Chapter 5

A Cognitive Research Methodology

In the previous chapter we developed the conceptual foundation for a research methodology aimed at charting processes of organisational learning from a cognitive perspective. This foundation consists of two pillars: one standing in the literature on organisational learning, the other resting on research in the area of managerial and organisational cognition. Building upon this foundation, the current chapter selects and discusses a set of cognitive mapping techniques to chart organisational learning occurring in the course of a diversification process. It sets off with an introduction into the nature of cognitive maps. Next, the chapter presents a short overview of the wide range of cognitive mapping techniques currently available. A framework is then presented consisting of five interrelated learning areas in which managers in a diversifying company may generate (different kinds of) knowledge and, thus, may learn. This theoretical framework guides the design of the cognitive research methodology employed in this research. The research methodology combines three specific cognitive mapping techniques: content analysis, the repertory grid technique, and a cognitive mapping methodology that makes use of software called Decision Explorer (previously known as Graphics COPE). Each of these techniques is discussed and their bases for comparing maps both in time and across managers is indicated. The chapter then turns to issues of validity and reliability in the context of cognitive mapping. The chapter ends with an introduction to the three case studies we studied using the research methodology presented and an outline of the way we organised the empirical part of this research project.

The nature of cognitive maps

The label ‘cognitive map’ goes back to Tolman (1932, 1948) who proposed the concept ‘cognitive map’ when he formulated an alternative to the stimulus-response models that dominated the study of human behaviour at that time. In several experiments he performed with rats, stimulus-response models failed to explain the behaviour of these rats: non-rewarded rats learned just as much as their rewarded companions. He inferred from this finding that the rats construed an internal ‘cognitive map’ of the experimental setting on which they based their
actions. Note that Tolman’s ‘cognitive maps’ closely resemble internal knowledge structures like schemas and scripts. This particular usage of the label ‘cognitive map’ has to be clearly distinguished from the graphical representations that are the output of so-called cognitive mapping techniques. As Stubbart and Ramaprasad (1990: 262) note, ‘it is not obvious or empirically proven that managers actually have cognitive maps in their heads or elsewhere’. Eden (1992) argues that few (if any) cognitive mapping technique can reasonably claim to represent human cognition and thinking. Particularly problematic is the elicitation process during which cognitive maps are construed:

‘... if we take seriously Karl Weick’s aphorism that we do not know what we think until we hear what we say, then the process of articulation is a significant influence on present and future cognition. If articulation and thinking interact, then an elicitation of cognition that depends upon articulation is always out of step with cognition before, during, and after the elicitation process.’ (Eden, 1992: 261)

Based on extensive empirical research Kosslyn (1980), for example, strongly argues that people (also) store ‘mental images’ in their memory from which they derive knowledge in the context of some action. His work, as that of others, indicates that people may not (solely) think in causal relations as many cognitive mapping techniques (implicitly) assume. In general, thinking is much richer than the few words that people speak when they are interviewed. Important aspects of human thinking such as tacit knowledge, emotions and feelings are largely lost when people try to communicate what they think (if they are willing to expose themselves fully in the first place). We can therefore never be sure in practice what it is we are mapping and we never know what we are not capturing (cf. Laukkanen, 1990).

In addition, interviews are also social and political events during which interviewer and interviewee interact and focus thinking upon specific topics (Eden, 1992; Eden and Ackermann, 1998a). As a consequence, cognitive maps built during or on the basis of interviews partially reflect the social construction of the interview, instead of the sole thoughts of the interviewee. Elicitation is even more problematic when documents are used as a basis for cognitive maps, as documents generally serve different purposes. In addition, most techniques demand substantial interpretive input from the researcher, making a cognitive map even more a joint product. Cossette and Audet (1992: 327) note, ‘it is the work of a researcher who constructs a graphical representation of a discourse uttered or written by a subject’.

Furthermore, an adequate theory of cognition is a prerequisite for any cognitive mapping technique to substantiate the claim that its products reflect cognition (Eden, 1992). As Schepers and Faber (1994: 166) phrase it concisely:

‘... as the assertion that a map is a representation of cognition presupposes the specification of cognition, and since cognition is a construct and constructs are specified in theories, a theory of cognition is a prerequisite.’
At this moment, few cognitive mapping techniques are underpinned by a theory of cognition. Most mapping techniques that do have a proper theoretical foundation are based upon Kelly’s Personal Construct Theory (1955); prominent examples include maps based upon the repertory grid technique (e.g. Fransella and Bannister, 1977; Eden and Jones, 1984; Ginsberg, 1989) and the work undertaken by Eden and his colleagues (e.g. Eden et al., 1979; Eden et al., 1983; Eden and Ackermann, 1998a). Researchers should be aware that techniques that are not explicitly underpinned by a theory of cognition implicitly impose a model of cognition upon human thinking by the structure and format of the cognitive maps they produce. For example, many techniques that focus upon the construction of causal diagrams implicitly assume that causality relations and interactions either adequately reflects human thinking or helps in eliciting human thinking. Using techniques that lack a proper theoretical basis raises serious questions as to the status and nature of the maps they produce.

What then is a cognitive map if it cannot be a full and accurate representation of human cognition? At best cognitive maps are ‘artefacts of human reasoning’ (Huff and Fletcher, 1990: 404) that ‘may represent subjective data more meaningful than other models’ (Eden, 1992: 262). In other words, they are the best substitutes we (currently) have for representing human thinking and identifying cognitive change. As Huff (1990b: 14) remarks ‘we are closer with cognitive mapping to understanding intentional choice than we have been before’. Moreover, cognitive maps reflect ‘the mappers’ understanding of particular, and selective, elements of the thoughts (rather than thinking) of an individual, group or organization’ (Eden, 1992: 262; italics added). Cognitive maps are aids that can help researchers (or interventionists) in comprehending how a manager (or group of managers) understands and anticipates his (their) environment. Scheper and Faber (1994: 183) argue that cognitive maps are ‘vehicles for representing meaning’, either at an individual or collective level. In line with this, Eden and Ackermann (1998a: 197) see a cognitive map as ‘a system of verbal tags [that] will use context and words to signify what was meant by the person being mapped’. They add to this that ‘meaning also derives from aspects of thinking that are not easily captured by a cognitive map’ such as non-verbal communication (ibid). The cognitive mapper should try to translate the full experience of an interview – what is being said and what is not – into a cognitive map.

Mindful of Weick’s (1979b: 47) saying ‘how can I know what I think until I see what I say’, a cognitive map can only claim to represent what an individual or group thinks if it is more or less meaningful to them. If they cannot relate to (parts of) a cognitive map, it cannot claim to reflect their thoughts. Note that this may easily be the case if a map is based on documents that are the result of negotiation (unless someone’s thinking has developed simultaneously in line with it) or were written with ulterior motives. We believe that the chances are higher that a cognitive map is considered as meaningful by the person/group being mapped if the mapping technique used to construe the map is underpinned
by an adequate (and explicit) theory of cognition. As noted above, few are at the moment.

Weick (1990: 7) argues that the meaning a cognitive map represents is intimately bound up with action and time: ‘the truth of the map lies in the action and the conditions of use’. A cognitive map will therefore only make sense to someone in the context of a particular action and at a given time. In the context of some other action the same map may be totally meaningless to the same person. Confronted with one of ‘his’ old maps the person may not understand or even recognise (parts of) it anymore. The differences and similarities in cognitive maps construed at different times can be taken as indications of the learning that has taken place.

Before proceeding to an overview of cognitive mapping techniques, a short remark on the use of the term ‘cognitive map’ is in place. Within the field of managerial and organisational cognition, both the term cognitive map and causal (or cause) map are used, often as synonyms (e.g. Axelrod, 1976). Whereas the distinction between the two is not always clear, the latter is usually limited to causality relations (Bougon, 1983) or ‘phenomenological beliefs and the causal dimension in the respondents’ thinking’ (Laukkanen, 1992: 14). A cognitive map is then seen as a broader generic device that may contain ‘all possible types of relations occurring in patterns of concepts’ (Bougon, 1983: 177) or ‘the full range of mental representations that can be mapped’ (Huff, 1990b: 28). Fiol and Huff (1992: 267), for example, describe cognitive maps as ‘graphic representations that locate people in relation to their information environments’. Hence, causal maps are generally considered as a specific kind of cognitive map, i.e. those maps that are limited to causality interactions. We will adhere to this distinction in this chapter while keeping the discussion in this section in mind while acknowledging that not every cognitive mapping researcher explicitly aims to reveal managerial and organisational meaning.

Cognitive mapping techniques

Over the years researchers have developed and used a wide variety of cognitive mapping techniques to study managerial and organisation cognition (see e.g. Axelrod, 1976; Huff, 1990a; Eden and Spender, 1998). Huff (1990b) suggests five generic ‘families’ of techniques, which she places along a continuum, based on the purpose of mapping (see Figure 5-1). Techniques up this continuum (i.e. positioned more to the right-hand side), she argues, require increasing interpretive input from researchers and draw on more complicated models of cognition. Moreover, each of the families of techniques produces a different kind of map. Each kind of map, in turn, reveals different kinds of knowledge, i.e. capture different parts of the content of schemata. In the following we will adhere to Sackmann’s (1991, 1992) classification of knowledge (see Chapter 4).
Huff (1990b: 16) notes that the boundaries between the five categories of mapping techniques ‘are somewhat permeable’. In practice researchers ‘often use more than one approach to mapping’ (ibid). Additionally, some techniques can hardly be put under the heading of just one category. This applies, for example, to the cognitive mapping technique developed by Eden and his colleagues as well as to content analysis, which has many different forms. The repertory grid technique may also fall into different categories depending on the processing of its output.

At the left end of the continuum in Figure 5-1, Huff places techniques that take verbal expressions as a direct indication of mental activity. For example, frequency of word use can be taken as an indication of cognitive centrality while change in word usage in time can be seen as an indication of changing attention. Also, clustering related words may suggest themes that are important to the person or group that is being mapped (cf. Weber, 1990). Content analysis of the manifest content of discourse (e.g. transcribed interviews, documents) falls into this category (see e.g. Bowman, 1984; Erdener and Dunn, 1990). The produced maps reflect ‘attention, association and importance of concepts’ and reveal dictionary knowledge, i.e. definitions and classifications of objects and events.

One step up the continuum in Figure 5-1 Huff places techniques that aim at identifying mental categorisations and hierarchical relationships among concepts. These techniques assume that people place concepts into categories and attach meaning to a concept by contrasting it with other concepts (or categories of concepts). As such they mainly uncover dictionary knowledge. Techniques that are based on Kelly’s (1995) repertory grid technique, often used in combination with some kind of statistical analysis, fall into this category (see e.g. Fransella and Bannister, 1977; Dunn et al., 1986; Dunn and Ginsberg, 1986; Ginsberg, 1989; Reger, 1990b). These techniques mainly uncover dictionary knowledge, although more complicated analyses (e.g. factor analysis, multidimensional...
scaling) may reveal axiomatic knowledge. Construing maps that ‘show dimensions of categories and hierarchies among concepts’ has been especially popular among researchers studying competition (e.g. Porac et al., 1989; Reger, 1990a; Hodgkinson and Johnson, 1994).

The next category of causal mapping techniques on Huff’s continuum generates maps that show ‘influence, causality and system dynamics’. The goal of mapping this kind of knowledge is to (re)construe the theories-in-use that inform a respondent’s decisions and actions. Examples include the ‘cognitive mapping’ approach developed by Axelrod and associates (1976), Bougon’s (1983; Bougon et al., 1990) Self-Q Technique, and Laukkanen’s (1990, 1992, 1998) comparative causal mapping methodology. The cognitive mapping technique developed by Eden and his colleagues (e.g. Eden et al., 1979; Eden et al., 1983; Eden and Ackermann, 1998b) can be placed in this category to the extent that the maps also represent causal relations. Jenkins (1998: 234) attributes the popularity of causal mapping among (strategic) management researchers to ‘a potentially higher level of procedural knowledge’ that causality provides compared to the previous categories of maps. In addition he argues that the temporal dimension of causal maps, especially the inherent inclusion of future inferences, makes these techniques particularly appropriate for representing strategy. Given the temporal element, causal maps have the potential to reveal directory (descriptive, historical) and recipe knowledge (prescriptive, future). The labelling of the concepts in a causal map reveals some dictionary knowledge.

There is a gradual transition from causal mapping techniques to a (still small) category of mapping techniques that aim at revealing ‘the structure of argument and conclusion’. There are, however, some crucial differences. In revealing such maps, these techniques subject texts (often documents) to a tight coding structure. Work by Fletcher and Huff (1990a/b; see also Barr et al., 1992) on strategic argument mapping, for example, builds upon the work of Toulmin (1958:254) who ‘proposes that valid arguments, analogous to a legal argument, have a proper form that can be laid out for inspection’. Given the imposed structure, the produced maps are more meaningful to researchers than to the person (or organisation) whose cognition is being mapped (cf. Huff and Fletcher, 1990a). Most studies that have construed argument maps have focused on historical documents and as such uncovered directory knowledge, next to some dictionary knowledge.

A final category of techniques aims at identifying ‘schemas, frames and perceptual codes’. Techniques in this category try to reveal underlying meaning of transcripts or texts and as such come closest to axiomatic knowledge (fundamental beliefs and causes). Prominent examples include semiotics (e.g. Fiol, 1990a/b) and discourse analysis (e.g. Edwards, 1997). Like argument mapping, these techniques focus on the latent content of texts, but in doing so they consider the structure(s) of language next to the content. Eden’s cognitive mapping technique may also be placed under this heading. The accompanying software Decision Explorer contains various tools to analyse cognitive maps and
identify underlying meaning (see Eden et al., 1992; Eden and Ackermann, 1998a). Eden’s approach differs fundamentally from the previous two. For one thing, maps are construed on the basis of the full experience of the interview, not solely on transcripts. Moreover, the systematic analysis of the cognitive maps with Decision Explorer may decrease the interpretive input of the researcher.

The five families of cognitive mapping techniques illustrate the wide variety of techniques that researchers can choose from to study managerial and organisational cognition (and we have not been exhaustive in our listing of techniques under each heading). The growing number of empirical studies show that researchers actively use this broad variety (see e.g. Huff, 1990a; Stubbart et al., 1994; Meindl et al., 1996; Eden and Spender, 1998). We have based our selection of cognitive mapping techniques used in our empirical research upon a number of considerations. The cognitive mapping methodology (or combination of techniques) should:

1. at least intentionally, cover the variety of knowledge that is generated in the course of a diversification project;
2. offer clear procedures for collecting data and allow for systematic processing and analysis of the data, thus increasing the reliability of the analysis;
3. allow for comparison of construed cognitive maps in time in order to chart organisational/managerial learning (cf. our conceptualisation of learning as cognitive change);
4. minimise irritation and avoidance behaviour by the respondents (cf. Brown’s (1992) recommendation).

We believe that paying explicit attention to conceptually different kinds of knowledge (such as covered by Sackmann’s (1991) categories) can increase our understanding of the (evolving) images managers construe in the course of the diversification project they are involved in. Prior research into diversification and the growth of SMEs suggests that managers’ images embrace several distinct but interrelated areas of managerial knowledge. As they gain experiences in the course of their diversification project they generate knowledge in each of these knowledge areas. The next section presents and discusses these ‘areas of learning’. Subsequently, we match these areas of learning with cognitive mapping techniques to make a selection.

Learning areas during diversification

As noted in Chapters 1 and 2, several authors have emphasised that the process of diversification is essentially a process of organisational learning and should be studied as such (e.g. Normann, 1977; Miles, 1982; Kazanjian and Drazin, 1987; Ginsberg, 1990; Mintzberg, 1990b). They argue that understanding
learning occurring in the course of diversification is critical to understanding success and failure of diversification projects. As we have argued in the previous chapter, depicting diversification as a process of learning accords with a cognitive perspective, as learning is (in part) a process of cognitive development. As managers cumulate experiences in the course of a diversification project, they (may) learn. Prior research into diversification (Chapter 2) and the growth of SMEs (Chapter 3) suggests that this learning occurs in several distinct but closely interrelated areas of managerial knowledge. Figure 5-2 shows a categorisation consisting of five such 'areas of organisational learning'. The arrows indicate the dominant direction of the relations that are thought to exist between the five learning areas; please note that these relations are by no means proven (if possible at all given that the framework conceptually cuts what essentially is one body of knowledge into five pieces). In addition to using this framework as a basis for choosing among the range of available mapping techniques, we will use the framework in Figure 5-2 to categorise the data we gathered during our empirical investigations. It is critical to note that we did not present the framework to any of the managers we interviewed nor did it (consciously) guide the structure of our (intentionally unstructured) interviews.

Following both Mintzberg (1988) and Ginsberg (1989), the heart of the learning processes occurring in the course of a diversification project seems to lie in the rethinking and reconceiving of the business portfolio of the firm. This includes both the conceptualisation of any new businesses added to the portfolio and the (re)conceptualisation of the (changed) portfolio of businesses as a whole. Businesses may range from products to complete divisions, depending on how managers experience it. Any learning taking place in these areas will be the domain of the top-management or owner-manager of the diversifying firm in particular.

Closely related to these two areas of learning is the development of a new 'dominant general management logic' (Prahalad and Bettis, 1986). As stated in Chapter 2 this concept relates to the way in which a diversified firm is strategically managed. Recall that Prahalad and Bettis (1986: 490) define a dominant logic as ‘the way in which managers conceptualize the business and make critical resource allocation decisions’. It represents process knowledge in the form of routines and procedures employed by the management of a diversified firm to manage a diverse set of activities. The different management styles for managing a portfolio of businesses, which Goold and Campbell (1987) identified in (successful) diversified companies, may be part of a certain dominant logic. The dominant logic offers a managerial explanation for the problems many diversified companies face.

In general, the larger the strategic variety within a diversified portfolio, the larger differences between required dominant logics will be. As a firm enters a new domain through diversification, the strategic variety may grow necessitating the development of a new and different dominant logic. The routines and
procedures that the management currently employs for managing activities may not fit. According to Grant (1988) the ‘goodness of fit’ will depend on the degree to which activities are strategically similar. Examples include similar sizes of capital investment, similar key success factors, similar competitive positions, similar stage in the product life cycle, etc. We note that these (dis)similarities are partially products of mental construction. Moreover, according to Bettis and Prahalad (1995) the unlearning of an old dominant logic must precede the learning of new logics.

A fourth area of learning concerns the organisation and operational linkage of the various businesses in the portfolio. Before a diversifying firm is able to produce and deliver any new products or services, it has to (re)organise its value chain of activities (cf. Porter, 1985). This means taking decisions on several organisational variables, such as division of labour, reward systems, information systems, etc. (see e.g. Galbraith and Kanzanjian, 1986). Furthermore, unless management wants to keep the new business activity fully separate from the other businesses in the portfolio, it has to decide on the organisation of the operational linkage(s) between businesses. This is particularly relevant if the management sees possibilities for realising economies of scale or scope or wants to transfer ‘know-how’ from one domain to another (e.g. Teece, 1980, 1982).
Finally, a diversifying firm has to develop such managerial skills, resources and knowledge as are necessary to compete in a new domain (e.g. Miles, 1982; Kazanjian and Drazin, 1987). The various operational skills required for producing a new product or offering a new service have to be mastered. Subsequently, the firm has to compete with the new product or service in a market with which it is not familiar and which may be fundamentally different from the markets which it is currently selling its products in. Whereas top management is involved to a greater or lesser extent with the other four learning areas, this is often not the case when it comes to learning in this area. The development of new business skills, largely operational in nature, occurs predominantly at lower organisational levels, for example by salesmen and production employees.

Because managers learn as they cumulate experiences, the framework can be depicted as layer above layer above layer, etc.; Figure 5-2 only shows two such layers. Moreover, due to conservative forces, knowledge generated in the past on the basis of experience gained in existing businesses, may initially constrain the learning within any of the five learning areas (cf. Piaget, 1937). For one thing, existing dominant logics direct sensemaking and in doing so limit the ability of an organisation to learn (cf. Bettis and Prahalad, 1995; see also Galbraith, 1983). This may not be much of a problem if a new business is quite similar to the existing ones, but serious problems are likely to arise if there are fundamental differences. For example, due to an inappropriate conceptualisation of a new business, managers may be wrong to apply existing procedures and routines in the new business, however successful these were in existing businesses (cf. Jemison and Sitkin, 1986). The resulting disappointment may launch new cycles of learning, or alternatively, lead to an early disinvestment of the new business if the ‘gap’ is considered to be too large (cf. Miles, 1982).

A choice of cognitive mapping techniques

The theories and empirical research on which the five learning areas in the framework are based suggest that these areas embrace different kinds of knowledge. For example, the conceptualisation of a new business relates to a different kind of knowledge from that connected to the development of a new business skill; the former appears to be more abstract and tacit than the latter. Moreover, as we argued that Huff’s (1990b) families of cognitive mapping techniques reveal different kinds of knowledge, we have chosen to employ a combination of different techniques. ‘Cognitive reality’ is multi-coloured and just as a painter needs various colours and brushes to paint a picture, we need various cognitive mapping techniques to ‘paint’ (construed) reality. We are thus using knowledge as the common denominator to choose among the variety of cognitive mapping techniques that is available while taking our four criteria for selecting cognitive mapping techniques (see page 119) into account. For four of
the five learning areas this straightforwardly leads to preferred techniques. Table 5-1 links the selected cognitive mapping techniques to Figure 5-1 and Figure 5-2.

The conceptualisation of a new business and the (re)conceptualisation of the changed portfolio dominantly concern the classification of business activities and as such come closest to dictionary knowledge (i.e. the definition and classification of objects) and possibly axiomatic knowledge (i.e. fundamental beliefs and final causes). Both closely intertwined conceptualisation processes can be captured by mapping the dimensions and constructs which managers use in judging and discriminating between different business activities (see Huff, 1990b). Kelly’s (1955) repertory grid technique, which embraces the elicitation and comparison of constructs, is especially appropriate for construing such maps (see e.g. Ginsberg, 1989; Reger, 1990b). In addition, conceptualisations of
businesses and portfolios are deeply rooted in managers’ minds and as such reflect axiomatic knowledge (see e.g. Mintzberg, 1990). We expected that the additional use of multidimensional scaling in this research project, to analyse the comparison of constructs by managers, might throw some light on the fundamental beliefs behind the selection of businesses in the portfolio.

Both the development of a new dominant logic and the development of new (managerial) business skills predominantly reflect the generation of process knowledge (cf. Prahalad and Bettis, 1986; Grant, 1988). In terms of Sackmann’s (1991, 1992) classification of knowledge, process knowledge embraces both directory and recipe knowledge (i.e. knowledge on how things are done or should be done respectively). The generation of these kinds of knowledge is typically captured by construing causal or argument maps. Given our intention to study diversification projects from the eyes of managers as opposed to an investigator’s perspective, we prefer to construe causal maps. Recall that argument mapping imposes a rather tight analytical structure on data. Moreover, because we aim to compare construed maps (both across individual managers and per manager in time) and want to preserve the idiosyncratic nature of the data as much as possible, we decided to employ the cognitive technique developed by Eden and his colleagues using Decision Explorer (e.g. Eden, 1988; Eden and Ackermann, 1998b). Decision Explorer has many built-in tools for analysing and comparing construed cognitive maps, which meets our wish for systematic analysis of data. Note that a comparable methodology developed by Laukkanen (1992) also offers excellent possibilities to compare maps but does so at the expense of the idiographic nature of the maps as researchers have to ‘standardise’ the constructs of respondents before comparison.

Learning with respect to the arrangement of the value chain and the design of organisational structures mainly reflects the development of directory and axiomatic knowledge. On the one hand, this learning area is closely connected with both conceptualisation processes, on the other hand it is linked to the development of the new dominant logic(s) and managerial business skills. We assume that the knowledge with respect to this learning area will be sufficiently captured when the preceding techniques are used. The conceptualisations of the new business and the portfolio of businesses revealed with the repertory grid technique may offer insight into intentional behaviour in linking new and existing activities. The cognitive maps construed with Decision Explorer may add to our understanding of changes in chains of argumentation with respect to this area.

In addition to the repertory grid technique and the construction of idiographic cognitive maps, content analysis of transcribed interviews can be helpful in a number of ways. Firstly, as an independent mapping technique, analysis of the

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1 In fact, during the first part of our study we used Graphics COPE, but changed to its successor Decision Explorer during the last parts. The latter (only) offers somewhat more flexibility to the user than the former.
content of transcribed interviews can help in identifying the meaning individual managers attach to phenomena (see e.g. Winterscheid, 1994). Secondly, content analysis can be helpful to both other techniques through the identification of (important) constructs and linkages between constructs. It may also help to interpret the output of the repertory grid technique, in particular the maps construed with multidimensional scaling. Content analysis is thus used as a kind of triangulation. A further consideration to use content analysis is that it can be employed without additionally ‘bothering’ the respondents that were interviewed.

In closing our selection of mapping techniques, we would like to stress once more that, consistent with an interpretive perspective, our aim is to understand how individual managers construe their world. As we have argued in the first section of this chapter, cognitive maps, being ‘vehicles of meaning’, are means to this end. The use of a combination of mapping techniques offers the possibility to compare the meaning of concepts and phenomena as inferred from each of them. An important implication of this understanding is that although we have straightforwardly linked learning areas to cognitive mapping techniques, this linkage should be considered as a loose one. We will fall back on each of the different types of cognitive maps to throw light on the content and meaning the managers attach to each of the five learning areas. Before going into each of the mapping techniques we selected in detail, we outline the mapping process in this research project.

The mapping process

The employment of three different cognitive mapping techniques in one piece of research can easily become irritating and laborious for respondents, and, in doing so, become counterproductive (see e.g. Brown, 1992). Cognitive mapping is a fairly intimate process and is probably most fruitful when respondents feel comfortable and free to talk, rather than being hindered by the (number of) techniques employed by the researcher. For this reason, the combination of interviews and cognitive mapping techniques was chosen in such a way that the time demanded of the respondents was minimised. On the other hand, using different cognitive mapping techniques can also be quite productive, as each technique presents the respondent with a different contextual setting. This may stimulate conversation and thus the elicitation of knowledge in general. Moreover, it offers some interesting possibilities for validation, both by the respondents themselves and as a result of cross-method triangulation. Validation is a necessary requirement in the process of cognitive mapping as articulation and thinking interacts (Weick 1979; Eden, 1992). On the basis of these considerations the three cognitive mapping techniques were combined in the following manner:
1. The cognitive mapping process with each individual (owner-)manager started with one or two open and unstructured interviews in which some general issues as well as the background and progress of the diversification project were discussed. The managers were asked to tell their own story, using some general catchwords, such as strategy, goals, important events and developments, and customers. Incidentally, they were probed for clarification of details. The content interviews (tape-recorded and transcribed) were subsequently analysed (see section on content analysis).

2. Using Decision Explorer, cognitive maps were construed in two interview sessions. After the first session with a manager, maps were construed on the basis of the transcribed interviews and subsequently organised and arranged into several submaps around emergent themes (cf. Eden and Simpson, 1989). In one case the cognitive maps were construed during the first round in direct interaction with the respondents and then organised and arranged in submaps (in later interviews we dropped this procedure as we felt that it focused conversation too much on causality interactions and, in doing so, interfered with the content analysis of the interviews). The submaps were either sent to the respondents before the second mapping session so that they could examine them carefully or passed through with them during the second session.

3. The mapping session in which the cognitive maps construed with Decision Explorer were reviewed was also used as a starting-point for the application of the repertory grid technique. Confronting the respondents with triads of businesses from their company’s portfolio, constructs were elicited (cf. Fransella and Bannister, 1977; Ginsberg, 1989). In addition, the results of both preceding phases were studied for the same purpose. Next, a questionnaire was mailed to the respondents in which they were asked first to compare the businesses of the firm pairwise in terms of similarity and then to rank them against the set of elicited constructs. This data enabled us to construe maps in a number of ways (cluster analysis, multidimensional scaling).

For each of the three diversification cases we studied in this research (see last section of this chapter), the foregoing mapping process was passed through twice with a time interval of approximately one and a half to two years. We reckoned that both a (much) shorter and a longer time interval would seriously hamper the identification of learning experiences. Each mapping process typically enclosed between three and five interview sessions, which lasted between one and a half and three hours. Overall, some 40 interviews with six respondents were conducted as part of a mapping process (we refer to chapters in which each case study is discussed for the selection of interviewed managers). In between the interview sessions additional contacts with the respondents were arranged (e.g. to visit local branches, to discuss specific issues, etc.) to keep
contact alive. The construction and analysis of cognitive maps turned out to be a labour-intensive process, in particular the construction of the idiographic causal maps with Decision Explorer (although the saying ‘practice makes perfect’ certainly applies to this). Roughly speaking, each individual mapping process took about two weeks in total.

The cognitive maps were compared both across respondents within the same company and for each respondent in time. We compared the output of each individual cognitive mapping technique and the aggregate (interpreted) output of the techniques. The next section describes each cognitive mapping technique in more detail, including their theoretical foundation, and indicates how comparison of cognitive maps across time took place.

Three cognitive mapping techniques

The three cognitive mapping techniques we chose to employ differ in many respects. In addition to the different kinds of knowledge each (predominantly) captures, they demand different kinds of data and produce different kinds of cognitive maps. Due to these differences, the three techniques compare cognitive maps on a different basis and offer different signs of learning. The three techniques, however, also share some characteristics. Each technique offers clear procedures for collecting subjective data and allows for systematic processing and analysis of the construed maps. In this section we successively discuss the characteristics of content analysis, the repertory grid technique, and cognitive mapping using Decision Explorer. We will indicate how we construed, analysed and compared cognitive maps using each of these techniques.

Content analysis

Content analysis is a research method that uses a set of procedures to make replicative and valid inferences from texts (Krippendorff, 1980; Weber, 1990). In principle, any text can be used, whether uttered or written by a subject. Content analysis has many different shapes, which differ with respect to the specificities of the procedures used. Fundamentally, content analysis can be conducted on two levels of analysis: the manifest content or the latent content of texts (Erdener and Dunn, 1990; Weber, 1990). The former is sometimes described as ‘classical’ while the latter is referred to as ‘ethnographic’ (e.g. Tesch, 1991). Analysis of the manifest content focuses on clearly discernible characteristics of texts such as word frequency and position of certain key words in their context (Weber, 1990; Winterscheid, 1994). Analysis of the latent content aims at capturing what the writer or interviewee actually meant when he used particular words in a certain combination and context. Identification of the latent content can, for example, be done by argumentation mapping (e.g. Fletcher and Huff, 1990a/b) and semiotics (e.g. Fiol, 1990a/b). From a cognitive point of view, identification of the latent content of texts is more interesting as it aims to reveal the underlying meaning embodied in the text. However, next to
being time-consuming, it relies more heavily on the subjective interpretation and judgement of the researcher (Erdener and Dunn, 1990; Weber, 1990). This holds the danger that the output is more meaningful to the researcher than to the subject who uttered or wrote the text in the first place.

Winterscheid (1994) outlines a (less time-consuming) procedure for latent content analysis that focuses on the interviewee’s most central cognitive categories. Departing from a social-constructivist position, her procedure aims at inferring the meaning people attach to phenomena from the language they use. A main assumption is that words (used in a certain context) refer to underlying ‘core concepts’ which people use to make sense of their world (e.g. Miller and Johnson-Laird, 1976). Latent core concepts manifest themselves as individuals use words to label their experiences. Moreover, frequency of word-use may reflect cognitive salience (Lachman et al., 1979). If an individual uses a particular term frequently, it may hold particular importance to him.

However, some caution is in place as the same term can refer to different core concepts and thus have more than one meaning (Weber, 1990). Also, people can use similar words but mean different things by them. In line with this, common word use thus does not automatically imply shared meaning, only shared labelling:

‘Consider, for example, the word ‘water’. Most would agree that ‘water’ refers to the liquid substance found in lakes and oceans. However, a person living near an ocean might think of salt water when using the label, while an individual living near a lake might associate fresh water with the term.’ (Waterscheid, 1994: 341).

But as meaning is conveyed through idiosyncratic combinations of words and concepts (Scheper, 1991; Scheper and Faber, 1994), the context in which terms are used may offer additional insight into their underlying meaning. Therefore, ‘in order to understand the meaning of others, one must build a bridge between public labels and private meaning which taps a constellation of networks between concepts’ (Winterscheid, 1994: 341). In this way one can establish ‘whether language [is] used the same way by different individuals, whether there [are] common patterns of language use, and ultimately, to explore the relationship between language use, personal meaning, and the evolution of [a strategic event] over time’ (ibid.: 339).

If interview transcripts are used as a basis for content analysis, it is absolutely crucial that the interviews are minimally structured. At best, interviews should be conversations (that is, monologues that appear to be dialogues to the interviewees) on issues that bother interviewees. The reason for this is that respondents should use their own labels and concepts and not adopt those of the researcher, as these will probably be meaningless to them. Some structure is, of course, inevitable as the interview takes place in the context of an event (such as a diversification project) and a research project. To minimise the structure of our interviews, we dropped the construction of cognitive maps in direct interaction
with respondents after the first round of interviews in the first case study. The transcripts of the first two interview sessions were content analysed following the analytical structure in Figure 5-3.

For each transcript a concordance was generated. Cognitive salience was then inferred from the frequency of word-use (the software-package KWALITAN (see Peters et al., 1989) was used for this purpose). Following Winterscheid (1994: 348) we then focused on nouns ‘because of their grammatical function of concept representation’. The most frequently used (categories of) nouns were depicted in graphs that, thus, showed salience of word-use. Next, these nouns were examined in their linguistic context, known as a ‘key word in context’ (KWIC) analysis. Whereas frequency of word-use does not convey any meaning, a KWIC analysis potentially does (cf. Weber, 1990; Winterscheid, 1994). In most instances, the sentence in which the key word occurred as well as the sentences immediately before and after this were singled out. Each text strip was studied to infer the meaning conveyed by the key words and to identify core concepts. Subsequently, the frequency list of nouns was studied once more to identify different nouns that potentially could have a similar meaning to the respondents as the most frequently occurring once. If a KWIC analysis confirmed this assumption, nouns denoting similar meaning were merged into a category.

The output of the content analyses was used in two ways (see Figure 5-4). Firstly, differences between respondents in underlying core concepts (as

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**Figure 5-3**

*Interpretive dictionary analytical diagram*  
(Source: Winterscheid, 1994: 352)
indicated by differences in key words used) were assessed to determine differences between respondents. For this purpose we first treated the transcripts as a single text and generated a composite key word list (cf. Winterscheid, 1994). We then compared the twenty most salient words from the composite list with the individual key word lists. To obtain a visual comparison, each individual’s percentage use of the sample key words was depicted into a frequency graph. The way in which each respondent used these words was then compared by examining the core concepts they conveyed. Recall that similar core concepts across individuals may reflect shared meaning. It goes without saying that these comparisons were only done if there were several respondents in one company, which was the case in two of the three companies we studied.

Secondly, changes in key words and core concepts used by respondents over time were taken as signs of learning. Following Barr et al. (1992) these changes may include the use of a new concept or the deletion of an old one, replacement of a specific concept by a more general one or the sustained use of (new) concepts. The format of this comparison was similar to that between respondents: transcripts of interviews conducted at different moments in time were treated as a single text (for each respondent), a composite list of key words was generated, differences in the use of key words assessed and underlying core concepts compared. The same procedure was then repeated for all respondents in the same company.

Figure 5-4

Employment of content analysis in this research
Repertory grid technique

The repertory grid technique was developed by Kelly (1955) as a practical instrument for the application of his Personal Construct Theory. According to Kelly (1955: 49) people try to understand and anticipate the world by developing and testing (consciously and unconsciously) their own implicit theories: ‘Like the prototype of scientist that he is, man seeks prediction’. As Fransella and Bannister (1977: 2) remark, these implicit theories differ by their nature from ‘normal’, scientific theories:

‘In using the metaphor of a ‘theory’, we are not arguing that such theories are formal and articulated. They may be verbal or non-verbal or pre-verbal, they may be tightly structured or loosely structured, they may be easily testable or almost too tangled to test, they may be idiosyncratic or commonly held. But they are theories in the sense of being networks of meaning through which persons see and handle the universe of situations through which they move.’

As indicated in the previous chapter, the implicit theories people develop consist of a finite set of linked constructs. With these constructs people make sense of their world by discriminating between the elements they face: ‘they are ways of construing the world’ (Kelly, 1955: 9). Elements can be anything, ranging from people, animals and cars (see e.g. Eden and Jones, 1984) to events and processes. Moreover, Kelly argues that people tend to discriminate by simultaneously noting likeness and differences. In line with this, constructs are dichotomous and consist of both a contrast and similarity pole. Thus, constructs give meaning and structure to one’s world by denoting elements as similar and thereby different from other elements. Examples of constructs include ‘strong-weak’, ‘fast-boring’, ‘nice-nasty’, ‘sour-happy’, etc. These examples illustrate that constructs belong to individuals and are not ‘logical’ in any other way.

Two properties of constructs are in particular worth noting in the context of cognitive mapping. First, constructs have a finite range of convenience, beyond which they are not relevant to a person. This applies to context, elements and time. For example, the construct ‘hostile-friendly’ may have relevance to a person for differentiating between his neighbours at a certain time, but may not have any meaning to him at other times or when he moves to another neighbourhood. Also, the same construct may not have any meaning with respect to elements like colleagues and cars. As Kelly (1955: 12) puts it: ‘Each individual man formulates in his own way constructs through which he views the world of events’. People can articulate some constructs clearly while others can only be expressed ‘in pantomime’ (ibid.: 16). Constructs that can be communicated can, in general, be more widely shared.

A second property of constructs concerns their linkage. Kelly argues that subsystems of constructs are hierarchically linked into one network of subordinate and superordinate constructs, called the personal construct system. The value and meaning of a particular construct can only be derived from the location within the entire network. Next to using different sets of constructs,
people are likely to differ with respect to the organisation and structure of their personal construct system. Thus people vary their construct system by modifying their constructs, delete existing constructs while creating new ones that are subsumed within existing superordinate constructs. Kelly (1955: 75) considers all these cognitive changes as learning: ‘learning is not a special class of psychological processes; it is synonymous with any and all psychological processes’.

In closing the theoretical introduction to Personal Construct Theory, a remark on Kelly’s (1955) ontological position, which he describes as ‘constructive alternativism’, is in place. To Kelly ‘the universe is real; it is happening all the time; it is integral; and it is open to piecemeal interpretation’ (ibid.: 43). Yet he does not fully adhere to a realistic ontology as he states that ‘all of our present interpretations of the universe are subject to revision or replacement’ (ibid.: 15). Different people construe it in different ways and by constantly modifying their personal construct system ‘through an infinite series of successive approximations’ (ibid.: 43) they come to understand the(ir) world. Since ‘there are always alternative constructions available to choose among in dealing with the world’ (ibid.: 15), ‘the structure we erect is what rules us’ (ibid.: 20). As the number of alternative interpretations of the world is, in principle, infinite, there are multiple realities. In addition, Kelly (1955: 21) does regard the deterministic nature of the ‘real world’ as relatively unimportant: ‘since no event could possibly have happened otherwise and still have been itself, there is not much point in singling it out and saying that it was determined’. Hence, within the context of cognitive mapping, Kelly’s ontological position does not contradict with our position as laid out in the previous chapter.

As indicated, Kelly (1955) developed the repertory grid technique to apply his Personal Construct Theory and as such it aims at exploring the structure and content of a person’s construct system. As Eden and Jones (1984: 780) put it, ‘a grid is intended to help an individual express his personal thinking about some part of his world’. Over the years, many variations on the repertory grid technique have been developed (see for a review Fransella and Bannister, 1977). Basically, a repertory grid is an $m \times n$ matrix of elements and constructs that is composed by asking respondents to evaluate the similarity and difference of a set of elements in terms of a set of constructs. It is absolutely crucial that both the elements and the constructs are meaningful to the respondents; they have to be in their range of convenience. Both elements and constructs should therefore not be provided by the researcher (e.g. derived from theory), but carefully elicited from the respondents. Once composed, grids can be quantitatively analysed in a number of ways (see e.g. Fransella and Bannister, 1977; Eden and Jones, 1984; Dunn and Ginsberg, 1986; Dunn et al., 1986). Examples include calculating the distance between elements or the correlations among constructs to assess cognitive complexity of the construct system. However, Eden and Jones (1984: 784) warn against bluntly employing different kinds of statistical analyses: ‘we must be sure that the helpfulness of such analyses is not built on a base of quicksand’.
We used the repertory grid technique in two out of the three cases (in the third case the respondents did not ‘see’ a portfolio of businesses that could be meaningfully compared) to assess the psychological distances that each manager perceived between the businesses in the portfolio, and to identify the dominant constructs along which they categorised these businesses. This gives us an indication of the way in which each respondent conceptualises the company’s portfolio of businesses, including any newly added businesses. Moreover, comparison of repertory grids composed at different moments in time throws light on the learning that occurred in the framing of the portfolio of businesses.

The elicitation of elements and constructs started in the last interview session of the mapping process. In the two cases we used the repertory grid technique, agreement among managers on the relevant businesses in the portfolio was reached quickly. Constructs were elicited following the minimum context card form (Fransella and Bannister, 1977). We confronted the respondents with triads of businesses and asked them the question: ‘Which of these three businesses are in your opinion most similar to each other and which are most different?’ After they had made up their mind and answered the question, we asked them ‘Why do you find these two businesses most similar and different from the third?’ At this stage this is the most central question as the answer potentially contains constructs which the manager uses to classify the businesses in the company’s portfolio. Often we asked further ‘why’-questions to clarify or elicit deeper-lying constructs. In this way, we presented them on average between 10 to 15 triads of businesses until no new constructs were mentioned. Prior to the interview we had arranged the triads randomly but in such a way that each business appeared at least four times. If respondents could or did not differentiate between triads of businesses we moved on to the next one. Note that the number and nature of the elicited constructs contain by itself valuable output.

Confronting respondents with all possible triads of elements is a laborious undertaking and may easily irritate respondents (Brown, 1992; Bijmolt and Wedel, 1995). We therefore decided to send a questionnaire to the respondents in which they were asked first to compare the businesses of the firm pairwise in terms of similarity (using a 9-point scale) and then to rank them against the set of elicited constructs. On the basis of a comparative inquiry among data collection methods Bijmolt and Wedel (1995: 370) recommend the use of paired comparison ‘as it appears to offer a reasonable compromise between retrieved information and respondent fatigue’. In the one case study with several respondents we used the same set of constructs for all respondents to enable comparison across managers. This holds the danger that not every respondent may use all constructs to construe every business (which, however, may also be the case if confronted with his ‘own’ constructs as Eden and Jones (1984) note).

The similarity and ranking data enabled us to analyse the grid in a number of ways in order to assess (1) the degree to which managers conceptualised the portfolio of businesses in a similar way, (2) changes in the conceptualisation of the portfolio by a manager in time indicating learning that has taken place, and
(3) the conceptualisation and position of the newly added business vis-à-vis the existing businesses both across managers and for each manager in time. Figure 5-5 summarises the various analyses we performed on basis of the ranking and comparison of businesses by each manager. Similar to content analysis, the output of these analyses were (1) compared in time for each manager to assess any learning that had taken place and (2) compared across managers in the company at one time.

We followed Ginsberg (1989; see also Tripodi and Bieri, 1964; Fransella and Bannister, 1977; Dunn and Ginsberg, 1986; Dunn et al., 1986) who proposes several indices to characterise a manager’s construction of his company’s business portfolio. In addition, we performed a cluster analysis and used multi-dimensional scaling (in combination with regression analysis) to get visual representations of the managers’ portfolio construction. We would like to stress that we used the results of these analyses to form an overall image of the managers’ construction of the portfolio businesses and only in combination with results from the other mapping techniques. There is a real danger that a few simple comparison and ranking tasks explode into massive amounts of data that starts to live a life of its own. To identify if any learning had taken place with respect to the construction of businesses, we compared (our construction of) the managers’ portfolio construction over time.

Following Ginsberg (1989), the ranking data was first used to compute the distances between the individual businesses using the $D$ statistic of Osgood et al. (1957). The $D$ statistic is calculated by assessing the absolute differences in ranking scores of the businesses on the constructs (also known as city-block or
Manhattan distances\footnote{Formulas are listed in Appendix C.}. Businesses that are close together are perceived as similar by the manager making the ranking\footnote{We did not calculate the frame diversity score Ginsberg (1989) recommends to assess the degree to which a manager construes the businesses in the portfolio as different from each other, as a ranking from 1 to \( x \) always produces the same frame diversity score.}. We then calculated an index of frame uniformity on the basis of the rank correlation coefficients\footnote{Spearman’s rho rank correlation coefficient, which is the Pearson correlation coefficient, based on the ranks of the data if no ties are allowed.} between elements (Ginsberg, 1989). Frame uniformity refers to the construed relatedness among the businesses in terms of the elicited constructs. High frame uniformity scores, as indicated by large correlations among all pairs of elements, suggest that businesses are seen as highly related. We further identified the centrality of businesses as perceived by each manager by averaging the coefficients of determination for pairs of businesses on each construct.

We repeated the preceding calculations taking the constructs as focal entities, thus determining cognitive complexity and construct significance. Cognitive complexity is characterised by cognitive differentiation and cognitive integration. The former refers to the degree to which each construct discriminates among the businesses. High scores are thought to reflect relatively complex construction systems in which each construct differentiates across businesses in another way. Cognitive integration refers to the degree of relatedness of constructs. High integration scores, as indicated by large rank correlation coefficients among all pairs of constructs, suggest minimal differentiation which means that each construct performs the same function as every other construct. Finally, we determined the significance of each construct for each manager by averaging the coefficients of determination for pairs of constructs on each business.

To identify which businesses are perceived as most similar (and to get a visual representation of the similarities), a cluster analysis was performed. Following Eden and Jones (1984; see also Hart, 1989), who argue for the use of the simplest and most transparent form of cluster analysis possible, we used hierarchical clustering by simple linkage, also referred to as the nearest neighbour technique. This form of clustering combines constructs or businesses into clusters on the basis of the distance, or greatest similarity, between them. As we used the \( D \) statistic as the measure of distance between businesses, the resulting dendogram visualises the distance matrix calculated on the basis of the ranking data. To ease interpretation we first normalised the distances to a scale from 0-100 to obtain so-called matching scores. A matching score above 50\% then indicates that two businesses are seen to be similar and if the score is below 50\% the two are considered dissimilar.

In addition to the above analyses, we used multidimensional scaling (MDS) to explore the constructs (or dimensions) along which managers grouped the
businesses in their portfolio. An additional advantage of using MDS was that we could compare its results (based on the pairwise comparison of businesses) with the results from the preceding analyses (based on the ranking task). MDS is a series of techniques that transforms judgements of (dis)similarity and preference of a set of objects into geometric distances in a multidimensional space, called a perceptual map (see e.g. Hair et al., 1990; Kruskal and Wish, 1991). One of the main aims is to help the researcher to identify the key dimensions that underlie respondents’ judgements of similarity. MDS has been extensively studied and used in the area of marketing (see e.g. Cooper, 1983; Bijmolt, 1996) and social psychology (see e.g. Forgas, 1979). We used the pairwise comparisons of the businesses to construe perceptual maps that show the relative positioning of all businesses in the portfolio according to each of the managers. Metric MDS-analyses were performed using the ALSCAL-algorithm that is available in the SPSS-software (SPSS 7.5). ALSCAL construes maps on the basis of Euclidian distances (Young and Harris, 1993). It is sometimes characterised as a classical MDS method as opposed to a group of more recent MDS methods that are based on the maximum likelihood principle (Bijmolt, 1996).

To determine the number of (dominant) dimensions that (may) underlie the similarity data, we used the measures of fit provided by SPSS (i.e. s-stress, Kruskal’s stress index and RSQ) and visually examined different solutions. The measures of fit indicate how well the configuration corresponds to the matrix of similarity data (note that the ALSCAL-algorithm optimises s-stress). S-stress indicates the fit of the squared distances $D^2$ to the transformed data. Kruskal’s stress measure is defined in the same way except that distances are used instead of squared distances. RSQ is the squared simple correlation between the distances and the corresponding transformed data.

Kruskal and Wish (1991: 34) give as a rough rule of thumb that ‘there should be at least twice as many stimulus pairs as parameters to be estimated, to assure an adequate degree of statistical stability’. For the two cases in which we used the repertory grid technique, this means that at the most two (possibly three) stable dimensions can be determined. Next, we determined the constructs that managers (may have) used to compare their businesses using linear multiple regression analysis (cf. Kruskal and Wish, 1991). In this procedure the average ranking scores of the businesses on the constructs are regressed over the co-ordinates of the businesses on the $n$ dimensions in the perceptual map (given the exploratory character of the exercise we took the liberty of using ‘only’ ranking data). Constructs that provide a satisfactory interpretation of a dimension must have both a high multiple correlation (roughly $r > 0.75$ with $p < 0.01$) and a high regression weight on that dimension. The constructs that met these requirements were subsequently plotted in the perceptual map.

Finally, in one case (Colifox, see Chapter 6) we performed a weighted multidimensional scaling analysis using the dissimilarity data of all the managers involved in the diversification project. The weirdness index calculated in this analysis indicates how unusual or weird each subject’s weights are relative to the weights of the average subject being analysed (Young and Harris,
Cognitive mapping using Decision Explorer

Out of feelings of unease when using the Repertory Grid Technique on various organisational problems, Eden and his colleagues developed a cognitive mapping methodology in which constructs are linked hierarchically (see e.g. Eden et al., 1979; Eden et al., 1983; Eden and Ackermann, 1998b). Although repertory grids can be helpful in some circumstances, Eden (1988: 3) remarks that repertory grids are ‘clumsy to use in a consultant-client relationship’ and ‘constraining in the degree of richness that can be captured’. In addition, because there are serious problems in using repertory grids in a theoretically sound way, he questions if the technique is a good reflection of Kelly’s Personal Construct Theory. For one thing, because ‘elements, let alone constructs, are unlikely to ‘belong’ to each member of a team’ statistical comparison is clearly problematic’ (Eden and Jones, 1984: 788). Although Eden and his colleagues developed their cognitive mapping methodology to support (teams of) managers in exploring and resolving the problem situations they face in a reflective way (see e.g. Eden, 1989; Eden and Simpson, 1989; Eden, 1992b; Eden and Ackermann, 1998b), it is also – and increasingly – used in management research (e.g. Jenkins and Johnson, 1997; Swan, 1997; Bood, 1998).

The methodology builds upon and extends Hinkle’s (1965; in: Fransella and Bannister, 1977; Eden et al., 1979) work on implication grids, which aim at eliciting the implications of a set of constructs. The cognitive maps that result from the methodology consist of networks of constructs that are organised in a hierarchical way; in line with Kelly’s (1955) Personal Construct Theory constructs are noted as psychological contrasts. A typical cognitive map depicts a situation that a manager experiences as problematic and includes ‘his’ causes, consequences, values and goals, and available options in causal relationships. Elicitation of a manager’s thinking about the situation occurs gradually during the act of mapping as the introduction of (linkages between) constructs evoke the identification of other (linkages between) constructs. As the introduction of new constructs and linkages can go on endlessly, the mapping methodology is able to hold on to the richness of a manager’s thinking. Accompanying software called Decision Explorer (previously known as Graphics COPE) makes it possible to cope with the complexity of constructs and linkages that comes with the richness.

Cognitive maps are not intended to be accurate records of what is being said during an interview but should be seen as vehicles for representing meaning. Basically, cognitive maps reflect meaning in three different ways (Eden and Ackermann, 1998a: 197). First, meaning derives from ‘the words that make up a construct, which may be judged as synonymous with other words or another phrase’ (ibid). Second, in line with Kelly’s proposition that people think along dichotomous constructs, the contrasting pole in the construct reflects meaning.
Eden and Ackermann note that elicitation of contrasting poles depends strongly upon interviewing skills and appropriate questioning. Our experience is that respondents sometimes name contrast poles themselves automatically or after some additional questioning. In other instances opposite poles emerge when the interview transcripts are carefully examined and thought over. Third and as Eden and Ackermann note ‘most significantly’, meaning derives from ‘the context of the construct within the map’ (ibid). Constructs take on meaning through their (hierarchical and causal) linkages to other construct (note the correspondence to the KWIC-analysis in content analysis).

**Decision Explorer** has many built-in tools to analyse and explore the meaning captured in cognitive maps (see Eden *et al.*, 1992; Eden and Ackermann, 1998a). Analysis is primarily aimed at identification of emergent properties by exploring the structure and content of maps in a ‘discovery mode’ and analysing the maps from various perspectives (Eden and Ackermann, 1998a). Although this may include the calculation of some key figures, the goal is not to reduce the richness of cognitive maps to clear-cut summaries in terms of some statistical characteristics. In a similar vein, comparison of cognitive maps, whether in time or across respondents, primarily involves comparison of the emergent features of maps. The analysis tools available in **Decision Explorer** and the graphical display of maps strongly help researchers in their exploration and comparison of cognitive maps. Eden *et al.* (1992) and Eden and Ackermann (1998a) describe a series of analyses of which we performed the following analyses when exploring and comparing the cognitive maps in the three case studies:

1. On a superficial level, counting the number of linkages and constructs, including the ratio between the two, gives an impression of the level of cognitive complexity. Densely connected maps have higher ratios of links to constructs and suggest a higher level of cognitive complexity. Eden *et al.* (1992) note that inexperienced mappers generate maps with fewer constructs and more linkages.
2. Finding and examining the most superordinate constructs in the map to identify a respondent’s value system (‘the most fundamental property of a cognitive map’) embedded within it.
3. Identifying the most central constructs on the basis of the number of linkages to other constructs, either directly or indirectly. Constructs that ‘are the most busy’ and have many linkages to other constructs point to constructs that are cognitively central to the respondent.
4. Forming clusters of related constructs manually around emergent themes. Relatedness can, for example, be indicated by the topics put forward by the respondent in the interview. Organising the cognitive map in manually formed clusters is especially useful when presenting and discussing the initial map with interviewees. Number, size and labels of the clusters can be used as a basis of comparison in time. Note that constructs can belong to several clusters.
(5) Identifying well-elaborated concepts by running a hierarchical cluster analysis. Hierarchical clusters contain all the constructs that ‘explain’ a superordinate construct. It can, for example, be formed to explore the value system identified above. In addition, the most potent constructs, which are part of several hierarchical clusters, can be identified. Potent constructs have ramifications for a large number of themes. The total number of potent constructs in relation to the number of heads may provide an indication of cognitive complexity.

(6) Identifying key areas by running the cluster analysis available in Decision Explorer. The cluster analysis in Decision Explorer is based on the Jaccard coefficient and forms mutually exclusive clusters based on link similarity; constructs with a common context are thus placed in the same cluster. Again, number, size, content, linkage to other clusters, etc. can be used as basis for comparison of maps. Clusters with more cross-links to other clusters are assumed to be more critical. Moreover, large clusters and many linkages between clusters provide an indication of a respondent’s cognitive complexity.

(7) Detecting dynamics in the respondent’s thinking by identifying feedback loops in the map. Note that feedback loops can also point to flaws in respondents’ thinking, especially if the respondent is not aware of such loops, or to erroneous mapping on part of the interviewer.

(8) Detecting the respondent’s portfolio of options for realising the value system by identifying the most subordinate constructs in the map. Sometimes a group of subordinate constructs feeds only one superordinate construct and indicates an elaborated option.

Eden and Ackermann (1998a: 205) stress that ‘it is important to consider maps as an holistic representation of the interview’. The properties of cognitive maps revealed from each of the foregoing analyses should therefore be examined in the context of other properties. Thus, maps should be compared as a whole and not (only) their distinctive properties in isolation.

We construed cognitive maps on the basis of two interview sessions. The first interview was unstructured using only some catchwords to keep conversation going on (if necessary at all). We aimed at having an open atmosphere in which respondents were willing to speak about the issues that concerned them in the context of the diversification project (instead of the kind of interview in which the ‘researcher’ asks and the ‘respondent’ answers). The transcripts of the (tape-recorded) interview where then used to construe cognitive maps (including the results from the content analysis of the transcripts). The cognitive maps were organised (manually) around themes that emerged during their construction (see analysis (4) above). After completion, the maps were analysed using the tools available in Decision Explorer to identify emergent properties that could be interesting for further questioning or elaboration. As mentioned earlier, during some of the first interviews we construed maps in direct interaction with
respondents, a format that is preferred by Eden and Ackermann (1998b). We left this format to minimise any structure of the interviews and use it also as a basis for content analysis. But even in the case of direct construction, maps were re-construed and extended ‘at home’ when, after having listened to the tape-recording of the interview, we felt that important parts, constructs and contrasting poles were missing.

Next, the submaps organised around emergent themes were presented to the respondents, either sent to them before the second interview session or passed through carefully during the second session. A main reason for this feedback follows directly from Weick’s (1979b: 47) aphorism ‘How can I know what I think till I see what I say’ (cf. Eden, 1992; see first section of this chapter). The argument is that because articulation and cognition interact, the two are always out of step and we should show respondents what they said to enable them to reflect upon it. During the second session we, again, aimed at having an open, unstructured atmosphere. Remarks of respondents on the content of constructs and the linkages of the maps led to direct changes. The second interview also offered the opportunity to focus on certain constructs and parts of the map that emerged from analysis as interesting or not well developed (few linkages). In addition, new issues emerged and were elaborated during this interview session. In most instances the maps increased in size and structure after the second

Figure 5-6

Cognitive mapping process using Decision Explorer
We now turn to the issues of validity and reliability, which take on a different meaning in the context of cognitive mapping.

**Validity and reliability**

Easterby-Smith *et al.* (1991) argue that the meanings of validity and reliability vary considerably according to the philosophical viewpoint adopted. From a positivistic viewpoint the issues of validity concern an answer to the question: ‘Does an instrument measure what it is supposed to measure?’ *(ibid.: 41).* It is clear that this question is only relevant if one is willing to accept one absolute real world ‘out there’ that can be known and measured. The same question is clearly problematic from a social-constructive point of view (which is part of the structurational perspective we adopted in Chapter 4) according to which people construe their own ‘world’. For this reason Easterby-Smith *et al.* (1991: 41) propose to rephrase the foregoing classical validity question into: ‘Has the researcher gained full access to the knowledge and meanings of informants?’.

Jenkins (1998: 240) supports the appropriateness of this approach to validity within the context of cognitive mapping and argues that it leads to the question: ‘Have we allowed the respondent to respond in a way which is salient and meaningful to him or her?’. In line with this, Laukkanen (1998: 175) argues that validity requires that ‘the elicited assertions of the respondents reflect their true beliefs or operant knowledge bases instead of espoused theories’. This approach to validity has a number of implications.

The most important implication relates to the format of interviews and the relation between researcher and interviewee. Researchers should avoid (as much as possible) to impose their way of thinking upon respondents in any way. For this reason, we tried to structure interviews as minimally as possible and leave as much room to respondents to tell their story using their language. In doing so we hoped that respondents experienced the interview as an open (one-way) conversation in which they could talk freely to a well-listening researcher. Moreover we attempted to suppress any urge to give our interpretation of what might be going on and tried to keep away from introducing formal theories into the interview sessions. As indicated in the first section of this chapter, interviews remain social and political events and ‘Hawthorne effects’ always lie in wait. As a result cognitive maps always partially reflect the social nature of an interview and the subjective interpretation of the researcher (which in itself is necessary to capture meaning).

Like validity, reliability takes on a different meaning within the context of cognitive mapping. In general, reliability concerns the isolation of research results from the cognitive influence of a researcher. From a positivistic
viewpoint it is defined as the replication of the results on different occasions using the same instruments and procedures (Easterby-Smith, 1991: 41; Yin, 1989: 41). All aspects mentioned in this approach of reliability are problematic from a social constructive viewpoint and a cognitive research perspective. Mappings on different occasions are more than likely to lead to different results, if only because of the development of a respondent’s thinking in time. In addition, the focus on instruments and procedures is problematic. Eden and Ackermann (1998a: 198) note that ‘if it is important to collect meaning then it becomes important to see the researcher as the research instrument, rather than the data collection and analysis techniques or tools as the research instrument’. For similar reasons, the coding of transcripts by coders raises concerns as they do not have access to the full experience of the interviews: ‘the subtlety of the data and their meanings is sacrificed to intercoder reliability’ (ibid.: 198).

Concerns around reliability grow as the interpretative input of data by the researcher increases. We dealt with these concerns in this research projects in a number of ways. Firstly, we went back with our cognitive maps construed after the first session to validate if they reflected the respondent’s way of thinking instead of ours. Recall that another reason for doing this is related to the interaction of articulation and cognition as indicated in the foregoing pages. Note that we only showed the respondents the cognitive maps we construed with Decision Explorer which were closest to the respondent, not the cognitive maps construed on basis of content analysis and the repertory grid technique. Secondly, we decided to use cognitive mapping techniques that offer clear procedures for collecting cognitive data and allow for systematic processing and analysis of this data (see page 119). Finally, we chose to give quite extensive and rich descriptions of the three diversification projects we studied, the cognitive maps we construed, the analyses we performed, and the inferences we drew from these. This helps others in following our interpretive process and develop their own interpretations.

An introduction to the case studies

In Chapter 2 we concluded that the aggregate results of mainstream diversification research are disappointing. Based on an analysis of the dominant approach to diversification research we identified several causes for this. In short, researchers have (1) mainly applied coarse-grained research methodologies, (2) to study only a limited number of themes while (3) hardly paying any attention to process issues and (4) largely neglecting the perspectives of the managers involved in the diversification process. We concluded from these causes that it is essential to study the process and context of individual diversification projects from the perspective of the managers responsible for it, i.e. a cognitive perspective. Case studies are particularly appropriate in this situation for several reasons.
The case study as a research strategy focuses on understanding the dynamics of phenomena within their real-life context (Eisenhardt, 1989; Yin, 1989). Case studies offer outstanding possibilities to study the interaction between content, context, and processes of change over time (Pettigrew, 1990). Moreover, they hold excellent opportunities for triangulation by using various data sources and methods to infer knowledge and meaning from the interviewed managers. Closely related, cognitive data gathered can be studied from various theoretical perspectives and using different lenses which forces the researcher to go beyond initial impressions of the data (Eisenhardt, 1989). This advantage applies particularly to comparative multiple-case studies (Yin, 1989; Eisenhardt, 1991). Due to these strengths, case studies hold the potential to ‘provide freshness in perspective to an already researched topic’ (Eisenhardt, 1989: 548). For these reasons, studying individual cases in detail is far more likely to lead to the formulation of new (testable, relevant, and valid) theories than multivariate statistical methods, which are preferred by mainstream diversification researchers. The latter research strategy does not generate theory but only leads to verification or, at best, modification of existing theories (cf. Glaser and Strauss, 1967; Eisenhardt, 1989).

Case study methodology has been well established in the previous decades with the development of a rich variety of procedures, instruments and protocols for gathering and analysing case study data (see e.g. Glaser and Strauss, 1967; Miles and Huberman, 1984; Strauss, 1987; Eisenhardt, 1989; Yin, 1989; Leonard-Barton, 1990; McPhee, 1990; Pettigrew, 1990). As a result case studies have been applied to a diversity of settings (political, organisational, psychological, sociological) to reach a variety of aims, ranging from plain description to theory testing and generation. Exemplary case studies clearly hold the potential to be widely known and referred to for years (see e.g. Allison, 1971; Pettigrew, 1973; Johnson, 1987). For case studies to become famous depends partly on the skills of the researcher but also on the case(s) being studied. Pettigrew (1990: 275) argues for the selection of extreme cases ‘where the progress is transparently observable’ which matches with Yin’s (1989) plea for the choice of significant case studies. Moreover, if multiple cases are studied in a comparative design both authors prefer ‘polar types’. Opposite cases hold the potential to challenge chains of evidence and, in doing so, to assess the range of application of a theoretical framework.

Unfortunately a researcher’s reality is often a bit more stubborn than theoretical guidelines. Researchers depend on the willingness of organisations for their co-operation instead of being able to select them freely. Although this also applied to our research, we were far from unfortunate with the three companies that offered their co-operation. The (owner-)managers in these companies were time and again willing to spend time for interviews and share some of their deepest thoughts with us. But above all, the three case studies met the working definition of diversification that we selected in Chapter 1: the management of these companies considered the new business activity they started up (or were considering to start up) as fundamentally different from the
existing business activities in the company’s portfolio they were familiar with. In addition, the three companies varied on many aspects and differed in terms of the (other) conceptualisations of diversification that we discussed in Chapter 1. Given the comments made above, such differences may contribute to the identification of important, yet unknown, factors and help in building a theoretical framework. Table 5-2 summarises the key characteristics of the three companies and their diversification projects we studied in this research project. It shows that the three companies varied with respect to their main business activity, size and international orientation. In addition, the character of the diversification projects these companies undertook and the motives they had for doing so (notice that the first four of the six categories of motives we distinguished in Chapter 1 are present in the three cases), the stage these projects were in at the time of our empirical research, the level of investment involved in proportion to the size of the company, and the success of the projects differed considerably.

By far the largest of the three companies, Colifox, trades in an extensive range of related products all over the world. The company has grown considerably in recent years and is one of the largest companies in the European market. Including several acquisitions made during our empirical research, the company now owns more than a dozen trading offices and warehouses in six European countries and, in addition to that, is participating in a joint venture in the U.S. Five years ago Colifox acquired a small Dutch company that sold a limited range of related products in several Latin American countries with the intention of reducing its dependency on the (largely European) agricultural sector by broadening its market base. A sales manager was specially hired for this job after finishing his studies at an agricultural college; halfway through our research he accepted an attractive job elsewhere. We characterised Colifox’s diversification strategy as concentric, related and geographical. In addition to the sales manager, we interviewed the group manager to which the sales manager reported and was counselled by, and the director responsible for finance and marketing. The first round of interviews took place several years after the acquisition of the company and enclosed the moment Colifox’s management decided to cut back their efforts in Latin America drastically. The Latin American experiences nevertheless fulfilled a useful function in that it contributed to the management’s decisiveness about the company’s corporate strategy, i.e. European expansion.

Although the second company, Beltics, we studied is also a wholesaler like Colifox, both companies have few things in common. Beltics buys and sells a specific type of used product all over world from the company’s only location in the Netherlands. Part of these products is collected from nearly 1,000 companies in the Netherlands. The company recently originated from a merger and the operational activities of the two (former) companies are still clearly separated within Beltics. At the time we interviewed the two directors of Beltics, just out of its first turn-around during which the third director left the company,
its management tried to establish a steady organisation and a solid financial base. Their efforts took place in an industry that went through considerable changes mainly as a result of governmental measures with respect to the recycling of used materials. Stimulated by these measures and a general incentive to increase profits, the managing director was seriously considering diversifying forwardly into the technologically unrelated stage of processing unusable, and therefore unsaleable, products. His main argument was that only then the company could offer a full range of products and services to its customers.
Although the managing director was convinced of the expected profitability of the new venture, at the end of our inquiries it was still unclear if the company could bring up the (high) investments for the chipping machine required for starting it up.

The third company, Agripride, and its diversification project, deviates in nearly every respect from the former two cases. It is the smallest company of the three with a turnover of approximately 1.5 million Dutch guilders (≈ m€ 0.7) that performs a variety of contract work for building and road contractors, local and regional governments and, to a lesser and diminishing extent, farmers. Five years before we conducted our first round of interviews with Agripride’s owner-manager (often in the presence of his wife who does the bookkeeping), he noticed the tightening of environmental legislation and decided to expand into the composting of vegetable, fruit and garden waste. Even though he could use some of Agripride’s machines for setting up the composting area and the composting process itself, we characterise the diversification move as essentially conglomerate and unrelated as the process of composting was fully unfamiliar to the company and its owner. Since the start-up of the new venture, turnover and profits grew steadily and during the time of our empirical research, Agripride’s owner-manager decided to triple the composting capacity and improve the processing of waste, amongst other things, by investing in new equipment.

We studied the diversification projects in each of these companies following the format as described in this chapter, mapping the (owner-)managers’ thinking on two occasions with a time interval of approximately one and a half, to two years. As each of the diversification projects covered a longer time span this meant that we only investigated these projects during a limited period of time. The diversification projects of Colifox and Agripride started a few years before we began our investigations. The diversification project in Beltics was still in its infancy when we stopped our inquiries. We only deviated from the mapping process in one case as the owner-managers of Beltics indicated that their business portfolio consisted of only two, or at most three more or less distinct business activities. Given this small number we decided to skip the use of the repertory grid technique (aimed at composing the managers’ images of the business portfolio).

The three case studies are described in the following three chapters (Chapters 6 to 8). Each chapter reports and discusses the main results of the three cognitive mapping techniques, including comparisons across managers and in time. Following Yin’s (1989) recommendations for multiple case-study design, the findings of each case study – most notably those related to the learning by the interviewed managers and the learning by their organisation as inferred from these managers’ learning experiences – are first interpreted and discussed in their own context. Subsequently, we compare findings and interpretations across the three case studies in Chapter 9 and relate the findings of our empirical research to the streams of research discussed in the first part of this research project.