

Designing and testing an OD intervention

Reporting Intellectual Capital to Develop Organizations

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This paper presents a design-based research study on the reporting of intellectual capital in firms. It combines the designing of an organization development (OD) intervention with the testing of the intervention using an action research methodology. A growing gap between theory-based research and practice has been identified in the literature as one of the reasons for a lack of renewal in the field of OD. Design-based research (DBR) has been proposed as a methodology that can help bridge the gap between theory-based research and practice. The purpose of this paper is to illustrate what a comprehensive methodology for design-based research might look like and to demonstrate the type of OD knowledge this research can produce. The DBR approach is used to design and test a tool for the reporting of intellectual capital within firms as an OD intervention aimed towards influencing the individual and collective sensemaking of managers.

Organization development (OD) seems to be in midlife crisis (Bradford & Burke, 2004). Greiner and Cummings' (2004) history of the field shows a proliferation of topics, approaches and techniques that has blurred the boundaries of the field and made OD difficult to describe. They propose that OD needs to redirect itself towards strategic problem solving in organizations by inventing new methods for "attacking" complex financial, operational, marketing, and competitive issues. At the same time there seems to be a shortage of new ideas and methods. The well has gone dry, and one of the reasons is a growing gap between theory-based research and practice (Bunker, Alban, & Lewicki, 2004; Heracleous & DeVoge, 1998).

Design-based research (DBR) has been proposed as a methodology and approach that can help bridge the gap between research and practice. Advocates of DBR claim that this can contribute to the development of organizational theory whilst at the same time enhancing professional practice. (Romme, 2003; Van Aken, 2005). In DBR the researcher designs and tests interventions, congruently developing knowledge about the application domain of these interventions as well as insights about the underlying generative mechanisms for change. In designing the interventions, the researcher can make use of the results from theory-based research. Testing of the intervention will lead to practical solutions as well as a deeper insight into the validity and viability of the theory guiding the development of the intervention.

However, design-based research is not yet widely applied in OD studies and so little empirical research has been done on its effectiveness. The purpose of this paper is to illustrate how a comprehensive approach for design-based research might look, and to demonstrate the type of knowledge pertinent to OD that this research can produce. The paper is a description of a study in which I used design-based research to design and test a tool for the reporting of the intellectual capital of firms. The reporting tool is an OD intervention designed to improve the individual and collective sensemaking of managers.

This paper is divided into five sections. The first section describes the nature of design-based

research. The second section portrays intellectual capital as a field that is closely related to OD. The third section describes the research methodology of the study. The fourth part presents the results from the study. Finally, the article ends with some brief concluding comments about design-based research and organization development.

The Nature of Design-Based Research

Authors use various terms to describe design-based research, including *design science* (Van Aken, 2004; 2005), *design research* (Collins, Joseph, & Bielaczyc, 2004; Romme, 2003), *design experiments* (McCanliss, Kalchman, & Bryant, 2002), and *design studies* (Shavelson, Phillips, Town, & Feuer, 2003). The Design-Based Research Collective (2003) uses the term 'design-based research', which I prefer because it avoids confusion with studies of designers.

Design-based research has been portrayed as a research methodology (Collins et al., 2004), a research dialect (Kelly, 2003), a mode of research (Romme, 2003), and a research paradigm (Van Aken, 2004; The Design-Based Research Collective, 2003). However, what these authors all have in common is that they advocate the creation of prescriptive knowledge for the improvement of professional practice as a scientific ideal. Prescriptive knowledge should contribute to practice in the form of design principles, or heuristic rules, that are combined into general solutions for real world problems. Van Aken (2005) refers to these solutions as *solution concepts*. The heuristic rules can be formulated as "if you want to achieve Y in situation Z, then something like action X will help" (Van Aken, 2004). Prescriptive knowledge should also contribute to theory by highlighting the *generative mechanisms* that make the solution concept work. A generative mechanism is described by the answer to the question, "why does this intervention produce this outcome?" (Van Aken, 2005). Advocates of DBR adopt the metaphor of "design" to emphasize four elements of this kind of research: (a) the researcher acts like a "designer" who uses existing knowledge about the way organizations work to create a "blueprint" of a solution based on a set of heuristic rules, (b) these solution concepts are like "designs" that consciously and explicitly have been "designed" before they are used, (c) these designs

are tested to check their validity, and (d) to improve them they are then "redesigned" in an iterative process.

It is important for the future development and proliferation of DBR to be able to position it in relation to more common research approaches. My view is that DBR is neither a paradigm nor a methodology. According to Denzin and Lincoln (2000) a paradigm includes the following elements: (a) ethics, (b) ontology, (c) epistemology, and (d) methodology. Advocates of design-based research share an epistemology rooted in pragmatism (Romme, 2003). However, they may differ in their ontological point of view, which may include critical realism, historical realism, and relativism (Lincoln & Guba, 2000). In addition, Van Aken and Romme (2005) argue that researchers can draw from several different research methodologies to test the validity of the design, ranging from more post-positivistic quasi-experiments (Cook, 1983) to action research type interventions (Susman & Evered, 1978). The lack of a common ontology and methodology leads me to conclude that design-based research is neither a paradigm nor a methodology.

Instead, I suggest design-based research can best be positioned as a research approach aimed at answering a particular type of research problem: the *design problem*. In his comprehensive review of the literature on research problems in doctoral dissertations, Oost (1999) identifies five possible research problems in scientific research. Each one of the five types can be constructed in two ways: as an open, explorative question or as a closed question, aimed at testing hypotheses. Table 1 provides an illustration of each of the ten combinations of research problems possible.

----- Table 1 about here -----

Design-based research is research aimed at providing answers to design problems. A design problem can be phrased as an explorative question (How can we improve situation Z?) or a question aimed at hypothesis testing (If we do X, will it improve situation Z?) According to Oost (1999), a design problem is not a separate type of research problem, but rather the combination of an evaluation problem with an explanation problem. Methodologically speaking, a design is a prediction that can be written as: $d: X \rightarrow Y$ (For domain d it is true that X will lead to Y), which is in fact an untested

explanation: Y is caused by X. This prediction is then seen as an answer to an evaluation problem: what is a good solution for this problem?; or, what is the best means to this end? In design-research, the researcher needs to answer an explanation problem (Can X cause Y?) and an evaluation problem (Is Y a good solution for Z?).

In design-based research there are three possible design questions, which can be formulated as follows: (a) $d: X \rightarrow ?$ (What are the effects of intervention X in situation d?); (b) $d: ? \rightarrow Y$ (How can we achieve Y in situation d?); (c) $d: X \rightarrow Y?$ (Is it true that intervention X leads to Y in situation d?) The first question calls for an explorative research approach in order to discover the impact of a particular intervention. The second and third questions reflect an approach aimed at developing and testing solution concepts. In this type of study the question $d: ? \rightarrow Y$ is answered by developing a tentative solution concept in the design phase and the question $d: X \rightarrow Y ?$ is answered in the testing phase.

To summarize the argument thus far: design-based research is a particular type of research that (a) is aimed at answering design questions, (b) that can be based on a variety of conceptions of reality, (c) that is based on a pragmatic epistemology, (d) and that can make use of different research methodologies.

The Intellectual Capital Perspective and OD

In the study described in this paper, DBR was used to develop a tool for the reporting of intellectual capital (IC) within firms. The intellectual capital perspective builds on both the resource-based and knowledge-based view of the firm (Penrose, 1959; Grant, 1996). The origins of IC can be found in the work of Sveiby (1997) and Edvinsson (1997). Both of these authors emphasize the role of people in organizations and the importance of releasing human potential. They build on the idea that in order to change the mindset of managers, one needs to change the dominant instruments managers use when they look at their companies. These instruments are typically restricted to internal and external financial reporting mechanisms such as annual reports, budgets, and management

reports. Sveiby and Edvinsson showed that intellectual capital must be included in those instruments. From their work, a genuine intellectual capital movement has been said to have arisen (Bontis, 1999).

The intellectual capital movement and the organization development movement have at least three things in common: both movements are driven by a dedication to create healthy, sustainable organizations (Edvinsson, 2002; Porras & Bradford, 2004); both are concerned about releasing the human potential in organizations (Bradford & Burke, 2004; Sveiby, 1997); and both apply a holistic view to organizations (Pike & Roos, 2000; Wirtenberg, Abrams, & Ott, 2004) in order to create sustainable solutions.

The intellectual capital movement adds to OD a focus on influencing managerial and stakeholder sensemaking through the identification, measurement and reporting of intellectual capital. Traditional financial reporting only highlights the tangible and financial capital of a firm and encourages short-term thinking. By developing additional reporting mechanisms that highlight the hidden intellectual capital of a firm, companies can create insight into their future potential and long term sustainability, and redirect the focus towards the importance of human resource management and knowledge management.

Many methods have been proposed to report intellectual capital (Bontis, 1999; Andriessen, 2004). However, little empirical research has been done into the effects of implementing these methods in practice. The study discussed in this paper was done in order to develop and test a tool for reporting intellectual capital, and to make improvements to the tool in order to increase its effectiveness (for more details on the tool, see appendix).

Methodology

Figure 1 gives an overview of the methodology used in this study. DBR's dual purpose of contributing simultaneously to theory and practice is expressed in two distinctive but interwoven streams of inquiry, namely the knowledge stream and the practice stream. The objective of the *knowledge stream* is to develop generalizable knowledge that can help create desired situations

(Romme, 2003), preferably in a way that contributes to theory (Collins et al., 2004). The objective of the *practice stream* is to contribute to the practical concerns of people in problematic situations, by solving particular problems in specific circumstances and, in the case of OD, creating healthy organizations.

----- Figure 1 about here -----

For this study I used the action research approach described by Susman and Evered (1978) to test the solution concept. They propose a cyclical process of action research as shown in the practice stream of figure 1. Here I describe the steps in my methodology in more detail:

1. Theorizing. I employed intellectual capital theory to develop a conceptual framework about the intellectual capital of organizations.
2. Agenda Setting. I drew on this framework to define a research problem, which I phrased as a design problem: *how can we determine and report the value of the intellectual capital of an organization in such a way that this information helps to solve organizational problems?*
3. Designing. A design team developed the initial solution concept. The team of KPMG consultants included a mix of expertise in the area of strategy, accounting, and valuation. I was a member of that design team. Step three of the methodology also included the formulation of plausible rival explanations (Yin, 2000) that might explain the success or failure of the designed solution concept. Testing for plausible rival explanations helps to substantiate the validity of the research. In this study, I tested for the quality of the implementation and for external factors as rival explanations that may explain the results.

Implementation teams tested this solution concept in the practice stream, and applied progressive refinement to the design (Collins et al., 2004) using a multiple developing case-study approach (Van Aken, 2004). Therefore, the same tool was never tested twice, because after each test the tool was changed and improved to take account of the experiences gained. The testing phase of the study started with step four.

4. Diagnosing. A crucial phase in the practice stream is diagnosing the practice problem. The problem of a case in the practice stream is different from the research problem in the knowledge stream. The practice problem is a problematization of the situation in a particular case for which the solution concept is a possible solution. For example, for one of the case study firms (Bank Ltd.) the problem was how to give the holding company of the bank insight into the bank's intellectual capital so that a nonintervention policy on behalf of the holding company could be agreed. This practice problem called for a specific solution that could solve a particular problem, while the research problem of the study required a solution concept that is applicable in a range of situations. The implementation team used the conceptual framework of intellectual capital to structure an intake-interview with the manager of the subject organization (the client) in order to diagnose the situation. At this stage, it is important to check whether the practice problem matches the application domain for which the solution concept is designed.
5. Action planning. In each case the action-planning phase involved identifying specific requirements and developing a specific design. The aim was to develop a tailor-made solution to the problem at hand, based on the solution concept.
6. Action taking. In the action-taking phase, the team implemented the specific design and presented the results to the client. In most cases, the explicit result was a report describing the value of the intellectual capital of the client. During the implementation process, the team gathered research data using interviews, participatory observation, and documentary analysis.
7. Evaluating. The implementation team evaluated the process and outcome of the project with the client. In four cases, I was able to evaluate these points again after two years, in order to assess the longer-term impact of the solution.
8. Specifying learning. At the end of each case, the team evaluated the project within the team to identify the lessons learned about the process of the implementation.

The practice stream ends at step eight. After this final step, I continued the research within the knowledge stream by reflecting on the implications of the case for the solution concept. This is the next step.

9. Reflecting. The next step was to reflect on the results of a particular case using within-case analysis (Eisenhardt, 1989) in terms of the success of the solution concept and the possibilities of improving it through redesign. Most cases led to alterations of, or additions to, the solution concept. Implementation teams tested each redesign in the next case.

10. Developing knowledge. The final step was to do a cross-case analysis (Eisenhardt, 1989) to identify the indications and contra-indications of the solution concept, as well as the underlying generative mechanisms for change.

Ideally, steps 3 to 10 are repeated several times with new cases until the point of theoretical saturation is reached (Eisenhardt, 1989). However, because of time and resource constraints this level of saturation was not fully achieved in this study.

Findings

In this section, I present the findings of my study to illustrate three distinct stages in design-based research: designing the solution concept (steps 1-3), testing the solution concept (steps 4-8), and developing design knowledge (steps 9-10).

Designing

The design team developed a tool to help managers view their company as a stock of valuable intellectual capital resources, with the intent to use this reporting tool to influence and improve managerial sensemaking. The idea was that a change in managerial sensemaking would result in better and more sustainable management of the intangible resources. This type of intervention is not of the stimulus-response variety. Instead, members of the target organization are considered

sensemaking individuals who determine their own actions, based on their individual interpretation of the situation, and their personal and collective aspirations. As Susman and Evered (1978) phrase it:

The interventions of concern ... are acts of communication between two or more self reflecting subjects, requiring mutual understanding of the meaning of the acts and common consent as to their presumed consequences. Such interventions have an element of surprise or unexpectedness to them so that they are unlike other actions routinely undertaken within the organization.... The element of surprise evoked by an intervention results when the change agent offers members of the target organization a new way to conceptualize an old problem and offers it in a language or framework that differs from that by which members of the organization define their present situation. (p. 593)

In this study the purpose was to develop an intervention in the form of a cognitive tool (Worren, Moore, & Elliot, 2002) aimed at influencing the way managers make sense of their company. This was done by offering managers new concepts and new information, based on an intellectual capital perspective of the firm. The intellectual capital perspective was thus used as a symbolic construct (Astley, 1984) to help balance traditional management accounting information, which focuses on the past, the short term, and on the tangible and financial assets of a firm. The design team first formulated a list of requirements for the tool. Then the team used design rules adopted from core competence theory (Hamel & Prahalad, 1994) and valuation theory (Reilly & Schweih, 1999) to design the reporting tool. For example, from core competence theory, a design rule was used that says that in order to identify characteristics that make a firm unique, core competencies can be identified, which can then be checked for customer benefit, uniqueness and extendibility (Hamel & Prahalad, 1994). From valuation theory, a design rule was used saying that the best proxy for the value of an intangible is based on an estimation of the present value of future income (Reilly & Schweih, 1999). The Appendix of this paper contains a description of the final version of the tool.

Testing

The tool was tested in six cases. Three cases were selected that fitted the intended application domain of the solution concept, which was small and medium sized knowledge-intensive businesses in a variety of industries. Three other cases functioned as *polar types* (Eisenhardt, 1989) to the small and medium sized businesses, which highlighted contrasts and provided additional information about the application domain: a large professional services firm and two departments within larger firms. In three of the cases, the implementation project was funded by a government grant. In the other three cases, the participating firms had to pay a small fee.

In each case, the implementation team consisted of three consultants from KPMG. In four of the six cases, I was a member of the implementation team. This helped to falsify the idea that the quality of the solution concept depended on the knowledge and skills of the designer of the concept. Van Aken (2004) refers to this procedure as β -testing. In one case, practitioners from the subject firm participated in the implementation team. This case can therefore be typified as participatory action research. In the other cases, outside consultants did the implementation, and these were therefore more expert driven. I briefly describe the experiences from each case.

Case A: Bank Ltd.

Bank Ltd. is an independent private bank that is part of a worldwide financial institution. Bank Ltd. was interested in testing the tool because management was facing the challenge of convincing the holding company that Bank Ltd.'s independent position within the holding and the bank's distinct style and identity were vital for its future success. The Chief Executive Officer (CEO) wanted to know what the value of their independence was. The implementation team interviewed six key players to gather data about the firm's IC and organized two workshops. Three additional interviews with the Chief Financial Officer (CFO) were arranged to sort out financial data. The results were presented during a regular meeting of the management board.

This test had been funded by the government and, at the time of the presentation, the implementation team had run out of funds. However, the management team wanted to continue the project because they were not yet satisfied with the results. They wanted to experiment some more with the formulation of core competencies and demanded modifications to the financial valuation. When the implementation team told them that this was not possible, the management team became frustrated. For them the project was promising but needed further work. They would not accept the results as they were.

Although the process was never finished, the preliminary end report *was* used in the decision-making process about Bank Ltd.'s independence. According to the CEO, the contribution of the report to the decision of the holding company about whether to sustain the independence of the subsidiary was visible but limited. In this case, poor implementation clearly contributed to the limited success of the reporting tool. The implementation team had not done enough to involve the client in the process and create acceptance for the results (see also Romme & Damen in this Issue).

Case B: Electro Ltd.

Electro Ltd. was an organization in turmoil. During the previous seven years, this electrical installation and engineering company had had five general managers, none of whom worked there longer than one year. The newly appointed general manager was working on a turnaround, trying to improve the market orientation and sales capability of the company. According to the manager, the company was self-centred, product oriented, and lacking market focus. Its profits were under severe pressure. He was developing a strategy focused on specific product/market combinations and wanted to use the intellectual capital reporting tool to help in the development of the new strategy.

The implementation work was done by a team from within the company, supported by consultants from KPMG. Thirteen people were interviewed and two workshops held. The analysis by the implementation team showed that the company possessed a very interesting core competence in the technical area of energy conversion. This discovery had the effect of creating a lot of enthusiasm and

optimism for the future of the company. At the same time, it became clear that the more traditional core competence of installing systems was very much the cash cow for the company and was still needed to fund the strategic transformation. The general manager of Electro Ltd. was pleased with the end report. He thought it contained useful information that could help create a new strategy for the company and turn it into a high-tech business. However, the turnaround came too late as six months after the project, the company filed for bankruptcy. In retrospect, it became clear that the implementation team had overlooked the company's cash flow problems in the diagnosis phase.

Case C: Automotive Ltd.

Automotive Ltd. was a supplier to the automotive industry. It had transformed from being a trading house, to a manufacturer and finally to a knowledge-intensive manufacturing and service company. The company's owner had led this transformation for twenty-five years and was still making all the major decisions within the company. He was a true entrepreneur who made decisions in an intuitive way. The company's financial controller wanted to use the tool to improve the strategic decision-making process as well as make it more explicit. However, the implementation team did not sense that the owner felt the need for better decision making, and he made it clear that he was willing to cooperate only if it would not consume too much of his time or that of the staff. Six interviews were conducted and one workshop organized. However, after that first workshop the owner no longer gave priority to the project and subsequently withdrew all staff from it. Another foreign acquisition was being attempted and this had required all of the management's attention. At this point, the implementation team decided to stop the project because of this lack of cooperation.

Case D: Logistic Services BU

Logistic Services BU was a business unit of a large multinational company in the transportation industry. The unit had been created to explore the opportunities in logistics consulting, and was on the brink of a breakthrough after working more than a year on a new business model. However, the economic situation of the company changed. The multinational company was forced to reconsider the

position of the business unit within the group. The management team of the unit decided to look at several alternatives, ranging from reorganization to a possible management buyout. Information about the financial value of the unit's intellectual capital would be useful in choosing among the alternatives. The results had to be available within two weeks, because the decision needed to be made imminently. No interviews were held. Instead, the implementation team used three workshops to implement the tool.

The client was satisfied with the process and the results of the implementation team. The tool had created energy within the unit. Management approved of the results and used them in their negotiations with the holding company. An agreement was reached with the holding company that allowed Logistic Services BU to prepare a management buyout within a month. Unfortunately, key people within the unit decided not to stay once it became an independent company. Therefore, the management buyout never took place and the business unit was dismantled. During the dismantling process, the results of the reporting tool were used to determine whether core competencies could be transferred to other business units.

Case E: Professional Services LLP

Professional Services LLP offered a wide range of consulting and auditing services to business clients. At the end of the millennium, it wanted to express the transition in the global economy from an industrial economy to an intangible economy in its annual report by describing its own intellectual capital. The member of the management team of Professional Services LLP responsible for the annual report gave the implementation team the assignment to do a study of the organization's IC, which was intended to produce results that could be used in the annual report. Thirty-four interviews were held and information was gathered from thirty-seven sources. Later, a full-day brainstorming session was held to develop core competence hypotheses, assess the competencies' strengths and weaknesses, and select supporting material. All the information was turned over to a professional journalist, who wrote the text for the annual report.

However, by that time, the manager who had given the assignment had retired and his successor had much less interest in the project. In addition there were problems with the results of the reporting tool. These were not self-evident and needed to be accompanied by extensive written explanations. Furthermore, Professional Services LLP considered the reporting of a financial valuation of intellectual capital risky, because the assumptions underlying the valuation could easily be challenged. It was also reluctant to report data about competitors that the implementation team had used as supporting evidence because it might provoke criticism from these competitors. In addition, the new manager was hesitant to report to the outside world the weaknesses about the company that the tool had identified. After considering the pros and cons, the client decided *not* to use the outcome of the tool in the annual report. The results of the study remained confidential and they were reported only to the management board of the company. The contra-indications that became apparent in this test seem to indicate that the reporting tool is not an appropriate tool for the *external* reporting of intellectual capital.

Case F: Consulting Department

Consulting Department was an internal consulting unit within a larger financial services company. It offered services in the field of information management, human resources management, and organizational design. In the year before this test, the company had merged with a large financial institution that was restructuring its back and front offices, as well as the supporting units. For Consulting Department, the continuation of the unit as a separate entity was no longer an option. The idea was to turn the unit into an independent consultancy company by means of a management buy-out. The manager of the unit was interested in analysing the core competencies of his unit as part of the discussion with his team about the future. However, there was limited time, so the implementation team offered to implement the reporting tool by organizing a half-day workshop. To do this team stripped the reporting tool to a bare minimum and replaced the interviews with assignments that could be done during the workshop.

The manager was very satisfied with the results of the workshop. The questions that were raised, he said, were exactly the ones that needed to be discussed with the team. The reporting tool proved to be an excellent way to introduce the team to the idea of becoming independent. Because of the tool, team members became more aware of the different contributions each one of them made to the team. The key message of the workshop was that while every member had his or her specific strengths or weaknesses, together the team had unique competencies.

Developing Knowledge Pertinent to OD

This study generated knowledge that is relevant to OD in three areas. I briefly summarize the findings and then elaborate on each of the three areas. I present the results as propositions that require further testing, because in this study the point of theoretical saturation was not reached.

First, the study provided indications and contra-indications (Van Aken, 2004) about where the reporting tool works and where it does not work. I found that the tool is best suited to the class of problems related to future orientation and strategy development. These problems are often complex financial, operational, marketing, and competitive problems - the kind of problems that according to Greiner and Cummings (2004) contemporary OD should focus on (but often is not). The class of contexts in which the tool can be successful seems to be limited to a specific type of knowledge-intensive, middle-size companies.

Second, the study illustrated types of interventions that can be useful when reporting intellectual capital in a firm. It also provided insight into the generative mechanisms for change that make these interventions work. Determining core competencies with a group of managers turned out to be a useful intervention. The financial valuation of core competencies seems to be useful with particular types of managers.

Third, the study provided clues as to how the solution concept itself can be improved further. For example, it became clear that in using the tool, there is a clear danger of leaning heavily towards a

solution-driven process in which the issues of the firm are not leading and thus might result in the situation of a "solution in search of a problem".

Indications and Contra-Indication for the Application Domain

The study provided insight into the application domain of the reporting tool. The application domain is the class of problems for which the solution concept can be a potential solution and the class of contexts in which it is likely to work. In three of the cases (B, D, and F), I found that the tool was a useful instrument for helping improve the way a company is managed. The common factor between the cases was that in each case management was reconsidering the position of the company, and wanted to develop a sustainable and healthy future based on the strengths of the company's intellectual capital. However, management did not precisely know the strengths of the company from an IC perspective, and wanted insight into the company's future potential. In this situation, it proved useful to identify the intellectual capital resources, assess their strengths, and then determine and report their value. On the other hand, Case E seemed to indicate that the tool is not suitable for the external reporting of intellectual capital.

These findings lead me to formulate the following proposition about the class of problems the tool addresses:

Proposition 1 (class of problems): The reporting tool can help in solving problems of future orientation and strategy development by facilitating the creation of resource-based strategies for those companies that lack insight into, or are insecure about, the intellectual capital resources that (can) make them successful.

From this proposition the following design rule can be concluded: If the management of a firm is insecure about what makes the firm successful and has problems defining a strategy because of it, something like a core competence-based intellectual capital analysis will help.

The tests showed that the tool might work for knowledge-intensive, middle-size companies employing from 50 to 1,000 employees (cases B and D). The tool also seemed to work with smaller

units within larger organizations (case F). Tests also showed that the tool can be used within companies bigger than 1,000 employees, providing that the analyst focuses on the core competencies of the company common to different departments (case E).

In case C, the tool failed to produce a result. This seems to indicate that the following conditions must be fulfilled to ensure a successful implementation: (a) a company must have a problem with its future direction; (b) management of the company must have a certain willingness to reflect on the organization and to critically review the organization's strengths and weaknesses; (c) management must have enough time to participate — at least be able to join in the interviews and attend for the presentation of the final report; and (d) management must have the willingness, as well as the mental ability, to look at the company from an intellectual capital perspective.

These findings lead to the following proposition about the class of contexts of the method:

Proposition 2 (class of contexts): The reporting tool is especially suited for knowledge-intensive, middle-size companies regardless of the industry, that have a problem with their future direction, and whose management has the time, the mental capacity, and the willingness to review critically the company's strengths and weaknesses using an IC perspective. The tool can be used on smaller units within larger organizations, or on larger companies, providing the analyst focuses on the overall core competencies of the firm.

Interventions and Generative Mechanisms

The study produced a number of insights into designing interventions around the reporting of intellectual capital and the generative change mechanisms that make these interventions work. To illustrate these insights I highlight two findings that are of particular interest from an OD perspective: the role of appreciative framing and the role of financial valuation.

As previous OD research has shown, highlighting the positive, constructive aspects of organizational life instead of the problems of it can be a powerful tool for change (Bushe & Kassam, 2005; Cooperrider & Srivastva, 1987). In the approach known as appreciative inquiry, highlighting

the positive is used as a way to facilitate conversations. The reporting tool in this study uses a form of appreciative *framing*. While appreciative inquiry is a conversational technique, appreciative framing is a way to frame and present reality in a positive way. The IC reporting tool uses appreciative framing when it emphasizes things that make a company unique and successful and helps managers search for the combined power of intellectual capital resources. The reporting tool aids in recognizing the way individual intellectual capital resources contribute to a company's uniqueness and cumulative capabilities. It also helps identify which resources are important and how they contribute to a company's success. In three of the cases (B, D, and F), discovering core competencies raised energy levels amongst the participants, evoking a sense of pride and opening up their minds to new opportunities. In these cases and in case A as well, the list of core competencies provided a common language for the members with which to discuss the future of their company in a new light. When I interviewed managers at Bank Ltd. and Consulting Department two years after the event, I still recognized elements of that new language.

Reflecting on the findings lead me to make the following proposition about one of the generative mechanisms that make the IC reporting tool work:

Proposition 3 (Generative mechanism): The IC reporting tool is successful in creating energy with members of an organization, because it uses a mechanism of appreciative framing. This provides a new, more positive view of the company and helps develop a common language that can explain the company's success. Appreciative framing also helps to install a sense of pride of the company in the members, to boost self-confidence, and to identify new opportunities.

Manning and Binzagr (1996) formulate the mechanism of appreciative inquiry as "What we assume to be real and possible in organizations becomes the organizational reality that we create" (p. 280). However, they also highlight a condition for success: "To do so requires that individuals in an organization be willing to re-examine their operating paradigm and redefine organizing assumptions" (pp. 280-281). At Automotive Ltd, this condition for success became apparent when the

owner was not willing to re-examine his view on the organization and terminated the implementation process.

The financial valuation of a firm's intellectual capital highlights the importance of these intangibles. Financial valuations seem to "resonate" within the sensemaking system of managers, especially in the financial services industry. Both the CEO of Bank Ltd. and the manager of Consulting Department acknowledged the importance of the monetary value figure in conveying the significance of intellectual capital to other stakeholders. The manager of Consulting Department phrased it as follows: "Within the financial services industry, people speak the language of money. If something has no monetary value attached to it, it is not considered important" (personal communication, October 28, 2002). The added value in expressing intellectual capital in terms of financial value lies in the fact that numbers are what attract management attention. This finding is in line with the view of Mouritsen et al. (2001) about the importance of indicators in intellectual capital statements. They maintain that these indicators in IC statements are especially important because they demonstrate seriousness on the part of top management.

This leads me to offer the following proposition about the mechanisms that make the financial valuation of IC actually work:

Proposition 4 (Generative mechanism): The financial valuation of intellectual capital contributes to the success of the tool, because the monetary value of intellectual capital emphasizes the absolute importance of intangible resources to company success, and helps to attract management attention.

From this the following design rule can be concluded: If you want to draw the attention of a manager in the financial services industry to the importance of intellectual capital resources, then presenting a financial valuation of the company's intellectual capital will help.

Opportunities for improvement

After each case, minor improvements to the tool were made. A cross case analysis provided information about opportunities for further improving the tool. In case C, the tool did not address the problems that turned out to be lethal for the continuation of the firm. In case E, it transpired that the tool was not the right tool for externally reporting intellectual capital. Both findings point toward the need for a more open-minded diagnosis at the beginning of each implementation in order to prevent pigeonholing. There is a clear danger that the tool may be used even if other approaches might have been better, or that the focus on the reporting tool itself masks other problems that have higher priority. At the end of the study, it was decided to add an intake phase to the process to mitigate this danger. Two checklists were supplemented that can be used to check whether a firm fits the application domain of the tool.

Proposition 5 (improvement): The addition to the tool of an intake phase, in which checklists are used to ensure the firm fits the class of problems and contexts for which the tool was designed, can help prevent the tool being used in an inappropriate situation.

Conclusion and Discussion

Organization development often requires a change of mindset of those involved in the process. This study illustrates how design-based research (DBR) can be used to develop solution concepts that help influence and improve the sensemaking processes of managers and alter their mindset, thus ameliorating the change process. The added value of the DBR approach lies in the thoroughness of the research process; a DBR approach stimulates the researcher to systematically work to improve the solution concept. At the start of the process, DBR forces the researcher to be explicit about the proposed solution, its grounding in theory, its expected results, and plausible rival explanations of the results. A series of tests helps to systematically advance the solution concept. A cross-case analysis provides information about the application domain of the solution concept and the generative mechanisms that make the solution work. DBR helps to substantiate the validity of the findings

through a process of elimination of plausible rival explanations. This validation process can lead to design knowledge in the form of heuristic rules and their application domain. Knowing when a solution concept does *not* work is especially important, because it reminds us of the fact that the social world does not behave according to general laws and it helps us to refrain from developing generic, one-size-fits-all solutions. This study shows there is a lot to learn from mistakes.

The contribution design-based research can make to OD theory lies in the identification of important variables and relationships that are missing in theoretical models, the discovery of new generative mechanisms, and the further specification of the validity domain of causal relations. In this way, I would argue that DBR is a useful addition to more explanatory, theory-based OD research.

The DBR approach is not without its pitfalls, however. First, there is a danger that the objective to create an explicit solution concept may result in the use of an expert driven approach to organizational change in situations where a more participative approach would be more effective. However, a researcher who is aware of this danger can allow for participation of a firm's members, making their participation part of the OD solution concept. Second, the idea of a solution concept may give the impression that there exist general OD solutions that are valid in every situation. This is not at all the case. Every solution needs to be adapted to local circumstances. For each case, a specific solution design has to be created. A third point is that the heuristic rules resulting from DBR may be mistaken for instructions that simply need to be followed and lead directly to the desired outcomes. In OD, as in many other social science fields, this is not possible. The effective use of heuristic rules requires considerable expertise about the rules and the local circumstances as well as cognitive and social skills (Van Aken, 2005). Fourth, the focus on the development of a specific solution concept creates the danger of pigeonholing, which is a concept that is illustrated by the adage "give a small child a hammer and soon everything needs hammering". In other words, the focus on finding or applying a solution may prevent the researcher from looking further for other issues that may be present. This is what happened in our case B. Therefore, the selection of cases needs to be based on a thorough

diagnosis of the subject organization to identify possible problems and to check whether the case fits the application domain of the solution concept.

In conclusion, I believe this study confirms that a methodology combining design-based research with action research testing can be a useful way to create business knowledge that is both relevant and rigorous – at the same time addressing where OD's weaknesses are said to currently lie. It also shows what a comprehensive approach for design-based research can look like. Such an approach separates the knowledge stream, in which the solution concept is designed and reflected upon and that is aimed at developing generalizable knowledge, from the practice stream, in which the solution concept is tested and that is aimed at helping a number of organizations. If both streams are combined, new methods for attacking complex financial, operational, marketing, and competitive issues can be developed, and the gap between theory-based research and practice can be closed.

Appendix: The Weightless Wealth Toolkit

The Weightless Wealth Toolkit (Andriessen, 2004) is a method that was developed in order to identify strategically important intellectual capital within firms, assess its quality using a number of criteria, and determine its financial value. The tool kit consists of:

- 1 Steps: A plan incorporating six phases and 20 steps
- 2 Questions: Suggestions for questions to ask to gather information
- 3 Exercises: Exercises to gather information and gain new insights
- 4 Checklists: Checklists to help assess value and determine a firm's core competencies, strengths and weaknesses
- 5 Calculations: A method to help calculate the financial value of the intellectual capital

Phase 1 is an intake in which a checklist is used to diagnose whether the toolkit can be useful in a particular situation and whether all necessary conditions for success are present.

Phase 2 is aimed at identifying the firm's strategically important intellectual capital. After gathering information on a broad number of issues, the objective of phase 2 is to formulate between five and ten core competencies of the firm. Each core competence will be a bundle of intellectual capital resources. This way an inventory of intellectual capital resources is build up.

Phase 3 includes an assessment of the core competencies identified. A checklist is provided to check whether a core competence has added value for the customer, is competitive, has potential for the future, is sustainable, and is robustly anchored within the firm. The result of these tests is reported using 'traffic lights' that can be green, orange, or red.

In phase 4, a financial formula is used to assign a financial value to each of the core competencies. The formula is based on a discounted cash flow calculation and takes into account an estimation of future earnings, a fair return for tangible and financial assets, the grow rate of the

economy, the grow rate of the firm, a discount factor, and the relative importance of each core competence to the various product groups of the firm.

In phase 5, all information that is gathered is analyzed to produce a management agenda. This agenda contains a list of recommendations for the firm on how to strengthen its intellectual capital resources.

Phase 6 is the reporting phase. All information is presented in a report for either internal or external use. The heart of the report is the so called 'value dashboard', that gives an overview of the total value of the intellectual capital, the value of each core competence, and the results of the quality assessment of each core competence (for an example, see figure 2).

-----Insert figure 2 here-----

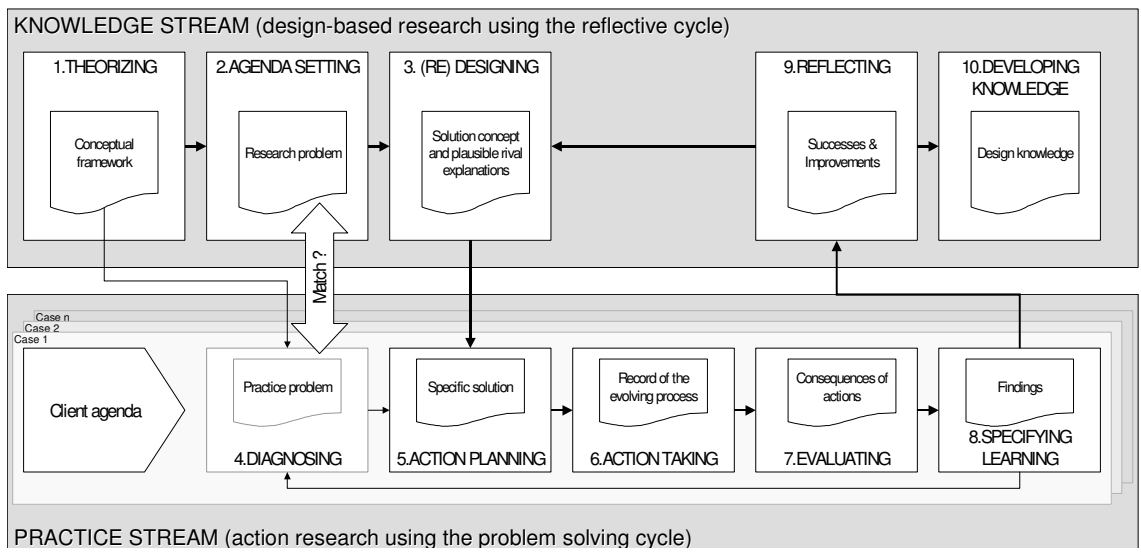


Figure 1. Research methodology of a design-based research study using action research

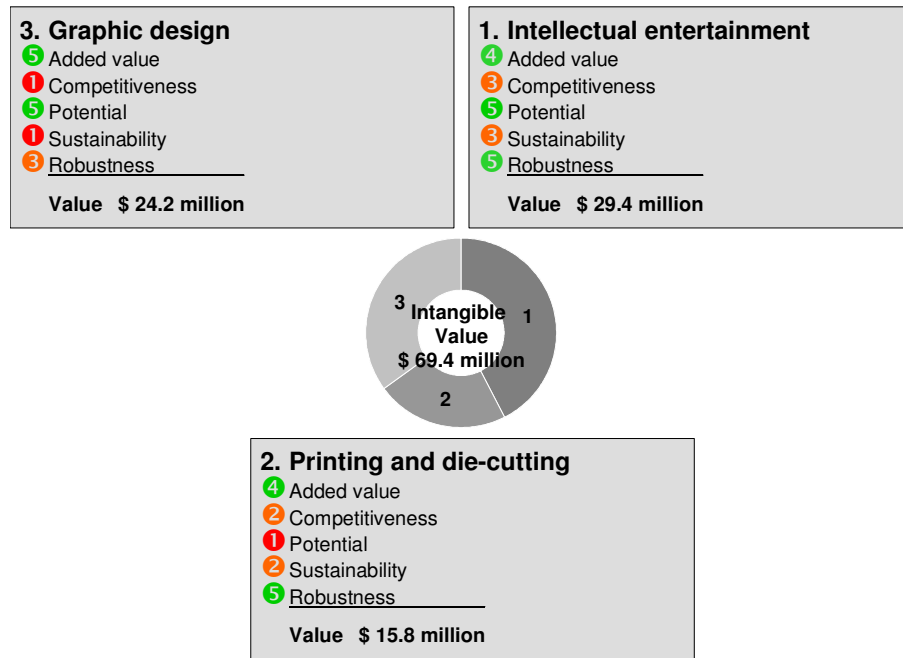


Figure 2: Example of a value dashboard with three core competencies

Table 1
Overview of Scientific Research Questions

Type of research problem	Example of explorative problem	Example of hypothesis testing
a) Description problem	What are the characteristics of X?	Does X have these characteristics?
b) Comparison problem	What are the differences between X and Y?	Are X and Y different?
c) Definition problem	To what class of phenomena does this belong?	Is this phenomenon part of this class?
d) Evaluation problem	How successful is this intervention?	Is this intervention a success?
e) Explanation problem	Why Y?	Is it true that X explains Y?

Note. Based on (Oost, 1999).

References

- Andriessen, D. G. (2004). *Making sense of intellectual capital*. Burlington: Elsevier Butterworth Heinemann.
- Astley, W. G. (1984). Subjectivity, sophistry and symbolism in management science. *Journal of Management Studies*, 21, 259.
- Bontis, N. (1999). Managing organizational knowledge by diagnosing intellectual capital: Framing and advancing the state of the field. *International Journal of Technology Management*, 18, 433-462.
- Bradford, D. L., & Burke, W. W. (2004). Introduction. *The Journal of Applied Behavioral Science*, 40, 369-373.
- Bunker, B. B., Alban, B. T., & Lewicki, R. J. (2004). Ideas in currency and OD practice. *The Journal of Applied Behavioral Science*, 40, 403-422.
- Bushe, G. R., & Kassam, A. F. (2005). When is appreciative inquiry transformational? *The Journal of Applied Behavioral Science*, 41, 161-181.
- Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *The Journal of the Learning Sciences*, 13, 15-42.
- Cook, T. D. (1983). Quasi-experimentation: its ontology. In G. Morgan (Ed.), *Beyond method: Strategies for social research* (pp. 74-94). London: Sage Publishers.
- Cooperrider, D. L., & Srivastva, S. (1987). Appreciative inquiry in organizational life. *Research in Organizational Change and Development*, 1, 129-169.
- Denzin, N. K., & Lincoln, Y. S. (2000). Introduction; The Discipline and Practice of Qualitative Research. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd ed., pp. 1-28). London: Sage Publications.
- Edvinsson, L. (2002). *Corporate longitude*. London: Pearson Education.
- Edvinsson, L., & Malone, M. S. (1997). *Intellectual capital: The proven way to establish your company's real value by measuring its hidden brainpower*. London: HarperBusiness.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14, 532-550.
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17, 109-122.
- Greiner, L. E., & Cummings, T. G. (2004). Wanted; OD more alive than dead! *The Journal of Applied Behavioral Science*, 40, 374-391.

- Hamel, G., & Prahalad, C. K. (1994). *Competing for the future*. Boston: Harvard Business School Press.
- Heracleous, L., & DeVoge, S. (1998). Bridging the gap of relevance: Strategic management and organisational development. *Long Range Planning*, 31, 742-754.
- Kelly, A. E. (2003). Research as design. *Educational Researcher*, 32, 3-4.
- Lincoln, Y. S., & Guba, E. G. (2000). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 163-188). London: Sage Publications.
- Manning, M. R., & Binzagr, G. F. (1996). Methods, values, and assumptions underlying large group interventions intended to change whole systems. *International Journal of Organizational Analysis*, 4, 268-284.
- McCanliss, B., Kalchman, M., & Bryant, P. (2002). Design experiments and laboratory approaches to learning: Steps toward collaborative exchange. *Educational Researcher*, 32, 14-16.
- Mouritsen, J., Larsen, H. T., & Bukh, P. N. (2001). Valuing the future: Intellectual capital supplements at Skandia. *Accounting, Auditing and Accountability Journal*, 14, 399-422.
- Oost, H. (1999). *De kwaliteit van probleemstellingen in dissertaties (The quality of research problems in dissertations)*. Doctoral dissertation, University of Utrecht, Utrecht: IVLOS Reeks.
- Penrose, E. T. (1959). *The theory of the growth of the firm*. New York: Wiley.
- Pike, S., & Roos, G. (2000). Intellectual capital measurement and Holistic Value Approach (HVA). *Works Institute Journal*, 42.
- Porras, J. I., & Bradford, D. L. (2004). A historical view of the future of OD. *The Journal of Applied Behavioral Science*, 40, 392-402.
- Reilly, R., & Schweihs, R. (1999). *Valuing intangible assets*. New York: McGraw-Hill.
- Romme, A. G. (2003). Making a difference: Organization as design. *Organization Science*, 14, 558-573.
- Shavelson, R. J., Phillips, D. C., Town, L., & Feuer, M. J. (2003). On the science of education design studies. *Educational Researcher*, 32, 25-28.
- Susman, G. I., & Evered, R. D. (1978). An assessment of the scientific merits of action research. *Administrative Science Quarterly*, 23, 582.
- Sveiby, K. E. (1997). *The new organizational wealth: Managing & measuring knowledge-based assets*. San Francisco: Berrett-Koehler Publishers.
- The Design-Based Research Collective (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher*, 32, 5-8.
- Van Aken, J. E. (2004). Management research based on the paradigm of the design sciences: The quest for field-tested and grounded technological rules. *Journal of Management Studies*, 41, 219-246.

- Van Aken, J. E. (2005). Management research as a design science: Articulating the research products of Mode 2 knowledge production in management. *British Journal of Management*, *16*, 19-36.
- Van Aken, J. E. & Romme, A. G. L. (2005). Reinventing the future: Design science research in the field of organization studies. Paper presented at EURAM 2005 in Munich, Germany.
- Wirtenberg, J., Abrams, L., & Ott, C. (2004). Assessing the field of organization development. *The Journal of Applied Behavioral Science*, *40*, 465-479.
- Worren, N., Moore, K., & Elliot, R. (2002). When theories become tools; Toward a framework for pragmatic validity. *Human Relations*, *55*, 1227-1250.
- Yin, R. K. (2000). Rival explanations as an alternative to reforms as "experiments". In L. Bickman (Ed.), *Validity and social experiments* (pp. 239-266). Thousand Oaks: Sage.