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Change Management: The Contribution of Personal Construct Theory (PCT)

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Abstract

This paper explores the use of two complementary approaches, each stemming from Personal Construct Theory (PCT), to investigate the interdependence of organizations and information systems. Two techniques - Repertory Grid Analysis (RGA) and Cognitive Mapping (CM) - are used to investigate the dynamics of this interaction. Changing business models and information technologies were investigated in two distinct work settings: the techniques contributed substantial insight into the role of information systems in each case. Our analysis shows that the techniques have matured to a stage where they provide a basis for improved understanding of the organizational complexities related to information technologies. The techniques focus on the social construction of meaning by articulating and interpreting the discourse that surrounds the development, implementation and use of information technology in organizations. The research to date has articulated and improved awareness of the issues and concerns that surround IT. Despite the differing contexts and work processes, our findings in each case suggest that this has made managers more conceptually agile, leading to improved integration of organisational processes and technology in each case. The complementarity of the findings from the two settings and their analytic generalisability is explored in the concluding sections of the paper where we identify a promising avenue for extending this research into the complex relationship between information systems and organizations using PCT.

Keywords: Social construction of meaning; shared understanding; methodological complementarity; managerial agility.

1 INTRODUCTION

This research explores the importance of the social construction of meaning within the communities of discourse (Orr 1996) that surround information technology and organizational management. Organisational discourse is central to the communication of concepts and ideas that enable individuals and groups to (a) make sense of the world in which they work and (b) understand the changes to work brought about by information systems. Recent work, such as that by Orlikowski and Barley (2001), highlight the advantages of focusing research on work processes rather than on either information technology or the organisation itself. Such a focus was adopted in this research enabling us to explore the mutuality of the influences of (information) technology and organisations on one another.

The rationale for looking at organisational discourse in this manner arises from Scarbrough and Corbett's (1992) observations about the nature and ephemerality of dialogue during organisational change. They suggest that technological change, such as that involving information systems, involves the participants in a complicated and extended dialogue. Further, they argue that the dialogue is affected by two criteria, both of which are of particular significance to information systems. Firstly, the level (detail) of design activity ranges widely during the evolution of an information system. Secondly, and perhaps consequentially, responsibility for activity surrounding the information system is shared between a number of individuals: such sharing could be simultaneous or sequential, following project phases for instance. Scarbrough and Corbett (1992) compare these dynamics to electrical circuits: although in place throughout the evolution of the project, changing responsibilities and work assignments mean that the circuits are constantly re-wired as new channels of communication supersede existing ones in their importance.

Mediating between these circuits of power and design is what Scarbrough and Corbett (1992) call the 'meaning circuit'. It is here that the discourse about information systems and technology and organisation is articulated and negotiated. The social construction of meaning that takes place as technology and organisation simultaneously evolve or unfold over time provides the locus in which the significance of the issues and concerns faced by those involved can be interpreted. Uncovering this 'meaning circuit', however, is not a trivial task – providing one reason for the 'requirements' focus in information systems development for example. Consequently, this research uses two organisational case studies to examine ways in which the 'meaning circuit' may be investigated. Two investigative techniques – Repertory Grid Analysis (RGA) and Cognitive mapping (CM) - are used to address the problem of providing a forum or a medium for the exchange of ideas and concerns between the technology and organizational communities. Although not directly comparable in terms of the work they undertake, the organisations studied faced similar difficulties in articulating and addressing the issues surrounding the management of their large-scale information systems (on which organisations are increasingly dependent).

The paper explores the capacity of RGA and CM to enhance understanding and appreciation of the impacts of information systems on work. The concluding sections explore the nature of the constructs elicited by the two techniques, each of which was used in a specific work context. We note some representational similarity that suggests the existence of higher level 'super-constructs'. Although the specific research findings are directly relevant to their respective context, this research suggests that the complementarity of the RGA and CM techniques can contribute substantially to researchers', users' and managers' understanding of the issues surrounding the design, implementation and use of information systems. The super-constructs represent shared cognitive schemata of the organizational complexities related to information technologies and the work processes that they support. Iterative use of the techniques and constructs over time enabled the participants in the research to identify, clarify and prioritise the issues that affected their work as they prepared for or undertook changes brought about by the introduction of information systems.

Many of these changes were planned and well prepared for: others were not. Not all the impacts of an information system can be anticipated. Such unanticipated impacts give rise to issues and concerns that, although perhaps significant to the workers concerned, are frequently difficult for them or their

organizational managers to explain. As the studies show, the techniques used in this research enabled these emergent concerns to be articulated and discussed within both the user and managerial communities. The techniques provide powerful support for the process of learning: participants in this research frequently reported that their understanding of their work and its relation to both the information systems they used and the wider enterprise of the organization had increased. This suggests that shared cognitive schemata are an important contributor to both organizational and information systems development and effectiveness.

The use of RGA to articulate constructs surrounding a large scale forensic information system is described in Section 3. Section 4 reports the use of CM to investigate the change processes experienced by information systems specialists in a large financial institution. Section 5 discusses some of the findings from the research, highlighting the similarity of the research outcomes despite the disparity of the work settings. The conclusion proposes further research to explore the extent to which super-constructs provide the basis for comparison of the impacts of information systems in other organizational contexts. These discussions are preceded by a brief overview of the theoretical foundation of RGA and CM, Personal Construct Theory.

2 PERSONAL CONSTRUCT THEORY

Repertory Grid Analysis (RGA) and Cognitive Mapping (CM) have a common theoretical foundation in Personal Construct Theory (PCT) (Kelly 1955a; Kelly 1955b). PCT was originally developed for use in Psychology, principally in therapeutic contexts. Three key assertions are seen to underlie PCT: that people make sense of their world through contrast and similarity; that people seek to explain their world (why is it so? what made it so?); and that people seek to understand the significance of their world by organising concepts hierarchically. In the traditional application of PCT, individuals are asked to express their view of the world in terms of constructs, each having a positive and negative pole (expressing the concept and its perceived opposite). The relationship between the constructs is then evaluated through an exhaustive paired or three-way comparison to develop what are known as Repertory Grids. Equally the relationships between the constructs may be reflected in a more visual approach, as developed in a related technique known as CM. The techniques are described in more detail in Sections 3 and 4, respectively.

Both RGA and CM can be used inductively to investigate situations where the nature and significance of the issues is not known in advance. Given that some information systems' impacts are unanticipated, the techniques provide a major advantage over questionnaires and similar research instruments that rely solely on pre-defined investigatory criteria. Equally, the strength of PCT's theoretical base and the structure provided by the RGA and CM techniques contrast with the more unstructured and debated nature of emergent techniques, such as Grounded Theory. The following sections explain the use of RGA and CM in the work setting. Later sections explore the nature and significance of the research process and findings, returning to discuss the theoretical foundation of PCT as the basis for future research efforts.

3 NAFIS AND REPERTORY GRID ANALYSIS

The National Automated Fingerprint Information System (NAFIS) is a large-scale distributed information system which became operational in all 43 police forces in England and Wales in July 2001. RGA was one of four techniques (the others were observation, interview and document analysis) used to assess the impacts of NAFIS on the process and organisation of fingerprint work. The NAFIS database, located in west London, holds the national fingerprint collection of some 50 million fingerprint images. It also holds a database of outstanding (latent) finger marks from crime scenes. NAFIS interfaces directly with the Police National Computer (PNC) that holds descriptive (alphanumeric) data about convicted offenders. Together, the alphanumeric data held on PNC and the corresponding fingerprint images (called 'ten-prints') held on NAFIS comprise the National Criminal Justice Record System (NCJRS).

NAFIS uses Automated Fingerprint Recognition (AFR) protocols to provide a comprehensive information system supporting two distinct processes (i) the verification of the identity of individuals arrested and (ii) the identification of those responsible for crime. Historically, identity verification (i) has been the responsibility of the National Identification Service (NIS) at New Scotland Yard in London, whereas identification of (latent) marks left at the scene of a crime (ii) has been a local (police force) responsibility. NAFIS bought these two processes together: since each process depends on the comparison of fingerprint images, NAFIS removes the need for both national (to support (i) above) and local (to support (ii) above) collections. The devolution of the ten-print verification process to the 43 forces bought with it responsibilities previously held by staff at the NIS. Although the ten-print process was familiar to provincial fingerprint officers, its management and resource implications were not.

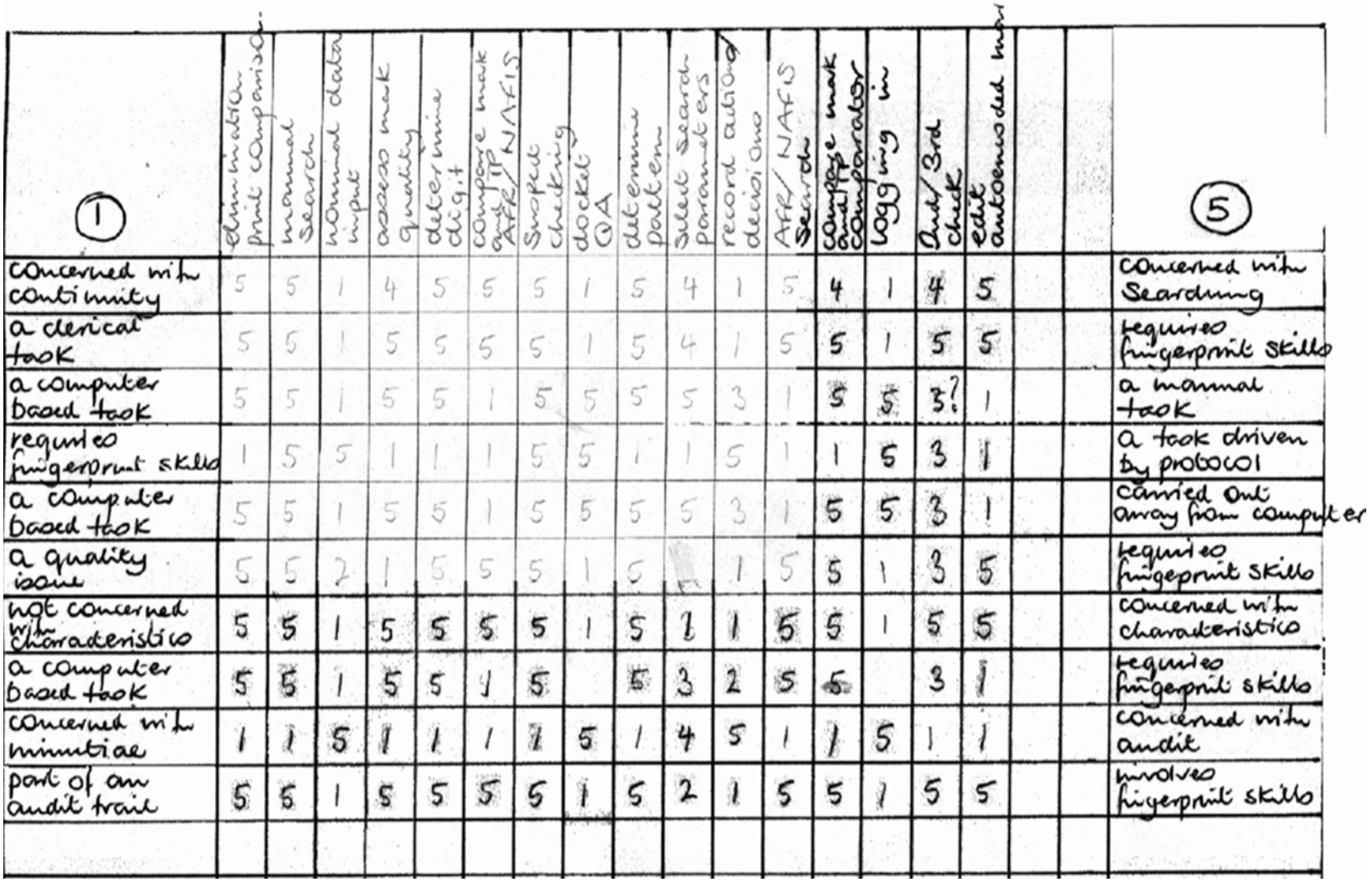
RGA was used in the research to articulate the tacit knowledge of fingerprint workers in order interpret the issues and concerns that faced them and their colleagues as NAFIS was introduced into operational use. RGA provided a content-free data gathering medium to facilitate conversations with fingerprint staff. This engagement with the fingerprint community allowed the negotiation of shared meaning and the inter-subjectivity of the issues and concerns surrounding the use of NAFIS. During the course of the study, 56 RGA analyses were carried out with 24 participants.

The initial phase of each RGA analysis followed the conventional pattern (as described by Fransella et al. 1971). Each participant was asked, “What tasks are involved in fingerprint identification?” Participants’ responses were verbal descriptions of their experience of fingerprint work, which were recorded. These task descriptors included both current manual tasks and tasks supported by NAFIS. Typically, participants named tasks in the sequence of their execution: the completeness of the list was intuitively clear to the participant. When a comprehensive list of tasks had been compiled, they were differentiated by a process called triadic elicitation. The task list was presented to the participant three tasks at a time. For each group of three (triad) the participant explained which task, if any, differed from the other two and how it did so. Participants also explained what made the non-differentiated tasks similar (see Thomas et al. 1985, for a full discussion). In this way, the task list enabled the development of a series of bi-polar constructs, unique to each participant, capable of differentiating the tasks. The task descriptions provided the column headings and the bi-polar constructs the headings for the two ‘poles’ of the rows in the repertory grid. Participants then rated each task in turn against the constructs using a 5 point Likert scale. The example in Figure 1 shows the task descriptors or elements as column headings and the constructs used to differentiate them as labels at the end of each row. The numbers indicate the ratings applied to each of the element and construct combinations.

Each completed grid was analysed on-site using a two dimensional cluster analysis that re-ordered both the task elements (columns) and constructs (rows) according to the correspondence of their numeric ratings to re-order the rows and columns. The example in Figure 2 shows how this correspondence was indicated by a series of crows feet, similar in appearance to a decision tree, to the right of the grid.

No further statistical analysis of the data was carried out at this time. The re-ordered grid was presented to the participant, who was asked to explain what the clusters meant in the context of their work. This process, called talkback (Thomas et al. 1985), diverges significantly from the conventional statistical analysis of Repertory Grid data used, for instance, by Hunter (1997). Here, RGA provided a conversational technology (Thomas et al. 1985): it was used as a medium for the organisational discourse, enabling participants to articulate their experience of fingerprint work and the values that they used to judge it.

Each analysis, or conversation, started from scratch with the same question. Most participants took part in three analyses during the three year study. During the talkback phase, the spaced-focused grid was annotated to indicate the meaning attributed to the clusters. Additionally, following the second



(1)	eliminator print comparison	manual search	normal data input	assess mark quality	determine digit	compare mark with TP AFIS/NAFIS	Swipe checking	docket QA	determine pattern	Select search parameters	record automated decisions	AFIS/NAFIS Search	compare mark with TP comparator	Logging in	2nd/3rd check	edit automated work			(5)
concerned with continuity	5	5	1	4	5	5	5	1	5	4	1	5	4	1	4	5			concerned with Searching
a clerical task	5	5	1	5	5	5	5	1	5	4	1	5	5	1	5	5			required fingerprint skills
a computer based task	5	5	1	5	5	1	5	5	5	5	3	1	5	5	3?	1			a manual task
required fingerprint skills	1	5	5	1	1	1	5	5	1	1	5	1	1	5	3	1			a task driven by protocol
a computer based task	5	5	1	5	5	1	5	5	5	5	3	1	5	5	3	1			carried out away from computer
a quality issue	5	5	2	1	5	5	5	1	5		1	5	5	1	3	5			required fingerprint skills
not concerned with characteristics	5	5	1	5	5	5	5	1	5	1	1	5	5	1	5	5			concerned with characteristics
a computer based task	5	5	1	5	5	1	5		5	3	2	5	5		3	1			required fingerprint skills
concerned with minutiae	1	1	5	1	1	1	1	5	1	4	5	1	1	5	1	1			concerned with audit
part of an audit trail	5	5	1	5	5	5	5	1	5	2	1	5	5	1	5	5			involved fingerprint skills

Figure 1 *A 'raw' repertory grid*

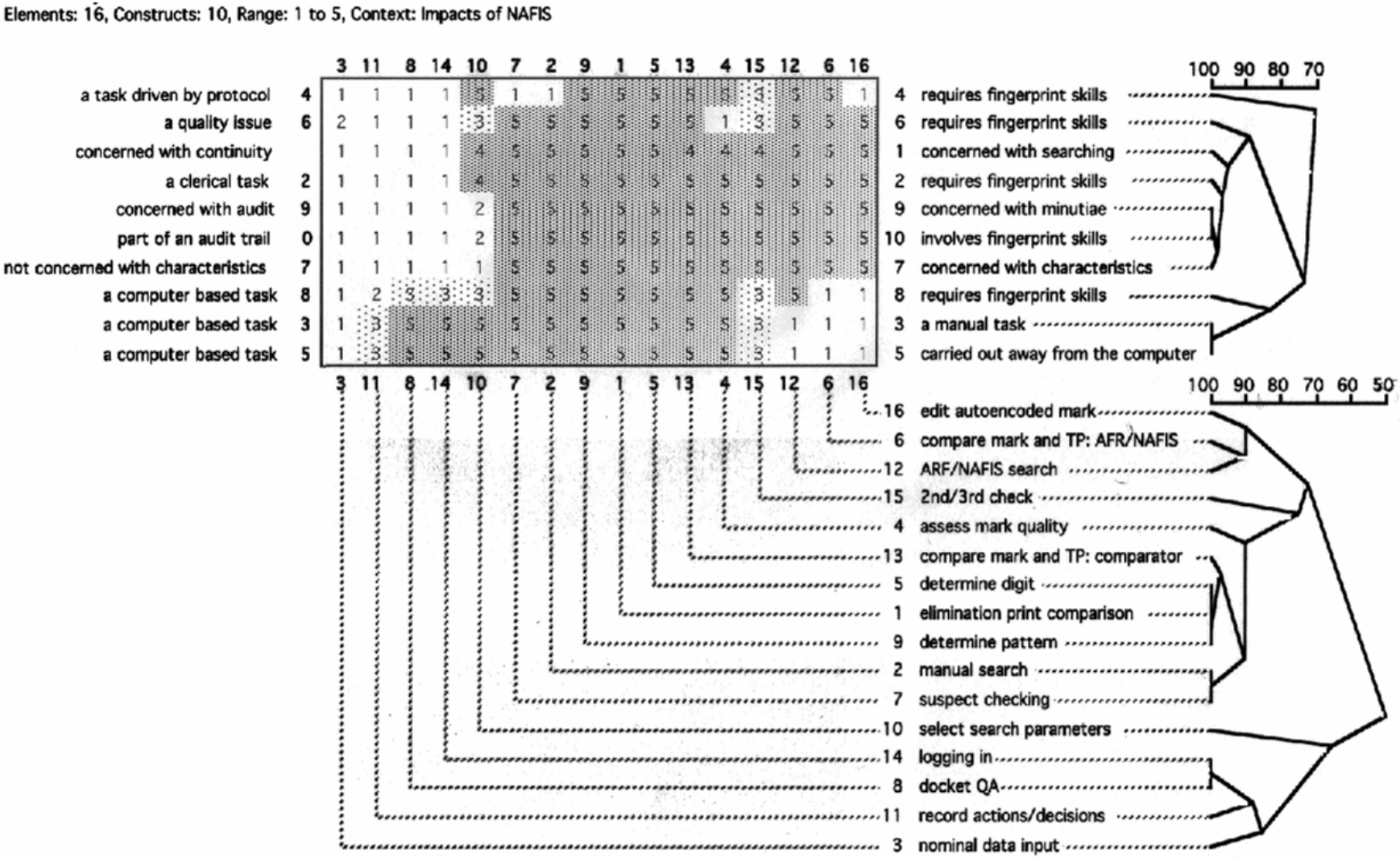


Figure 2 *A re-ordered repertory grid after two-dimensional cluster analysis*

and third RGA analyses, participants were asked to compare the most recent grid with the previous grid(s). This provided a substantial extension of the talkback protocol, enabling change in both working practices and interpretations of those changes to be monitored and discussed as utilisation and understanding of NAFIS increased.

In these analyses, the participants were responsible for interpretation of the repertory grid and the data that it contained. The RGA process gave rise to substantial learning at a number of levels. Individual participants increased the repertoire of language used to describe and explain their work: many remarked that they had not thought of or would have described fingerprint work 'in that way' before. This is an example of what Thomas and Harri-Augstein (1985) call self-organised learning. The value of RGA to this study did not lie either in the quantity or quality of the numeric data contained in the grids, nor in the rigour or reliability of the statistical protocols underpinning the FOCUS analysis. Rather, the value of RGA arose from the dialogue that it supported and the articulation of a number of super-constructs or 'work motifs'. Nine work motifs were identified during this phase of the research: they are listed and described more fully by Davis (2004). The work motifs are representations of cognitive schemata shared by the research participants.

The super constructs that arose from this inductive RGA used language that was mutually understood within the fingerprint and wider police communities. This quality proved highly useful in enabling organizational managers to understand and appreciate the concerns of the fingerprint workers as the impacts of NAFIS 'unfolded' in the work setting. Observational and interview work following the use of RGA showed that the super-constructs helped to inform managerial decision making and to optimize the process and organization of fingerprint work.

In addition to this valuable practical outcome, our use of RGA shows how the interpretation of empirical field study data can be enriched by retrospective comparison within the work context. This suggests that in addition to providing the basis for learning and organizational development, the data could be combined with those from other sources, such as interviews, observation and CM, to provide complimentary perspectives of the situation under study.

4 UKFI AND COGNITIVE MAPPING

Technology Group (TG) is the division of a large UK Financial Institution (UKFI), which has evolved from a building society to a financial group of 10 strategic business units that service both corporate and personal banking and investment needs. TG is responsible for the development, implementation and day-to-day operations of information systems of business-to-customer (B2C) and business-to-business (B2B) business streams. TG consists of about 90 information systems specialists distributed in three locations within the UK, handling the information systems of the financial institution nationally, including its web and call centre services.

Despite the group's diversification, Retail Banking is still the core business unit of the group. It serves approximately 15 million customers through approximately 714 branches, 3,180 ATMs. The group launched E-banking in May 2000, aiming to provide access to customer services through internet, telephone, digital TV and WAP mobile phones. The centrality of Retail Banking for the financial health of the group, along with its reliance on Information Systems, triggered the need for this study.

This study focuses on the relationship between TG and the Retail Banking business unit. The aim was to facilitate Information Systems development and implementation for Retail banking by improving collaboration. The primary objective was to uncover the root causes of existing barriers to collaboration and define a solutions space that would enable negotiation and action taking.

During the course of the study, over 30 semi-structured interviews were held with board and top-level managers within TG and the Retail business. Within this context CM was used to a) interpret and represent individual perspectives of those involved in the study in order to b) synthesise in a group representation an inter-subjective view of corporate reality. This inter-subjective view aimed to highlight the differences and similarities of individual perspectives and issues and concerns discussed.

CM was originally developed by Eden (1983) as a technique for use in strategic decision making in organisations. It adopts Kelly's concept of constructs, but uses them in a much less rigid way than RGA (see Section 3). Constructs are identified from the statements individuals use in describing a situation during an interview and are represented as brief phrases in natural language. Sometimes the negative pole will be given, but often it is assumed to be implicit. Rather than carry out the Repertory Grid comparison, the links between constructs are identified from the chain of argument employed in describing the situation. The relationship between constructs is assumed to take the form of explanations and consequences as shown in Figure 3. The relationship may be positive (i.e. construct A reinforces construct B) or negative (construct A operates in the opposite direction to construct B - reinforcing the negative pole), or connotative (implying a relationship between the constructs, but of unknown or neutral effect).

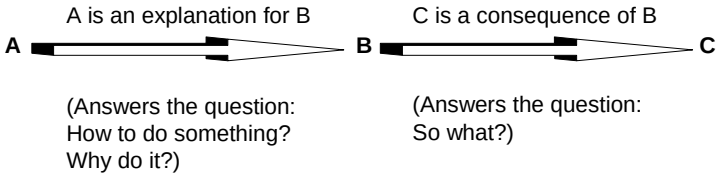


Figure 3 Basic mapping convention for representing relationships between constructs

The product of a CM exercise is therefore a map (in the style of a directed network) made up of nodes (consisting of phrases used by the individual to describe the situation) and arcs (links identified from the individual's description of the situation). Discussing it with the interviewee validates the structure and content of the map.

The mapping is initially carried out with pencil and paper during a normal interview. The large number of constructs generated in a one hour interview (100 or more) often results in a very "messy" picture/map being generated. This then needs to be "tidied-up" both for analysis and feedback to the interviewee. As part of this tidying process the map can be transferred to a specific computer application (Decision Explorer™), which has been developed to operationalise cognitive mapping. It enables much easier handling of large numbers of constructs and introduces a much higher degree of flexibility in manipulation of the maps.

Following this tidying of the map, the information is then presented back to the interviewee for amendment, and/or confirmation that it is an appropriate representation of their viewpoint (an example is shown in Figure 4). Rather than working with the whole map, particular chains of argument can be separated out and are much easier to examine. At this point there is wide scope for negotiation over the content and structure of the map, using the physical map (whether working directly with the software or on printed output) as the negotiative object. As noted in Section 3, the mapping process (including the feedback to the interviewees) allows for learning to occur, in that the process of reflecting on work practices, and deciphering their rationale, allowed for insights by the individual participants that might not otherwise have been made.

Having established some agreement over the basic outline for the map, the next step is to begin to make use of it. In practical terms maps of more than about 30 concepts are too difficult to deal with as a whole and Decision Explorer™ includes analytical routines which can aid the identification of: clustering of concepts, the beginnings and ends of chains of arguments (often described as assertions and goals), constructs which have many others associated with them (described as issues), or which are branching points in a chain of argument (option points). This analysis can help to guide in the validation and interpretation of the map.

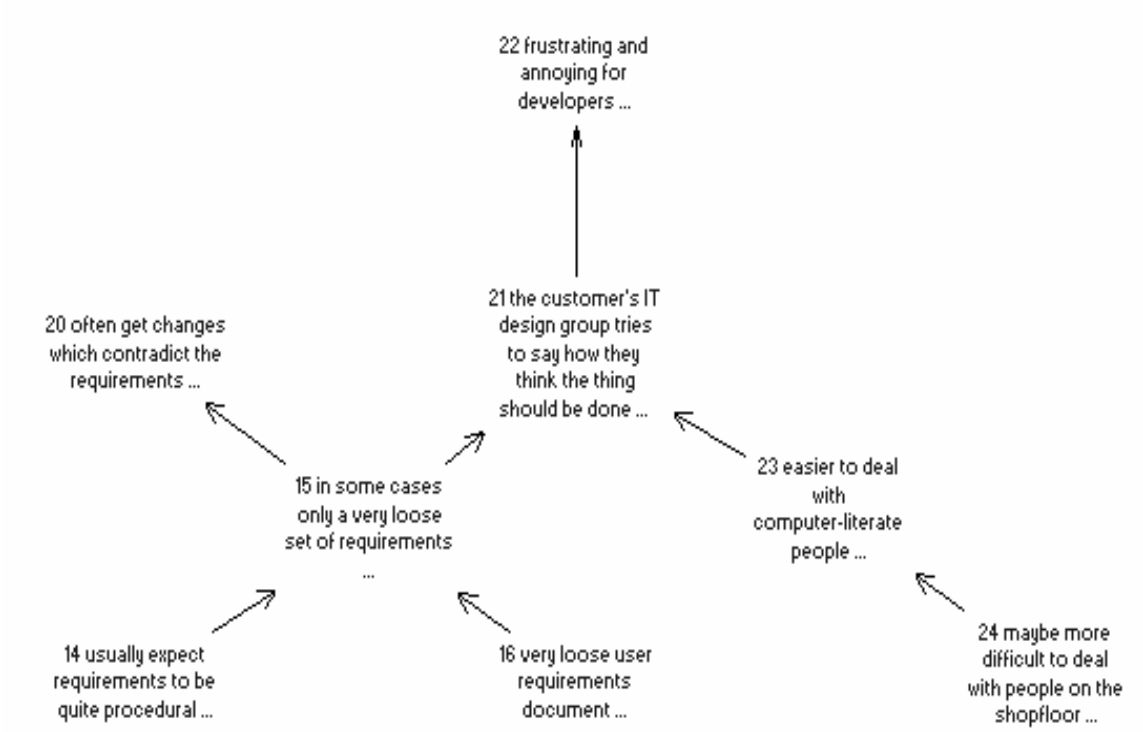


Figure 4 Example of section of a cognitive map used in a feedback session

In its application in strategic decision making, cognitive mapping can be used as part of a more general method known as Strategic Options Development and Analysis (SODA). In this approach different stakeholders whose views have been individually mapped are brought together in a meeting (a SODA workshop). The individual maps are compared and a collective map is negotiated which seeks to merge those of the individuals. Where there is uncertainty or different views about the meaning of constructs this can be examined in the individual maps and debated amongst the meeting participants. By retaining elements of the original (individual) maps in the collective map, the stakeholders' sense of ownership of the group viewpoint is encouraged. By providing a rich representation of individual viewpoints the similarities and differences between different stakeholders can be studied and debated. Apart from the process and affective benefits of such negotiation, the collective map can serve as an agenda for strategic action by identifying shared goals, problems and options.

Cognitive mapping is an established technique in strategic consultancy (Eden et al. 2001), but it has not been widely applied in the Information Systems field. It may be argued, however, to have many characteristics which would commend it for use in information systems development (Brooks and Jones 1996). These include,

- simple to use / non-intrusive - pen and paper recording during 'normal' interview;
- easily comprehensible - uses interviewees own words;
- emphasis on negotiation of viewpoints - validation of maps allows exploration/clarification of viewpoints and explicit debate in group sessions;
- computer-based support - therefore it may be more acceptable/interesting to IS professionals.

The study within UKFI used interviews, based on a three-section interview schedule, that aimed to explore perceptions of i) the current situation and interviewees' experience with TG or Retail Banking, ii) issues of collaboration between the two groups and definition of a potential solutions space and

finally iii) relationship management and attitudes towards it. Each interview lasted between 20 minutes and one hour and was tape-recorded and transcribed.

Cognitive mapping was used as analytical, rather than data collection, technique. Mapping was carried out based on the interview transcripts. Individuals' own words were used to form the map constructs, as much as possible. Each map consisted of 100-300 constructs depending on the interview duration, along with the detail and conciseness of individuals' discourse. Maps were "tidied-up" using Decision Explorer™, in order to present a more orderly representation. In addition it was possible to derive a 'stripped' set version of each map, in which the essential part of the map could be viewed, as a type of summary of the wider picture. Given the amount of information contained in each map, this enabled insights to more easily be drawn, and the wider set of issues to more easily be identified.

Following the tidying of individual maps, a collective map was created by aggregating and linking individual maps based on common themes to highlight similarities (see Figure 5). Linking was based on researchers' reflections regarding commonalties across different maps. These links were denoted with a different notation to highlight the type of imposed link. This map was presented to representatives of the organisation for identifying shared goals, problems and options. Used in conjunction with other analysis techniques this can be used to set the agenda for strategic action.

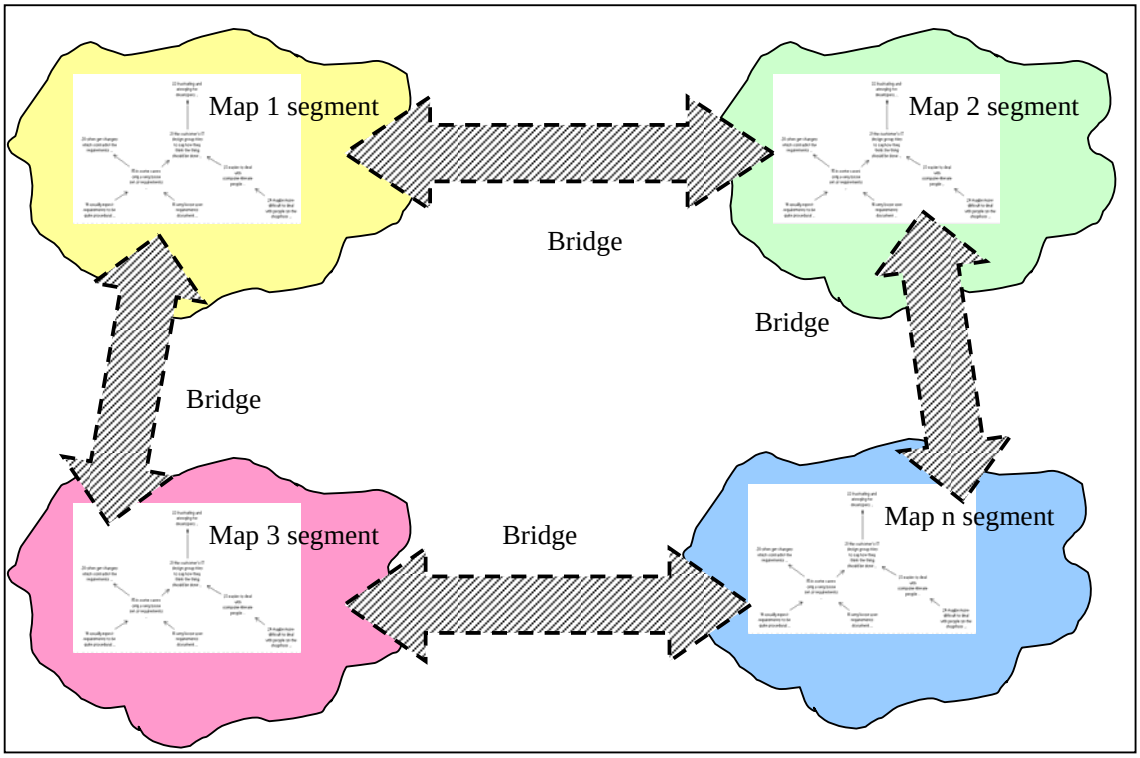


Figure 5 Schematic representation of bridging links to produce an aggregate map.

The value of presenting the aggregate cognitive map to UKFI company representatives arose from its conciseness in representing and maintaining the multiplicity of individual perspectives. This provides the basis for further exploration of conflicting issues surrounding the process of Information Systems Development within UKFI. As noted already, the main aim for this study was to investigate the different perspectives held by TG and Retail Banking, in order to identify and remove possible barriers. The result of the map analysis was a set of 6 'goal' concepts and 16 'key issue' concepts. These were then translated into five main problem areas and used in the feedback to the main members of UKFI.

- Collaboration: issues include inconsistent ways of working, entangled organisational structure and 'over-the-wall' mentality between
- Communication: across the business/TG 'gap', for example, the range of communications issues that do not occur in a clear/timely manner.
- Focus: need for a clear focus and delivery of business priorities between Retail Banking and TG.
- Recognition: issues related to the recognition of TG contribution and inequality of status within the company.
- Trust: underlying mistrust between aspects of the business.

As with the RGA and NAFIS, these problems areas are expressed in language that is compatible with the UKFI context, and could be used as points of discussion and to bridge understanding between the diverse areas of the business.

5 DISCUSSION

Although the contexts in which they were used during this stage of the research were quite different, the outcomes of the RGA and CM processes were similar in terms of the nature and utility of the constructs that they identified. Cropper et al (1990) compare RGA and CM directly. They highlight that while both techniques are well suited to the articulation and exploration of constructs used to explain organisational change, CM has an advantage over RGA since the latter lacks what they call a propositional structure. Pidd (1996) also compares the techniques, highlighting the ability of CM to help people understand and interpret other people's view of reality. Use of the talkback protocol enabled RGA to make a similar contribution. Consequently, each technique provided similarly deep insights into issues and concerns that emerged in their respective organisational contexts.

The crucial point here is that, despite their disparity, the organisational contexts studied shared elements common to many IS, particularly that of organisations (and the people that constitute them) feeling that the 'technology' is in the driving seat, and that they are in danger of losing control over the situation. In the case of NAFIS, the changes in the organisation were seen as being driven by the resource changes brought about by the ability of the technology to do what could not have been done before (ie. the combination of the verification/identification processes). In the case of UKFI, the scenario was more dispersed, with the general feeling of separation between the TG and the Retail Bank, resulting in a lack of communication and shared common goals. While no specific technology was involved here, it is a more generalised version of the NAFIS scenario, whereby, the perception that the technology and hence the technology group (TG) were driving the organisation. In the same way that the RGA allowed the police participants to re-conceptualize the role and usefulness of NAFIS, the introduction of a Relationship Manager role in UKFI was beginning to increase understanding between the TG (information systems) people and the user communities they served. In each case, the research outcomes increased understanding of the contextually specific issues by supporting the development of shared cognitive schemata that facilitated discussion, explanation and action. In this way both RGA and CM, using their Personal Construct roots, were tapping into the subtleties of individual perception, and the problems encountered when these emerge into the intra-group and inter-group contexts. Whereas RGA is constrained and well bounded, CM is more open and free flowing. However both produce representations of the more sensitive aspects of the complex organisational settings. As such the complementarity of the two PCT approaches provides insights that are often difficult to otherwise uncover, and more importantly to clearly demonstrate to the appropriate stakeholder groups.

6 CONCLUSION

In addition to sharing a common theoretical foundation, it can be argued that CM and RGA produce complementary outcomes, since both support the natural flow of the individual and collective narrative. Each also allowed the narrative to be presented in a diagrammatic form (as shown in Figures 2 and 4) and enabled the modelled constructs to inform later phases of the organisational discourse. Whereas RGA enables a smaller set of constructs to be exhaustively explored and elaborated, CM

allows the wider view (scenario) to be represented and multiple perspectives to be drawn together. Without pre-determining content, these techniques effectively exploit the theoretic foundation of PCT to provide a common basis for the representation of a structure or schema of constructs. The techniques articulated and facilitated the use of language and terms that provided a shared understanding between the business and technology communities.

Thomas and Harri-Augstein's (1985) analysis protocols support the use of RGA as a content-free data gathering medium. This quality is particularly useful for the investigation of the organisational discourse surrounding information systems since many of the impacts of IS are not and cannot be known in advance or anticipated. Equally, CM allows for the free flow of ideas from the interviews, during the data gathering experiences, to be represented and analysed and so used to inform bridging of the IT-Business 'gap'.

Although the outcomes of the CM and RGA processes differ substantially in their appearance and presentation, it is our view that their common foundation in personal construct theory suggests a substantial opportunity to explore their complementarity. We anticipate the ability to develop a conceptual model as a framework for the analysis of cognitive schema and shared understanding in future phases of our research. We also anticipate that the availability and use of such a model will increase awareness of issues that concern both organisational and technology communities and, perhaps most importantly, enable the conceptual agility of organisational managers to be improved. This, we would argue, is an essential prerequisite for the organizational agility vaunted by the suppliers of contemporary information technologies such as component based systems.

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