future supplier and customer needs and expectations [20].

The question of how to incorporate and how to focus on the most important projects has been studied extensively, and requirements determination literature has presented numerous methods to academia and practitioners. To provide a structure for selecting the right method for each project, Davis [6] suggested a framework for selecting strategies for information requirements determination based on the level of uncertainty in projects. Davis [6] argued that, to reduce IS project risk, more complex methods should be used in projects with high uncertainty. Fazlollahi and Tanniru [11] revisited the framework and argued that emphasis should also be given to information presentation. They argued for the importance of information richness in requirements determination methods. Other researchers have also recognized the importance of a wide understanding, interpretation, and communication of rich information, to strategic decision-making [3].

Peffers et al. [29] argued for a wide participation of organization members to facilitate successful information systems planning. Where innovative applications are contemplated, gaining access to knowledge from outside the firm may be crucial, as the effectiveness of such systems is often determined by current and future supplier and customer needs and expectations [20]. Using top-down planning exclusively
ignores this knowledge [32], effectively wasting it. In an era where quick, proactive adaptation to new environments is required [4], this is probably no longer acceptable. As a solution to these problems researchers have argued for including the end-users in the development process [21].

**Information Theory**

Since broad participation in IS planning has the potential to affect the information available to managers about applications that may create user value, we might expect information theory to have something of value to say about how this value could be realized. Rich information may help managers understand competing demands for new and enhanced systems from within and around the firm and how systems might affect the firm’s performance.

Information has been characterized in terms of two related major characteristics, *media richness* and *synchronicity*. Media richness refers to the capability of the media to carry complex, multidimensional information and cues that help message recipients to better understand the intended message [5]. Information helps to manage uncertainty and equivocality in the decision environment. Rich media helps managers to overcome equivocality as it provides sufficient multidimensional clues to help them understand the intended meaning of complex and ambiguous messages. For example, a face-to-face boardroom meeting might be richer than text because in a face to face conversation participants can observe cues conveyed through body language, facial expressions, and tone that lend meaning to words and they can use graphics and animation to supplement oral discussions. Such a meeting might be better than email for a planning discussion about a new project for which the goals haven’t yet been fully determined. Uncertainty, on the other hand, about questions for which there are known answers, may be best resolved through acquisition of sufficient
information of the correct type. For this purpose, lean media may be perfectly sufficient.

Dennis and Valacich [7] argue for an extension of media richness theory that they refer to as “media synchronicity.” The use of information for any task can be characterized by two processes, conveyance and convergence. Conveyance refers to the process of transferring required information to the intended recipients as well as thinking about the meaning of messages. Information conveyance can result in divergent understanding as actors independently interpret incoming data about a problem. Convergence refers to the process of developing shared understanding among actors about the meaning of the message. Meaningful action in any group requires that communication supports both conveyance of data and convergence of shared understanding. The conveyance of sufficient information is essential for individuals to reach correct conclusions and convergence is necessary for the group to act together (with synchronicity) and with a common understanding [8].

In this theory, media is characterized by five characteristics, immediacy of feedback, symbol variety, parallelism, rehearsability, and reprocessability. Immediacy of feedback affects the level of interaction among participants in communication to the extent that bi-directional communication is fast. Symbol variety refers to the number of ways in which a given message may be coded. Greater symbol variety can help message recipients to better understand the meaning of the message because some information can better be coded in one format or another. It can also facilitate the process of coming to a common understanding about the meaning of the message. Parallelism refers to the ability of the media to carry multiple conversations simultaneously. Greater parallelism better supports the conveyance of sufficient information to support the decision tasks. Rehearsability refers to the extent to which
an author can take time to prepare and edit a communication before sending it. Greater rehearsability slows down the communication but may help it to be more precise. Reprocessability refers to the extent to which a communication in the media can be observed multiple times and be stored for future reference. Higher levels of reprocessability may assist in convergence by acting as a memory for the group [8].

**Applying Information Theory to IS Planning**

We can apply media richness and synchronicity theories to IS planning. Table 1 shows relationships that we have identified among elements of information theory and information processing needs for IS planning. In Table 1 we have operationalized five information processing needs for information systems planning: *multiple source data gathering, modeling reasoning, model aggregation, ideation, presentation, and decision-making.*

Multiple source data gathering refers to the need to gather information from many sources within and around the organization about ideas for potential systems and features that might be important for the firm. With innovative applications spread all around the organization, from integrating applications with suppliers, to operations, to infrastructure, and to applications that create new marketing channels, many people may hold valuable information about what systems may be important for the firm. The purpose of multiple source data gathering is to convey a wide variety of different ideas to the planning process. Multiple sources help to understand the ideas of many. Multiple source data gathering may result in divergent views because many ideas are likely to be inconsistent with each other.

Modeling reasoning refers to the need to simplify information and to present it in such a way that planners can understand why individual participants think that preferred systems or features might be important. Casting the IS planning net more
widely insures that participants are likely to come from different occupational, organizational, and national cultures. Without an effective means of representing the reasoning behind their preferences, the information that they provide may not be useful. Representing reasoning contributes to conveyance of understanding as it becomes easier for parties to the planning process to understand what is the intended meaning of the information provided by participants.

Multiple sourced data gathering and modeling reasoning are supported by three elements of information theory: more data, parallelism, and rehearsability. More data and parallelism support gathering much data from diverse sources. Rehearsability supports the modeling of individual participant reasoning to better understand reasons why participants prefer applications and system features. In general, these needs are well met with media that is low in synchronicity, i.e., participants don’t need to work together at the same time to create or process this information.

Aggregated modeling refers to the need to combine the information received from many participants in a meaningful manner, so that planners and developers can use it to create real systems. In society, meanings, understanding and values combine over time to form what we call culture of an organization, profession or society. If we can systematically aggregate information provided by participants to the planning process, this can help to further understand what is meant by the participants. Without such aggregation, the ideas contributed by many individuals may remain useless, as a kind of babble, potentially overwhelming the planner with an information overload condition. Aggregation can also prepare planners to converge ideas about applications that may be desirable for the organization.

Ideation refers to the translation of aggregated models of preferences and reasoning about systems and features that could be important to the organization into
feasible project ideas. This contributes to convergence about what from the aggregated models is feasible and desirable.

Presentation refers to the process of putting the ideas into presentation forms that can be used effectively by decision makers and developers.

Model aggregation is supported by symbol variety and reproducibility. These media characteristics are essential for the development and use of analytical procedures that can support the combination and use of the ideas of many participants. Ideation and presentation are supported by rich media, symbol variety and reproducibility. Developers and managers involved in idea generation require high levels of all three characteristics to optimize their understanding of user needs and user reasoning. Staff members preparing presentation material for decision-makers require similarly high levels of all three characteristics.

Table 1 Mapping information theory to the information processing needs for information systems planning.

<table>
<thead>
<tr>
<th>INFORMATION THEORY</th>
<th>INFORMATION PROCESSING NEEDS FOR INFORMATION SYSTEMS PLANNING</th>
<th>SYNCHRONICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>More data</td>
<td>Multiple source data gathering. Gathering diverse data from a variety of sources.</td>
<td>Low</td>
</tr>
<tr>
<td>Parallelism</td>
<td>Modeling reasoning. Modeling individual participant reasoning.</td>
<td></td>
</tr>
<tr>
<td>Rehearsability</td>
<td>Model aggregation. Aggregating models across individuals. Ideation. Using aggregated data to generate feasible solution ideas. Presentation. Preparation of material to support decision making.</td>
<td>Medium to high</td>
</tr>
<tr>
<td>Rich media</td>
<td>Decision-making.</td>
<td>High</td>
</tr>
<tr>
<td>Symbol variety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reproducibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reproducibility</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decision-making refers to the actual activities to decide which systems and features to build. Decision-makers require rich media and feedback to enhance their understanding of user needs as well as feedback and reproducibility to support deliberation and consensus-making behavior.
**PARTICIPATIVE METHODS FOR IS PLANNING**

Next we look at existing methods from IS, marketing, and manufacturing that have been employed to encourage wide participation in IS planning.

*Five participative methods*

There are many methods that have been used to enhance participation in IS planning and requirements analysis. We review five methods here because we think them to be fairly representative of the general kinds of methods in use. The five, shown in Table 2, along with brief descriptions and characterizations of objectives, include Delphi, focus groups, ETHICS/SADT, multi-criteria decision making (MCDM), and total quality management/quality function deployment (TQM/QFD).

Here we describe the five methods in terms of their objectives and data gathering and analysis characteristics.

<table>
<thead>
<tr>
<th>METHOD</th>
<th>DATA GATHERING</th>
<th>ANALYSIS AND PRESENTATION</th>
<th>OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delphi [19]</td>
<td>Open ended survey with answer rounds.</td>
<td>Interpretive and aggregated information after each round until a consensus is reached and the forecast can be written.</td>
<td>Acquire knowledge from a range of expert end-users and aggregates the knowledge.</td>
</tr>
<tr>
<td>Focus Groups [18; 26]</td>
<td>Focused group interviews</td>
<td>Interpretive report written by the facilitator.</td>
<td>Use group dynamics to get rich information of the selected focus area efficiently.</td>
</tr>
<tr>
<td>ETHICS, SADT [16; 23; 36]</td>
<td>Team including members with specific roles</td>
<td>Variance Analysis tool, job satisfaction analysis, and graphical modeling language.</td>
<td>Enable capturing of the system requirements with the system’s functions and dataflow among them with a structured approach and a wide participation of stakeholders.</td>
</tr>
<tr>
<td>Multiple Criteria Decision Making (MCDM) [17]</td>
<td>Individual Interviews.</td>
<td>Dataflow diagrams that present optimized function of organizational resources and the subsystems’ characteristics.</td>
<td>Enable formal and well-structured analysis and presentation of requirements.</td>
</tr>
<tr>
<td>Total Quality Management (TQM) / Quality Function Deployment (QFD) [14; 30]</td>
<td>Individual and focused groups. No specific methods defined.</td>
<td>House of Quality presents a matrix containing rich set of information about requirements.</td>
<td>A way to include the customer in development process. Multilevel view to communicating the requirements to different stakeholders.</td>
</tr>
</tbody>
</table>
**Delphi**

The objective of the Delphi method is to acquire and aggregate knowledge from multiple experts [34] so that participants can find a consensus solution to a problem [19]. Data gathering begins with open-ended survey questions and proceeds with multiple rounds of participants commenting anonymously on each other’s ideas. The Delphi method doesn’t define how to select participants; they can be internal and external system users. The data is interpreted after each round until a consensus is reached and the forecast report can be written. The strength of Delphi is thought to lie in opinion convergence.

**Focus Groups**

A second distinct method is focus groups (or focused group interviews). This method relies on team or group dynamics to generate as many ideas as possible. Focus groups been used for decades by marketing researchers to understand customer product preferences [18]. As a data gathering method they typically rely on spreading the data gathering simultaneously among various segments of customers [18]. The strength of focus groups is thought to be in their ability to facilitate gathering data from diverse targeted groups about the existence of ideas. Group interviews are typically ‘one off,’ i.e., not iterative, events. The facilitator writes an interpretive report as a result of the qualitative analysis.

**ETHICS/SADT**

The ETHICS and SADT methods represent attempts to apply the concept of focus groups specifically to information systems planning, eliciting data from groups of stakeholders [36] or organizational teams [23]. They are characterized by their use of predetermined roles for group/team members and the use of graphically structured diagrams. SADT enables capturing of a proposed system’s functions and data flows
among the functions [35]. ETHICS is more analysis oriented and uses a variety of analysis tools, such as variance analysis to assist in the identification of systemic and operational problems and problem areas [23]. Hirschheim and Klein [16] have argued that “the value of participation [in these methods] is in its process,” i.e., that the methods help stakeholders to negotiate preferences and needs.

*Multi-criteria decision making*

MCDM [17] views requirements gathering and analysis as a problem requiring individual interviews. Analysts using MCDM focus primarily on analysis of the collected data to reveal users’ requirements, rather than on resolving or negotiating ambiguities. The objective is to find an optimal solution for the problem of conflicting values and objectives, where the problem is modeled as a set of quantitative values requiring optimization. One of the difficulties of implementation is that managers may not understand the method and may not be committed to provide the required information to make subjective judgments among requirements [17].

*Total quality management*

TQM is a way to include the customer in development process, to improve product quality. In a TQM project, data gathering for customers needs, i.e. requirements elicitation, may be done with QFD [40]. The emphasis of QFD is interaction with the customers of the product along the all phases of the design process [14; 40]. TQM literature does not specify the nature of TQM data gathering methods, so in practice they may be elicited in many different ways, such as an open-ended survey questionnaire followed by a telephone interview [14].

TQM takes a multilevel view to communicating stake-holder requirements. It presents the requirements as a “house of quality,” the result of qualitative analysis of requirements data. In a software engineering context this data may include technical
product specifications, customer requirements, customer requirement priorities, a correlation matrix, and technical product specification priorities [14].

*General observations about participative methods*

Each of the five methods provides a different set of features to support the IS planning process. Table 3 summarizes our interpretation of the support provided by these methods in terms of the six information processing needs that we identified for IS planning. Delphi is intended to involve a variety of participants in data collection, deliberation and decision-making or forecasting. Consequently, Delphi primarily supports data collection, opinion convergence, and decision-making. Focus groups are intended to use groups as a tool for effective gathering of preference data and to interpret it for decision-makers, so this method supports multiple source data gathering and presentation. These methods have little to say explicitly about modeling reasoning or aggregating models. ETHICS and SADT support multiple source data gathering and combine it with modeling techniques to apply the focused group interview methodology to IS planning. MCDM is primarily a method for modeling a known value structure (it has little to say about data gathering) and determining the best outcome, so this method supports modeling reasoning, model aggregation and decision-making. TQM tries to help avoid requirements chaos with a clear representation of requirements using quantitative analysis. TQM is primarily a method that supports modeling and analysis of data. It has little to say either about data gathering or other aspects of the planning process.

None of the models that we reviewed supports the transition of information for ISP through the six information processing needs for ISP that we identified. Next we review a recently designed IS planning method, called “critical success chains (CSC)” that meets more of these needs.
Table 3 Information processing needs for IS planning supported by five participative methods of requirements elicitation.

<table>
<thead>
<tr>
<th>Information Processing Need</th>
<th>DELPHI</th>
<th>FOCUS GROUPS</th>
<th>ETHICS /SADT</th>
<th>MCDM</th>
<th>TQM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple source data gathering</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modeling reasoning</td>
<td></td>
<td></td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Model aggregation</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Ideation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Decision-making</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

CRITICAL SUCCESS CHAINS SUPPORT FOR CHARACTERISTICS OF COMMUNICATION

Critical success chains (CSC) [27; 28] is a method of data gathering, analysis, and ideation for ISP that makes use of the knowledge of many people in and around the organization to develop feasible ideas for new systems that are potentially important to the firm. The use of CSC, claim Peffers et al [29], has the potential to positively affect the portfolio of IS projects available to the firm. The method can result in better information from wider participation, provides rich information important for planning, and helps keep focus on what is important for the firm. Five of the six information processing needs for ISP that we identified in Table 1 are supported by features in CSC.

In Figure 1 we make the graphical connection between information theory characteristics, the ISP information processing needs, and CSC features. Briefly, multiple information sources are supported by an economical structured interviewing method to incorporate the views of many people into the planning process. Modeling reasoning is supported by expressing the results of the interviews as a series of feature—performance—value chains. Model aggregation is supported by a clustering process that results in chains from many individuals combined to form firm-specific network models. Feasible idea generation is supported by an ideation workshop. Idea
presentation is supported by post-workshop analysis that transforms ideas generated in the workshop into documents intended for decision makers and developers. The sixth need, for deliberation and decision-making, is not explicitly supported by CSC.

<table>
<thead>
<tr>
<th>Information Theory</th>
<th>Information Processing Needs for ISP</th>
<th>Meeting Information Needs with CSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyance: information sufficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More data Parallelism Rehearsability</td>
<td>Multiple source data gathering</td>
<td>High Participation Structured Interviewing</td>
</tr>
<tr>
<td></td>
<td>Modeling reasoning</td>
<td>Chains</td>
</tr>
</tbody>
</table>

| Convergence: common understanding | | |
| Rich media Symbol variety Reproducibility | Aggregating models | Content analysis and models clustering |
| | Ideation | Ideation Workshop |
| | Presentation | Post-Workshop Analysis |

| Decision: agreement about solutions | | |
| Rich media Feedback Reproducibility | Decision-making | Not supported in CSC |

Figure 1. Study framework to meet the needs of IS planning for rich information with critical success chains. Information theory adapted from [7] and [5]. CSC elements adapted from [29].
To determine whether CSC could allow us to use information effectively for IS planning, we used it at Digia, Inc. to develop a portfolio of financial services applications for use with mobile communications technologies by a multi-organizational value chain that includes banks, mobile network operators, wireless appliance manufacturers, retailers, and information intermediaries (infomediaries). Our objective was to develop a package of information and analysis to help the firm to understand the value that potential end-users would attribute to innovative applications and features that had never been used and the reasoning behind this value, so that developers would have a better chance of developing systems that would be highly valued and successful in the marketplace.

**Charge from the firm and study scope**

Digia, Inc. is a Helsinki-based firm that specializes in innovative software applications for the mobile communications industry and service industries that use mobile communications. It focuses on the development of technologies and applications for wireless information and communication devices. Digia’s customers include mobile handset manufacturers, mobile operators and related firms. Its mission is to shorten customers’ product development cycles.

In Fall 2002 we held discussions with Digia executives, who wanted to develop a portfolio of applications for Digia to meet the needs for financial services to be delivered by next generation wireless devices. Digia chairman, Pekka Sivonen,

\footnote{In [29] we published a very abridged version of the Digia study, along with another case study, for the purpose of providing evidence that the basic features of CSC worked. Here we report on the full set of extended CSC method features that we used at Digia.}
referred to the ideal applications as, “financial cocktails for mobile commerce.” For Digia to succeed it is important for the firm to develop some “killer cocktails,” i.e., applications so well embraced by customers that they help to insure the acceptance of the next generation wireless devices in a way similar to the way VisiCalc helped to insure the acceptance of the PC by business. The scope for the applications was loosely defined as somehow involved with money and financial services. Of course, we couldn’t insure that anything we helped develop would succeed commercially, much less succeed so dramatically, however, this seemed like an excellent opportunity to see whether CSC could help developers by providing them with better information about applications and features that potential users would value.

**Participant selection**

The first task in our study was to select study participants. Intensive qualitative studies are expensive, so for CSC to be a practical method, it is important that the participants be well specified. Clearly most of the participants would come from outside the firm. Development, implementation and use of the desired applications would involve people up and down the value chain, so it seemed desirable to obtain input from a representative group of people who might be expected to possess knowledge about the value of potential new applications, including bankers, risk investors, mobile telecommunications operators, researchers, and potential end users.

We focused on two groups of participants, experts and end users. For potential expert participants, we targeted a cross-section of Finland’s most relevantly knowledgeable scientists, professionals, and managers. Our analyst worked with Digia’s chairman and a staff assistant to develop a list of expert participants. Because of Finland’s relatively small population this could be readily done from people known to these three individuals.
For end-users we targeted sophisticated communication technology users, people who would be likely early adopters of attractive new mobile commerce applications. We defined the desired demographic characteristics for end-user participants using segmentation that had been used in a major mobile value-added services study [25]. For this study, the business mobile user segment, presented in Table 4, was considered the most appropriate.

**Table 4 The business mobile user segment, based on [29].**

<table>
<thead>
<tr>
<th><strong>THE BUSINESS USER SEGMENT OF MOBILE VALUE ADDED SERVICES</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Aware and have used mobile value added services (VAS)</td>
</tr>
<tr>
<td>Wealth</td>
<td>Not restrained by monetary issues</td>
</tr>
<tr>
<td>Education</td>
<td>Highly educated, working on the managerial level or as an expert</td>
</tr>
<tr>
<td>Technology orientation</td>
<td>Internet and information technology littermates</td>
</tr>
<tr>
<td>Mobility</td>
<td>Very mobile people, participating actively in sports and outdoor activities</td>
</tr>
<tr>
<td>SMS usage</td>
<td>Moderate SMS-users (1-7 mobile originated SMS/week)</td>
</tr>
</tbody>
</table>

Selection of a panel of potential early adopters was more complex. The snowball sample selection method has been used in social science disciplines, such as marketing and sociology [22], to identify samples from hidden populations, e.g., cocaine users [39]. Here we wanted to identify potential early adopters for applications that hadn’t yet been invented. We used the snowball method to identify professional, managerial, executive, and other sophisticated end-users, with the characteristics of the business mobile user segment, starting with individuals identified by Helsinki School of Economics faculty members, not including the analyst. The resulting combined list of nominated participants contained 40 names.

**Data collection**

We were able to contact 32 of the forty nominees by telephone. Each agreed to participate. The resulting participant panel included 18 outside experts and 14 potential end-users, including just one Digia employee. The experts included 3 IS
development managers, 4 academic researchers, and 12 executives from m-commerce related industries. The potential end-users included 5 managers and executives from a variety of industries, 4 professionals, and 2 university students. All of the participants were from the Helsinki vicinity and all were mobile telephone users. Qualitative researchers in the social sciences have found that samples in the range of 15 to 30 people [9; 13] are sufficient to gather nearly all of the ideas about an issue from a population. Consequently, we considered the size of our sample to be adequate.

Table 5 shows a profile of the study group. All participants were moderate to heavy mobile communications technology users. Estimated Internet use for the group was averaged 2.8 hours per day. All except one participant were familiar with mobile value-added services and most used services at least occasionally, up to 5 times per week. The average age was 33 years and the participants estimated that they spent 25% of their working time outside of their office on average. About half of the participants had sold or bought stocks during the past year.

To provide idea stimulus, we asked each participant, during the appointment setting telephone call, to tell us the first thing that came to mind when they thought about financial services that could be provided with the next generation mobile devices. Thirty of the 32 participants provided ideas. We rewrote the 30 ideas as four bland descriptions, from which participants could infer specific features.

We interviewed each of the participants individually over a five week period. The interviews averaged 50 minutes. In each interview we spent the first 5 to 10 minutes on warm-up conversation and discussion of the interview objectives. Then we showed the participant the four system descriptions and asked to him/her rank order the best two. Generally the participants volunteered ideas about system features.
When necessary, we also showed participants prototype pictures of innovative mobile
devices to indicate that we weren’t limited to current device capabilities.

**Table 5 Demographic profile for all participants in Digia study.**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>20-29 yrs</td>
<td>38 %</td>
</tr>
<tr>
<td>30-39 yrs</td>
<td>44 %</td>
</tr>
<tr>
<td>40+ yrs</td>
<td>18 %</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Bachelor</td>
<td>31 %</td>
</tr>
<tr>
<td>Masters</td>
<td>56 %</td>
</tr>
<tr>
<td>Doctorate</td>
<td>13 %</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>84 %</td>
</tr>
<tr>
<td>Female</td>
<td>16 %</td>
</tr>
<tr>
<td><strong>Use of Mobile VAS</strong></td>
<td></td>
</tr>
<tr>
<td>0-5 per week</td>
<td>50 %</td>
</tr>
<tr>
<td>5-8 per week</td>
<td>22 %</td>
</tr>
<tr>
<td>over 8 per week</td>
<td>25 %</td>
</tr>
<tr>
<td><strong>SMS messages/week</strong></td>
<td></td>
</tr>
<tr>
<td>0-19 per week</td>
<td>38 %</td>
</tr>
<tr>
<td>20-49 per week</td>
<td>38 %</td>
</tr>
<tr>
<td>50+ per week</td>
<td>24 %</td>
</tr>
<tr>
<td><strong>Internet Banking</strong></td>
<td></td>
</tr>
<tr>
<td>used regularly</td>
<td>91 %</td>
</tr>
<tr>
<td>Stock trading with Internet banking</td>
<td>47 %</td>
</tr>
<tr>
<td><strong>Mobility (% of time working out of office)</strong></td>
<td></td>
</tr>
<tr>
<td>0-29%</td>
<td>22 %</td>
</tr>
<tr>
<td>30-69%</td>
<td>50 %</td>
</tr>
<tr>
<td>70%+</td>
<td>28 %</td>
</tr>
</tbody>
</table>

Next we asked the participant a series of questions to collect chains of attributes, CSF consequences, and personal objectives [29]. All but five of the interviews were done at the participant’s work premises because participants seemed more at ease there than elsewhere, especially when it was in a conference room, away
from interruptions, rather than in the participant’s office. The interviews were recorded. Afterwards, we used the tapes to record the responses into chains of reasons. The interviews were well structured, so aside from two interviews where it was challenging, transcribing the chains was a straightforward task. In total 147 chains were recorded averaging 4.6 per participant.

Figure 2 shows an example chain. Items near the bottom refer an application’s to specific attributes. Those in the middle refer to consequences or performance. Those near the top refer to results, objectives or values. The interview, from which the chain shown in Figure 2 results, is transcribed, in part, in Appendix 1.

Analysis

Each participant expressed his or her views in the interviews with unique statements, more than 1000 in the 147 chains that we collected, so it was important to attach a common label to similar statements, expressed differently. Two analysts used an iterative, qualitative clustering process to cluster the more than 1000 statements into 114 concepts, representing system features, performance consequences and personal values.

Next we mapped the chains into a matrix where 147 rows represented the chains and the 114 columns represented the concepts. We clustered the chains, using Ward’s method [1], to minimize the variance of the constructs contained in each cluster, aggregating the chains into socially constructed CSC models.

We examined resulting clusters, focusing on solutions with three to 10 clusters. After producing rough models for most of the cluster solutions, we settled on a five cluster solution that seemed to be coherent and meaningful. We mapped each cluster into a network model where nodes represent the constructs and links represent
the links connecting the constructs in the chains. The models were tidied up by eliminating redundant links. Figure 3 shows one of the five resulting models.

![Diagram of a chain with labels: It is always with you, Pay micropayments instantly, No separate wallet, Less things to lose, No need to sign anything, No receipts to store, Easy to search information, Life is in order, Able to function properly.]

**Figure 2 Example chain collected from a participant in the Digia study.**

In the figure application attributes are shown to the left, critical success factors in the middle, and personal goals on the right. For example in figure 3 a specific feature, “information pushed to your mobile,” is related to the “ability to customize and filter” and “independence of time and place,” both performance variables or CSF. These are, in turn, related to “efficiency and economy” and “in control of life,” which are personal objectives. Together the CSC model represents an aggregation of applications or features that a number of people thought would be important to their lives and the reasons why, expressed in terms of performance and personal values.

**Ideation workshop**

To translate the aggregated CSC models into feasible ideas that could be considered by decision makers and implemented by developers, we organized an ideation workshop. Both business and technical R&D people were chosen to
participate, including the chairman of the board, the Nokia Key Account Director, two business development managers and two engineering managers.

The workshop was scheduled for a single five-hour session, starting with a brief introduction to the CSC method and the study and a discussion of the purpose of the meeting and broken by a fancy catered lunch. The objective was to examine and discuss each CSC map as a group, then come up with a project idea that would address the desired consequences and values expressed in the models, including a name, short description, architecture, a list of supply chain players, our customer segment(s), benefits for players and customers, our profit model, and risks involved, all at a “back-of-the-envelope” level of detail. In addition, they were to produce a rough graphical network business model that showed the relationships among customers and supply chain participants, including the flow of information, value and revenue. Participants were told that they should rely on their own knowledge, rather than making use of resources outside the room.

Each CSC map was described and discussed, one at a time. Participants discussed the models with animation, with every member participating and participants taking turns leading discussion at the flip chart, taking notes, and writing out and drawing models of the project. The researcher’s role was to direct the flow of the process and give it limits if needed. During the discussion there were several questions about the individual statements behind the CSC map labels. Discussion of the first model took 2.5 hours, but the remaining discussion moved more quickly. All of the models were discussed in the five hour session.

For each of the CSC models for which an idea was developed, the participants first drew a business model on the flipchart. Figure 4 shows the rough drawing for a business model for the idea generated from map 2. This model aims to describe
information and revenue flows among parties, including end users, mobile operators, information providers, and others for a product idea called “My Financial Advisor.”

For this application idea there was a lively discussion about the architecture. One of the most important things would be an ‘always on’ connection. The user interface raised questions about whether a text-based push would be adequate for this...
purpose and whether speech synthesizer technology was needed. In addition, the application interface might have to vary to accommodate different devices.

![Diagram](image)

**Figure 4. Photo of business model for “My Financial Advisor,” hand-drawn on brown flip chart paper, in the workshop from CSC map 2 (language mixed English and Finnish).**

The customer for the developer would be analysts and the profit model could be a license fee per device. The participants had a very clear idea of the market size for this application. They estimated that it would be twice the number of people traveling in business class, plus current Nokia Communicator users. It was estimated that it would take only two weeks to develop a prototype for such an application.

Perhaps the biggest risks for this set of applications would come from the firm’s inexperience with the financial sector and the financial industry’s ‘not invented here’ attitude. Banks could develop own applications to better control the value chain.

Participants developed three application ideas from the five CSC maps. For one map there was a short discussion. Then someone in the group said, “there is no game for us here. Let’s move on.” Digia wouldn’t be a part of any value chain developed from this model, so there was no point in pursuing it, although it might
have been interesting to a firm in the banking industry. Group members decided that
the two last maps could be satisfied with a single new business idea.

Post-Workshop Analysis

Following the workshop, the next step was to take the rough ideas developed
over the day and refine them into presentable form for the CEO and eventually for
developers.

The first step was to refine the ‘back-of-the-envelope’ descriptions developed
in the workshop. Table 6 presents the application idea resulting from the discussion of
map 2, My Financial Advisor. The description includes the name of the application
and brief descriptions of its likely architecture, the likely value chain participants,
benefits for customers, size of the market, and the source of profit for the developer.
The purpose is to present sufficient information to understand the system idea well
enough so that the reader could move ahead to begin to develop a real feasibility
study, business plan, and project proposal.

Table 6 ‘Back-of-the-envelope’ description of the My Financial Advisor, an application idea
developed from CSC map 2 (figure 2) at the Digia ideation workshop.

<table>
<thead>
<tr>
<th>MY FINANCIAL ADVISOR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>An easy and intelligent way of receiving real time financial information. An ‘aggressive’ screensaver that pushes information.</td>
</tr>
<tr>
<td>Architecture</td>
<td>Always on connection (GPRS, i-MODE etc.), Multiple user interfaces / access methods, speak synthesizer, Browser, storing of information, chronological order of information (Archiving the information), structuring of the information, Lotus Domino client/server environment</td>
</tr>
<tr>
<td>Players</td>
<td>Stock Exchange, Customer, Infomediary, Analyst, Network Operator</td>
</tr>
<tr>
<td>Customers for the developer</td>
<td>Analysts for developer, For Analysts day traders</td>
</tr>
<tr>
<td>Benefits for players and customer's)</td>
<td>End-customers - Real time information, better decisions, Stock Exchange - more volume for trading, Infomediary - Revenues from Analyst, Network Operator - more network traffic, Analyst - increased revenues, better customer relationship</td>
</tr>
<tr>
<td>Revenues and market size</td>
<td>2x People traveling in business class, Nokia Communicator users</td>
</tr>
<tr>
<td>Profit model for the developer</td>
<td>License sales to analyst(s)</td>
</tr>
</tbody>
</table>

The next step was to refine the rough business model, such as the one shown
in figure 4. First however, we wanted to make sure that we understood all of the
expected major interactions among the value chain participants to this model. For this we turned to an interaction model, as proposed by Timmers [42].

Table 7 presents these interactions and processes for My Financial Advisor. The interactions in this table can be understood as they are in entity relationship models. The table provides a vehicle to ascertain that one understands all of the major interactions and helps the analyst to draw the finished business model. It may also be helpful to developers later as it presents another view of the application idea.

Table 7. The interaction model of My Financial Advisor (MFA)

<table>
<thead>
<tr>
<th>V[(a),(b)]</th>
<th>Interaction(s)</th>
<th>Involved processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer : Analyst</td>
<td>1:1, 1:Many</td>
<td>Service fees, information requests, real time analysed information</td>
</tr>
<tr>
<td>Analyst : Infomediary</td>
<td>1:1</td>
<td>Information brokering services, fees</td>
</tr>
<tr>
<td>Analyst : Stock Exchange</td>
<td>1:1</td>
<td>Financial information, fees</td>
</tr>
<tr>
<td>Analyst : Company</td>
<td>1:1</td>
<td>Information flow</td>
</tr>
<tr>
<td>Analyst : Customer</td>
<td>1:1</td>
<td>Information push, service fee revenues</td>
</tr>
<tr>
<td>Company : Analyst</td>
<td>1:1, 1:Many</td>
<td>Information push</td>
</tr>
<tr>
<td>Stock Exchange : Analyst</td>
<td>1:1, 1:Many</td>
<td>Information flow, fee revenues</td>
</tr>
<tr>
<td>Stock Exchange : Customer</td>
<td>1:Many</td>
<td>Information push (mass push)</td>
</tr>
<tr>
<td>Infomediary : Analyst</td>
<td>1:1</td>
<td>Information brokering services, service fee revenues</td>
</tr>
<tr>
<td>Portfolio manager : Customer</td>
<td>1:1</td>
<td>Customer service, information push</td>
</tr>
</tbody>
</table>

The final step in the post-workshop analysis was to redraw business models. This process was very easy and straightforward with the help of interaction models. Assembling the interaction models of the applications really helped to understand the processes behind the rough drawn business models and helped to the analyst to clarify them, especially with the more complex ones. One of the business models that resulted from post-workshop analyses, ‘My Financial Advisor,’ is shown in figure 5. It presents the players and, importantly, three types of interaction among them, consistent with the interactions developed for table 7.

Three types of interaction are shown in the model: information flow, revenue flow, and logistical flow. Information flow is shown with a solid arrow, revenue flow
is represented by a dotted arrow, and logistic flow is represented by a dashed arrow. These flows represent the interaction model and processes described in it. Mobile network operator was included in the model but without any arrows to or from it. Its position between analyst and customer would allow it to collect revenues from network traffic resulting from the application; its role was seen as a necessity but not interesting to the implementation of this application.

![Diagram of My Financial Advisor business model]

Figure 5 The Business model of My Financial Advisor.

According to Digia product analyst, Markus Ahonen, the firm regards CSC favorably because (1) the method seems to work well and it is easy to see why it works, (2) the interviewer collecting data for the method needs no special abilities or skills, and (3) the resulting CSC maps are very helpful in understanding how people think about an issue. Digia’s Chairman remarked that the workshop
“positively...exceeded [his] expectations [about] the results...” The firm plans to continue using the CSC method in IS planning.

COMPARING CSC WITH OTHER PARTICIPATIVE METHODS

Where does CSC fit in among other participative methods for IS planning and requirements analysis? In Table 3, we listed five participative methods for IS planning and we characterized them in terms of their explicit support for the information processing needs of IS planning. Delphi’s strength is in support for multiple source data gathering and decision making. Focus groups are effective in gathering diverse data and presenting it to facilitate decision making. ETHICS/SADT excels in data gathering and in reasoning modeling. MCDM focuses on finding an optimal solutions, so its forte is in modeling reasoning and aggregating models, as is TQM’s.

CSC supports five of the six ISP information processing needs identified in Table 1. The structured interviewing method provides a solid ground for multiple source data gathering. The chains of features, performance and values model reasoning and the analysis of these and clustering the models supports aggregating models as presented in Figure 3. CSC is the only method to explicitly support the ideation process with the ideation workshop. The post-workshop analysis enables presentation of information for decision-making, e.g. Figure 5 and Tables 6 and 7. The one exception is that CSC does not support explicit decision-making behavior.

CSC not superior to other methods

This paper’s characterization the five participative methods for IS planning and CSC should not be taken as a claim that CSC is in some way superior to these other methods. Clearly we have compared these methods in terms of one dimension of interpretive, qualitative characteristics: how they provided support for the information processing needs of IS planning. Each of these methods has many other characteristics
and IS planning’s information processing needs could be subdivided differently. Consequently, which method is judged superior is likely to depend on the circumstances and use to which IS planners need to put it. For example, of the compared methods only Delphi provides strong support for deliberation, consensus reaching, and decision-making behavior. Focused groups have unique abilities to use group dynamics to develop reasoning that can’t be done in individual interviews. ETHICS/SADT are thought to be superior in terms of graphical modeling. MCDM enables analysts to find optimal solutions where values can be appropriately quantified. TQM is an excellent way of avoiding problems in presenting large models.

CSC has some limitations. Like other qualitative methods it is expensive, far more so than assuming that developers already know what users need. It is designed to be economical, however, with short, structured interviews and a very constrained ideation workshop. Other methods, however, such as prototyping, might be considered as alternative tactics to avoid catastrophic mistakes about user needs and values. Like any qualitative method, the quality of analysis depends somewhat on the skill and diligence of the analyst. It seems likely that the services of a skilled research practitioner are required for some of the activities.

CONCLUSIONS

At Digia, the CSC method, extended with network business models, helped managers and technical experts to develop ideas for feasible application products for the firm. These were developed at a ‘back-of-the-envelop’ level, then polished by the analysts for presentation to the Digia CEO. Digia is currently developing products related to these ideas for roll out for next generation mobile devices.

The CSC maps provided workshop participants with rich information about features that the experts and sophisticated users wanted and the reasons why they
wanted them. This rich information helped workshop participants to develop application ideas that, in turn, contained very rich information for developers, including not just the desired application functionality, but information about the interaction among business partners and customers, the flow of information and revenue, architecture, and other issues. This is expected to make it more likely that developers can successfully develop applications that users will value.

*Information theory and CSC*

CSC provides support for conveyance and convergence to help managers better use information about customer needs and values to develop applications better suited to meeting those needs, as well as application systems for which customers are willing to pay. CSC supports conveyance with two features. The structured interviewing method allows participants to be interviewed quickly and economically, supporting the inclusion of many participants in the data collection effort. Chaining structures the data to help analysts understand the reasons for participant preferences.

Convergence, the process of coming to a common understanding about what customers need, is supported by three features of the CSC method, content analysis and model clustering, the ideation workshop, and the post-workshop analysis. Together these activities provide effective support for transforming participant ideas: aggregating many individual ideas into socially constructed models of what is important, transforming them into feasible project ideas, and creating the documentation necessary to justify the projects in the organization. Together the five CSC features can provide support with rich information to help managers choose the most important new systems and help developers to understand these systems.
Contributions

We identify four distinct contributions of this study. It

1. uses information theory, including media richness and synchronicity, to identify the information processing requirements for IS planning.

2. reviews five major participative methods for IS planning in terms of their support for the information processing needs of IS planning.

3. identifies a new method for IS planning that effectively supports five of the six information processing needs for IS planning.

4. demonstrates the efficacy of this method in a case study.

Implications for managers

This extended CSC method should be helpful to planning for IT in a variety of circumstances. We used experts and sophisticated end-users as our participants. Other groups could be used in different circumstances. For example, where a firm wanted to plan infrastructure IS investments, a participant group that included representative employees, plus supplier representatives, might be employed. For systems involving integration with vendors, participation of incoming logistics employees, representatives from operations, and supplier representatives might be a good idea.

The extended CSC method is sufficiently economical so that participation doesn’t have to be limited to just a few people. The marginal cost of adding an additional participant was approximately the cost of the individual interview, about an hour. At Digia, the interviewing process was spread out over about five weeks, but that resulted from its scheduling during the holiday season. Ordinarily it might be feasible to interview 30 participants in about two weeks. The analysis should normally take another week or two, and then another two weeks should be allowed for the
workshop and post-workshop analysis. During most of this period, however, only the two analysts are fully engaged.

The analysis for CSC is sophisticated enough so that it generally requires the services of a skilled social scientist, at least for the first time. The interviewing is quite simple, however, and can be done by an employee with interviewing skills after a short period of coached practice. In the future resources should be allocated to developing intelligent software so that managers can use this method themselves with a moderate understanding of analytical tools. The CSC method also holds promise for use in requirements gathering. The authors are currently involved in research to develop this promising potential.
REFERENCES


APPENDIX 1 - TAPE 1, LADDER 1

Participant selected following stimuli: 1) Mobile device as cash, 2) Mobile device as payment instrument

PARTICIPANT (P): I think I will select the two first ones because if I think about really that what is the good side of cellular phone it is that it is always with you (A). In this sense the paying the invoices and using cellular as cash are good…

ANALYST (A): Ok, let’s start then with the first one. Do you have any ideas how this could work? Actually was not one of these originally your idea…

P: No, don’t remember if that was but one could easily invent many useful uses like movie tickets, paying tram fares instantly when you go inside of the tram. (A) These micro payments, there are so many of those…

A: When considering the attributes shown in choice one are attributes that especially interest you or is there something clearly missing? How about the credit card payment opportunity? Do you see it important?

P: Yes, as listed here Visa and others but maybe also some international choice what ever that could be. Even though the practical implementation could be difficult this idea that you would not have separate wallet would be an good idea. (C) Let’s say that you have communicator style device that would contain the necessary information, in a manner your life is in that. (C) Then you separate cellular that contains your money and credit cards. The idea that you could combine these…

A: Why would this not having a separate wallet attribute would an important feature for you?

P: It could this funny thing that you have less to misplace (C). I have this habit of losing wallets but then there is this horror image that you loose the device and there is everything in that…

A: Yes, then again so it is with your wallet now days.
P: Yes, that’s true. Hmm, it is easy. You don’t have to sign anything (C) and you don’t receive any receipts to save (C). I get little nervous with my wallet when it seems to be full of paper and all the time you have to empty it. …

A: To return to not having receipts. Why would you think this would be important?

P: Well, in some things I am very systematic but if I would have shown you my office desk you would understand what I mean as it is full of papers. With this aspect it emphasises the fact that it is more easy to search (C) information with your computer or in this case with your mobile device. It’s just so easy if you have organized the things, let’s say in different folders like having receipts in this folder etc.

A: Why you have a need to organize your life?

P: I am just the sort person who does that. Even though I could be called ‘creative lunatic’ and messy person at the time but it is all the time important that my life is in order (C). Like I know what is the schedule for the week, I know what I do tomorrow and day after etc. I have to have a clear will that where my important things are etc.

A: Could it be that it is a value for you that you have to have your personal things in order?

P: Yes, especially if I don’t have my personal things in order I feel that I am in not in a balanced state and I am not able to function properly. (V)