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DESIGNING PROJECT MANAGEMENT FOR NEXT GENERATION PROJECT MANAGERS

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ABSTRACT

Project management education seems still to be mainly focused on training in using prescriptive instruments such as PMBOK, PRINCE etc. while the increasing complexity of projects requires also a different set of competences. Our purpose is to refocus education from learning the systems of project management to learning how to be a project manager. It is our view that project managers are above all expert problem solvers, and that project management is an appropriate field for the application of Design Thinking. We first review the literature on Design Thinking in management and project management. Followed by a review literature on project management education. We then introduce the ADaPteR Cycle consisting of the elements: Awareness, Design, Performance and Reflection. As a means to help students and young project managers to develop their skills in design thinking and habits of thought that will help them develop into expert project managers.

To explore the validity of the ADaPteR Cycle for project management we conducted an interview study of project managers. We then interpreted an existing data set of observations of a project manager in his daily work to identify elements of the ADaPteR Cycle in practice. For this study ante-narratives were constructed extracting coherent stories from the messy data of everyday practice. Both studies demonstrate that the elements of the ADaPteR Cycle are recognizable in practice. Further that cycle can be identified at different levels of problems or situations in project management work.

Finally we conclude from literature and our research that the ADaPteR Cycle can serve in training designing project management for the next generation of expert project managers.

KEYWORDS

project management theory, expert intuition, design thinking, project management education.

INTRODUCTION

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In this paper, we introduce the concept of Designing Project Management as a domain specific approach to the management of architectural design and construction projects in an ever-changing environment, and to training students and young project managers in developing their skills as, eventually, an expert project manager.

Much recent research points to the importance of understanding projects, especially construction (Svejvig 2015), as social systems in which there is a complex interplay and alignment of different goals, meanings, and perspectives (O'leary 2013). This research suggests that it is important to take the personal, professional and business situations of project partners, commissioners and stakeholders into account when attempting to manage project teams. Many of the leaders in the rethinking project management (Cicmil 2006; Hodgson 2006; Morris 2013) have come to the conclusion that as yet little of this research has led to significant advances in project management tools, practice, or education. Nor does the so-called classical approach address issues of daily practice or career development of project managers structurally do. In this we believe that current approaches to project management, while containing much essential material are not entirely adequate to the task of helping project managers to carry out their work (Heintz et al. 2015). Our purpose is to refocus education from learning the systems of project management to learning how to think like and to lay the basis for development into an expert project manager.

To do this we propose an approach to project management that is based on the agency of the project manager rather than on the integrity of project management systems. It is not that we believe that the project management systems are irrelevant, but that we place the emphasis on the project manager's agency and expertise in selecting tools and actions from those systems and enacting courses of action using them. More specifically, we choose to see project management as a process of designing and enacting courses of action in order to achieve "preferred situations". In doing so we are shifting attention from project management as "an ostensive (the idea) ... [to] a performative (the enactment of the idea) dimension" (Carlgren 2016).

We call this approach Designing Project Management. The research intention is as much to provide a lens through which to view project management action as to confirm the use of designerly approaches to problem solving by project managers. The educational intention is to offer a model for and an approach to training students in management of design and construction projects in how to enact the systems and theory of project management in the management of complex building projects. Further we believe that this approach will support (future) project managers in developing their professional capabilities.

We first review the literature on Design Thinking in management and project management. Followed by a review literature on project management education. We then introduce the ADaPteR Cycle consisting of the elements: Awareness, Design, Performance and Reflection. As a means to help students and young project managers to develop their skills in design thinking and habits of thought that will help them develop into expert project managers.

To explore the validity of the ADaPteR Cycle for project management we conducted an interview study of project managers. We then interpreted an existing data set of observations of a project manager in his daily work to identify elements of the ADaPteR Cycle in practice. For this study ante-narratives were constructed extracting coherent stories from the messy data of everyday practice. Both studies demonstrate

that the elements of the ADaPteR Cycle are recognizable in practice. Further that cycle can be identified at different levels of problems or situations in project management work.

Finally we conclude from literature and our research that the ADaPteR Cycle can serve in training designing project management for the next generation of expert project managers.

DESIGN THINKING

Design Thinking is difficult to define (Dorst 2010). Its meaning depends on its context and epistemological roots (Johansson-Sköldberg et al. 2013). Within the design realm a rich variety of approaches has emerged, making it better to speak of ‘designerly thinking’ (ibid.). Within the management realm Design Thinking is used as ‘a paradigm shift’ in approaching innovation and creativity in business (Muratovsky 2015). Starting with apparently obvious definitions of Design Thinking as ‘thinking as a designer’ or “defin[ing] courses of action aimed at changing existing situations into preferred ones” (Simon, 1969: 55) the meanings of Design Thinking summarized below in a short review of the literature on Design Thinking research.

In the early 1960s design research started with the Design Methods movement (Goldschmidt, 2014: 10). Designing was seen as a logical rather than intuitive process, one controlled by rules that could be explicated and prescribed, hence many of the proposed methods took the form of prescriptive models comprising operational design steps (or stages). (Lawson 1997). One basic model of the design process gained consensual acceptance by the entire Design Methods community, the Analysis (of the problems)-Synthesis (of the solutions)-Evaluation- or ASE-model. (Goldschmidt, 2014: 11, 12). Based on the paradigm of problem solving as information processing –similar to the paradigm underlying cognitive science (ibid, 21) – the ASE-model, particularly in the variant of a spiral model, is meant to convey the movement from a wide (abstract) problem space to a specific (concrete) solution (ibid, 13), in which designing can be usefully interpreted as a variety-reducing process. The most influential attempt to devise a complete system for the analysis of design problems and the synthesis of solutions was proposed by Christopher Alexander (1964) in his Notes on the Synthesis of Form.

Another milestone was reached by the publication of Hebert Simon’s “Science of the Artificial” (1969). In this book Simon proposes that most design problems are ill-structured and ill-defined. Simon proposed that intellectual process of design was not limited to activities such as architecture but was an essential character of sciences such as management as well. Then in 1984, Donald Schön proposed that designers frame and reframe the problems at hand until the design task is clear. Although both these publications were primarily conjectural in nature, they were –and still are- very influential in both the Design Thinking debate, and in debates around professional expertise because of their innovative concepts.

Parallel to these publications, research into design thinking continued. By the mid 70s researchers considered that the notion of intuitive design thinking might not be so objectionable after all and began to talk about ‘descriptive design models’, which they contrasted with prescriptive models or methods (Goldschmidt, 2014: 19), inducing a change of paradigms in design research from prescriptive to descriptive,

from explaining to understanding design thinking by describing practice. Hence one of the early descriptive design research texts in Britain – Brian Lawson’s *Design Thinking* (1980/2005), was based on extensive observations (ibid, 22). Another example of influential descriptive empirical research is a workshop among designers at the Faculty of Industrial Design Engineering at the Delft University of Technology (Dorst & Cross, 2001). They concluded that the ‘problem-solving’ aspect of design can be described usefully in terms of the co-evolution of problem and solution.

The final example of influential research on Design Thinking is the work of Gabriela Goldschmidt, e.g. described in *Linkography 2014*. Observing designers Goldschmidt traces ‘design moves’ (Goldschmidt, 2014: 41,47), comparable to chess moves, and studies their design activity by a registration method that visualizes the connection of these design moves into a network of links, the *linkograph*. From this emerge patterns of design moves. The patterns show that each designer’s patterns differ to some extent from those of other designers. Patterns personal, but they all show that the synthesis (design) is to achieved during the early phase of the design process through a series of cycles of divergent and convergent thinking in which ideation and evaluation follow each other in frequent proximity (ibid, 46).

DESIGN THINKING IN MANAGEMENT

Approximately 20 years ago, Design Thinking became a topic in management discourse. Based on the different backgrounds of their advocates, Johansson-Sköldberg et al. (2013) distinguish in three types of design thinking in the management discourse:

1. Design Thinking as design company IDEO’s way of working with design and innovation, e.g. (Kelly 2001);
2. Design Thinking as part of management theory (Boland & Collopy 2004);
3. Design Thinking as a way to approach indeterminate organizational problems, and a necessary skill for practicing managers, e.g. (Dunne & Martin 2006)

In the first type, Tim Brown the CEO of IDEO, described design thinking as process consisting of a series of steps which can be applied to anything from product design to business strategy. They also provide examples, or stories, to help their readers use IDEO’s methods, particularly business people and social innovators (Johansson-Sköldberg et al. 2013: 128). Inspired by the way of working of architect Frank Gehry the second type of Design Thinking in Management is characterized by a design attitude, distinguished from the usual decision attitude of managers. This approach to design thinking emphasises opening up the range of possibilities to be considered, and reasoning backwards from solution to problem. Scholars such as Carl Weick have used this notion of design thinking to application of their own frameworks of thinking and theorizing (ibid. 129) to a wide range of problems. In the third type, Design Thinking understood as an ongoing cycle of generating ideas (abduction), predicting consequences (deduction), testing, and generalizing (induction). The third type has been promoted as a useful process in different disciplines, including library administration, legal practice management, HR and in the management area strategy and organizational change and development. (ibid 128, 129).

Hassi and Laakso also attempt to set out a framework for design thinking and discuss the use, application, benefits and limitations of Design Thinking (Hassi & Laakso 2011). Muratovski (2015) describes the new role of design in business and society as

a paradigm shift, based on in documents from several companies such as Apple Inc., Nike Inc., Coca-Cola, IBM, PricewaterhouseCoppers (PwC), Deloitte, Accenture, Barclays, Facebook Inc. and Google, even the Bill & Melinda Gates Foundation and The World Bank. Muratovski shows that they adapt design thinking as a way of dealing with complex problems with two key features: engagement of stakeholders, sometimes called ‘Human-centred design’, from the very start; and focus on the definition of the problem, or better ‘problem-finding’ (ibid 135). The editors of the Academy of Management Journal endorse Muratovski’s findings, writing that over the past two decades, the importance of design and the value of design thinking as a tool for innovation have been recognized by both business and government (Gruber, M., et al. 2015). They further provide a model contrasting the approach of business-, engineering and design-led innovation. All three approaches are appropriate depending in context, with the latter being best applied where breakthrough thinking and disruptive innovation is required, or to address “wicked’ problems (ibid: 2). Meanwhile, new publications on Design Thinking in Management continue to appear e.g. (Carlgren et al. 2016) and (Mahmoud-Jouini et al. 2016). We conclude that despite some critique, Design Thinking is still seen as a valuable tool the Management discourse and although there is still relatively little empirical verification, it appears to be a way to deal with ill-defined, indeterminate or wicked management problems.

DESIGN THINKING IN PROJECT MANAGEMENT

We focus here on how project managers make interventions in steering projects towards completion. Such interventions occur at a range of scales from major tasks such as development of project organizations to ‘smaller’ daily problems such as conflicts between project team members. These problems may be planning problems, or they may be problems requiring interventions in already ongoing events. Indeed project management can be seen as a process of situated inquiry in which the project manager must interrogate the situation he or she finds themselves in, and through processes of sense-making arrive at judgements about, or design, what to do (Lalonde 2012).

Seen this way, project management is a form of problem solving (Ahern 2014). Anticipating the current interest in design thinking Herbert Simon connected problem solving in areas such as management with design in areas such as architecture (Simon 1969) He proposed that design was a approach to general problem solving across a wide range of fields, and defined design as itself “defin[ing] courses of action aimed at changing existing situations into preferred ones.” (Simon 1969) A more recent and more specific definition is: “A design can be defined as a model of an entity-to-be-realized, as an instruction for the next step in the creation process.” (Aken 2007). This highlights the fact that design often generates both models of the desired outcome and processes to reach it.

Design problems facing design and construction project managers include developing briefs and budgets, composing the design teams, specifying tendering approach and project organization, and creating construction schedules. However, design is also required in order to solve the day-to-day problems that face building project managers, such as: conflicts between stakeholders, changes in scope, or

suppliers suggesting alternative products. In each case the project manager must inform him or herself about the current situation (the problem and the context) and determine a course of action that is very likely to lead to the desired result. Both kinds of design problems, the mapping out of the future course of the project, and the resolution of day-to-day problems occur under a high level of uncertainty, and in dynamic situations where hidden and exogenous factors will likely play a significant role in driving the project off the current plan. Design thinking is required to find courses of action that will yield the desired results but will be robust across a large range of possible futures.

DESIGN THINKING IN PROJECT MANAGEMENT EDUCATION

Kimbell signals a growing interest in design in management academia including experiments in teaching design to MBAs and executives at e.g. the Fox School of Business (Temple University 2011), the Rotman School of Management (University of Toronto, 2011), Said Business School (Kimbell 2011), and the Weatherhead School of Management (Case Western Reserve University 2011) (Kimbell 2011: 293, 294).

Similarly, to the theoretical discourse with its distinction between the ‘Designerly’ discourse (Carlgren et al. 2016) of design-based researchers and the Design Thinking discourse of management ‘theorists’, the education streams have remained separate, with design thinking within design-based education drawing on Schön or Simon for engineering applications, and management-based offerings being concerned with pedagogical foundations (Johansson-Sköldberg et al. 2013: 128).

Dunne and Martin see the application of Design Thinking in education as approaching management problems in the same way as designers approach design problems (Dunne & Martin, 2006: 512) – as solving wicked problems through collaborative integrative thinking using abductive logic (ibid: 513). This, we believe, is the essence of design thinking: solving wicked problems in a coevolution of problem and solution (Dorst & Cross 2001), where wicked (or ill-defined or indeterminate) concurs with complex, because of the uncertain or unpredictable character of complexity (cf. Bosch-Rekvelde et al. 2010; Verhees 2013: 69).

In the debate on project management education the lack of training student project managers in dealing with this complexity is observed by Thomas & Mengel (2008: 304): their review of the literature and of project management training programs demonstrates the focus on standardization of the field and on preparation for the professional designation of project managers. This is confirmed by (Pant 2007; Ojiako et al. 2008; Ramazani et al. 2015), and by research into the actual practice in project management education in the Netherlands (Nijhuis forthcoming). Hence, project managers must be taught to “seek first to understand” the increasingly complex environments they are operating in as opposed to our current focus on applying prescribed techniques. Rather than training project managers to apply tools and techniques, we need to prepare them to diagnose situations, adopt appropriate tools and techniques, adapt the tools and techniques as necessary, and to learn continuously (Thomas & Mengel 2008: 311). Although not always made explicit as such, within this debate there appears to be a growing attention for (aspects of) design thinking in complex, sometimes innovation, situations in (project) management, e.g. the introduction of an experiential learning model (Berggren & Söderlund 2008), the

approach of Project Managers as Reflective and Creative Practitioners (Ojiako et al. 2008) or Project managers as reflective practioners (Louw & Rwelamila 2012), the use of Guided reflection on project definition (Cano & Lidon 2011) or A problem solving perspective as a continuous learning perspective (Ahern et al. 2014) and finally Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction (Liedtka 2014). For example Berggren & Söderlund, 2008 and Ojiako et al., 2008, discuss rethinking Project management education by respectively emphasizing articulation and reflection (Berggren & Söderlund, 2008: 289) or reflection (Ojiako et al., 2008: 4, 5) in the development of project managers from trained technicians to reflective and creative practioners (cf. Louw et al., 2012) or finally the use of reflection as a learning aid in the definition of a real life project by project management students that had a positive effect on their learning (Cano & Lidon, 2011).

THE ADAPTER CYCLE

A TOOL FOR DEVELOPING EXPERTISE

Project management education seems still to be mainly focused on training in using prescriptive instruments such as PMBOK, PRINCE etc while evidence is mounting that the increasing complexity of projects requires a different set of competences (Pant & Baroudi 2007, Berggren & Söderlund 2008, Thomas & Mengel 2008, Ojiako et al., 2008; Ramazani et al. 2015; Nijhuis, 2017). But professional expertise consists not of simple rule following, but of recognizing and adapting a body of knowledge to the specifics of any given problem or situation.

There is a long tradition of research in the role intuition plays in expertise. Beginning with the work of Simon (1969), through work with medical professionals (Benner 1982), and into work on professionals, AI and learning (Dreyfus & Drayfus 2005; Gobet 2009). This research shows that expertise cannot be captured in rule based systems, and that some form of intuition or intuitive judgement plays an essential role in expertise. Novices learn and work by rule and practice, applying the rules they know too well defined situations. Experts have internalized both the theory or their discipline and their experience in such a way as to be able to act in any situation based on an “immediate intuitive situational response” {Dreyfus, 2005 #3494}. The process of skill acquisition and learning to be an expert “incorporates a progression from analytic to intuitive knowledge but also an increased ability to deal with abstractions. Thus, an expert in physics will both recognize concrete patterns rapidly and understand the problems at a higher level of abstraction than a novice.” (Gobet 2009) This corresponds to evidence previously found by the authors of a clear distinction between the bureaucratic and rule based work characterising the beginning project manager, and the more intuitive, socially oriented work of the senior or experienced project manager (Lousberg 2017).

We propose the introduction of the ADaPteR Cycle as a means to teach project management students to deal with this complexity, and to help them cultivate habits of thought that will speed their development of expert reasoning. Others have

proposed similar tools using step by step methods to facilitate the development of expert judgement with some success, e.g. Lizzio and Wilson's (2007) tool for the development of critical professional judgement among behavioural science students.

The ADaPteR Cycle

Design whether in the more generalized sense described by Simon, or in the more specific architectural sense, is a cyclical process. In the simplest sense this is a cycle of generate and test (Simon, 1969), but the design cycle also bears similarity to Deming's Plan-Do-Check-Act cycle (Deming, 1952) and the Kolb Learning Cycle: Concrete Experience – Reflective Observation – Abstract Conceptualization – Active Experimentation (Kolb, 2000). These similarities are not coincidental, design and management both rely on learning and feedback from the situation to arrive at better outcomes than might otherwise be realized. For the purposes of illuminating the role of design in building project management the following formulation of the cycle may be most helpful:

Awareness – Design – Performance – Reflection

i. Awareness

The cycle begins with establishing awareness of the current situation. This awareness encompasses not only the formal project as captured in so called "project information", but also, and importantly, the social situation (situational awareness), including the status and state of the various actors and stakeholders in the project. Awareness of what is going on, who is doing what, etc. Also of intentions, goals, and plans. Awareness also encompasses the determination that 'something needs to be done' i.e. deviation from the intended course of the project in some way. Awareness has a very significant component of sense-making.

ii. Design

Out of awareness flows an understanding of both the current state, a need for change and perhaps a desired outcome. Having determined that action is required, design refers to the shaping of a course of action. Design thinking here is important in its open and free approach to generating alternatives and possibilities. But Design should include both generate and test. A designed course of action is also one that has been in some sense tested.

iii. Performance

The designed course of action must be performed by the project manager. The choice of the word performance refers to the performative aspect of management. It is not just a matter of carrying out the design. A performance is required in that project management requires that one changes people's minds and actions. This requires that one reach them in the same way an actor does. Here we define performance as acting/ putting on a mask to change behaviour.

iv. Reflection

Finally, there is a reflection upon the outcome, attempting to draw any lessons about the designed course of action or its performance that may be useful in the future. We use Reflection in two different senses. In the first sense reflection refers to reflecting in a separate moment after the performance is completed, reflection-after-action. This type of reflection is used by e.g. Deming's (quality) management cycle and Kolb's Experiential Learning cycle (Kolb, 2000). The second sense in which we use reflection is reflection while performing, referring to reflection-in-action, introduced by Schön and defined as thinking about doing something while doing it (Schön, 1983). It's this reflection in- and on action that links the ADaPteR Cycle to project management education.

INTERVIEW RESEARCH

If the ADaPteR Cycle is to have any pedagogic value we must determine if the way of thinking supported by the ADaPteR Cycle is present in the everyday work of project managers. As discussed above, as professionals achieve higher levels of expertise their thinking process becomes more intuitive, more tacit, and it is increasingly difficult to either observe their thinking process through vocalisations or for them to explain it themselves. Still, our first attempt to gain insight into the potential applicability of the ADaPteR Cycle was a series of interviews of experienced project managers.

METHODOLOGY

Next to the case study but with the same attempt to determine if the elements of the ADaPteR Cycle can be recognised in the practice of project managers, and to what extent these elements function together as a cycle, we conducted an additional explorative research.

In the period from February 2016 to March 2017, two researchers conducted nine interviews with experienced project managers, four of which were employed by the municipality of Amsterdam, three at a consultancy firm and two were independent. The interviewees were selected on the basis of the following criteria: functioning at the level of senior project manager and experienced with simple and complex projects. At the beginning of the interview, only one question, our central question, was put to these project managers: "what do you actually do?". Depending on their answer follow-up questions were asked, but with each time on the background this central question. From these interviews transcriptions were made and by two researchers independent of each other qualitatively coded and categorized using Atlas-Ti. After this analysis, the researchers have discussed each other's analysis results and reached the following findings.

DATA AND FINDINGS

Differences

First of all, the difference in language between the project managers is remarkable. Almost all the interviewed project managers tell their story on the basis of a concrete

project of their own, on different levels of abstraction with different personal accents. Says one project manager on the basis of the concept of '*connecting people*' that she in that way '*tries to find the ultimate answer to the question of the principal*', while the other under the same concept '*connects people to get support for a change or amendment as realization of an ambition*'. This makes it tricky when coding one interview to use encodings that are found in the other interview. We have solved that by not using the found concept as a code, but to use the essence of what is meant as a code "answering clients' requirements by the design team" in the one and "create support in the design team" in the other. We explain this difference between project managers from their different position relative to the project team. The first project manager gives daily guidance to the project team while the other one is leaving day-to-day management to a junior project manager.

Furthermore, it is noticeable that there are differences in personal focus between the project managers; the one is more focused on the (user) processes, the other on setting up with margins and then finishing a project plan and a third on trying to keep all the frogs in the Barrow. Another difference is that a number of project managers, in particular those of the municipality, sees themselves as an '*Advisor to the client*', while another speaks about his relationship with the client as '*contributions to the ambition of the client*' or '*give him only rubber-stamp situations*'.

Summarising, differences seem to emerge mainly by the type of project (on what lies the focus), the type of client (municipality or otherwise), the position of the project manager (daily management or not) and the personality of the project manager (differences in level of abstraction).

Similarities

A first similarity between the project managers is that they all use a '*framework*' or '*model*' to shape the management of the project. In seven of the nine interviewees, this '*model*' was "Working by means of Projects", something expected, because the consultancy firm where this method comes from has trained the project managers of the municipality. All use this '*framework*' for '*the project to establish*', '*to shape*' or '*to make*'. Everyone seems to work with one or other structure of agreements from which they take their daily work to relate to. This is often a standard which is modified on the project. One of the project managers replied, "*I start with identifying ... the program of requirements [including] the environmental factors i.e. stakeholders who can influence the project, feasibility studies, risk analysis, ... and then I walk through all management elements. ... [then] I start with a Plan of action.*" Another project manager described his role as "*determining frames ... My role in this is: making it a project. ... I look at it from the point of view of project hygiene. My role is very much to agree, capture and make people stuck to their role. ... I'm not going to start with a project if I don't have written my own project plan. You need to formulate your own assignment as it were. This includes explicit creation of what I do not. ... First you focus the project on what do you want to achieve, then you need to set it up and then you go do.*" Both project managers start with gaining awareness of the project and environment, and then create a Plan of action or determine and establish the frameworks within which the project can be carried out; the first steps in a large project design cycle.

In addition to the framing of the project in more or less measurable terms as money, time and quality, many project managers speak of the *'shaping of processes'* and *'create/generate support'*, as activities arising from the setting of (modified) frames with a client, or as an activity in coping with *'surprises'*. One of the project managers describes how she treats a 'surprise' in the daily work: *"I try to advise the client as well as possible, because in the end it is not my risk, but that of the client. I draw up scenarios, and the client then asks me 'what do you think?'. First, there is a problem signalled, that problem is extensively unravelled on what risks we actually have and there are possible measures (Design), where each choice has all kinds of consequences, up to and including the procurement strategy. So you will have to think about very well."* And another says about 'surprises': *"I manage decision making, by my client, but also by myself. However, if something happens, I always ask myself: 'is this bad, is it an issue? ', because what everyone does when something is an issue – especially in a meeting with techies – is to solve, without thinking at all whether it is necessary. I sharpen the problem in terms of consequences, I see that as my role compared to other team members."* To which another project manager adds: *"Actions such as letting clients choose where the paintings may hang – together with the architect – are deliberately designed [to create support for the project]."*

A third similarity is that a number of project managers speaks about *'reducing, removing'* or *'mitigating risks'* as an important task. This not so much in the interest of themselves as project manager, but, as they put it, *'in the interest of the client'*. Finally, we noticed that usually, but sometimes not, in the analysis one of the four concepts of the Project Design Cycle – awareness, design, performance and reflection- could only be used as a code, if we asked about it in the interview, but in veiled terms. As for instance with regard to the element Performance, when asked to elaborate on acting out his role as project manager, one interviewee responded: *"I have been trained to think of yourself as a tool. That is, to be aware of what you can do and what you can't, also of how you look, what you're wearing, for example, a suit and sometimes a tie. The rule is that you never are underdressed."* Another: *"Yes. I act absolutely. For instance, in a meeting where I enter and think about the place where I sit down, and meetings where I say nothing or only two things. What I'm going to do, mainly depends on the others."* And another: *"Sometimes you need some sort of decisiveness. This has to be called a form of bluff sometimes, because you still do not know exactly what's going on."* And e.g. regarding Reflection one interviewee said: *"I think about work when I'm in bed at night. It's about responsibility. Whether did you do things well as a team, or did you have enough control ..., did we do things well – you always doubt of course – did we make the right choice, could we have done it not better in another way?"* Most of the project managers said they think it's important to reflect with colleagues, e.g.: *"Often this is in conversations with colleagues who were there. We discuss how it went, what the next steps are that we need to take, what those are in six weeks. ... It is sharing what you are going through, that mutual collegiality, that reflection is very important to be able to grow. That you should do as much as possible."* Or: *"Moments of reflection are those in which I am away with my assistant on to or off from a meeting. We also here internally with colleagues do very much to exchange knowledge, both structurally at meetings every month as it happens to come across or look for each other, with us is that essential."*

Summarizing, findings suggest that project managers draw up frameworks in order to make a project out of the otherwise as chaotic perceived reality, then ensure that the project remains within the framework and, if necessary, adjust the frames. In addition, that generating support/shaping processes for the (amended) project and, to a lesser extent, mitigating the risks for the client seem to be important tasks. Finally, that the elements of the ADaPteR Cycle, are recognizable only after asking about them in veiled terms.

8.3 Reflection

Just as the case study, the goal of the explorative research is to determine if the elements of the ADaPteR Cycle can be recognised in the practice or project managers, and to what extent these elements function together as a cycle. Therefore we compare the findings from the analysis of this research with the theoretical framework of the ADaPteR Cycle. Especially the similarities between the interviews show that all project managers draw up frameworks, often using a standard model that is adapted to the project. This activity would be considered as a design activity, where the problem is explored first and then a design is created. This design is established with the client and then the aim is to keep the course of the project within the framework of the design. If circumstances so warrant, the design is reflected upon and eventually adapted, so partly redesigned. In this general sequence the ADaPteR Cycle can be recognized, with its succession of Awareness, Design, Performance and Reflection. So in the big picture over a longer period of time, the ADaPteR Cycle can be recognized; in daily actions, however, only fragmented: elements can be recognized, but not in their cohesion.

In addition to using frameworks it seems to be that generating support/shaping processes is one of the most important activities. The interviewed project managers seem to open here, they seem especially doers – performers- that "realizing things with people" (Leeuw 2002). In this they seem to be architects, on the basis of their analysis of the situation (awareness) they design measures that are performed from which they learn of the extent to which they work (reflection). That the processes for support take place as in this order, does not appear from the interviews, that the elements awareness, design, performance, reflection are recognizable, though.

AN ANALYSIS OF WORK FLOOR EXPERIENCES

INTRODUCING THE CASE AND METHODOLOGY

In order to determine if we could observe the elements of the ADaPteR Cycle in the everyday experience of a project manager on the work floor, the researchers took the opportunity to reinterpret a data set that had recently been collected for a different research project.

The observations collected for a study of Supply Chain Partnering (Venselaar et al., 2013; Venselaar, 2017) was made available for use as a second case study. We used 22 observation journals of a bigger set of data containing observations of a project leader in a Dutch housing association, HA, going about his daily work. The observations were made without a specific observation scheme, taking all aspects of daily work life into account, and ensuring the capture of individual behavior

(Venselaar 2017). The role of the observing researcher can be best described as consulting observer.

For the current research, the data was coded using the phases of the PDC (Awareness, Design, Performance and Reflection). 13 journals were analyzed at sentence level. Some sentences had multiple codes, because they were multi-interpretable. Then we decided that more coding at sentence would not gain more insight. The rest of the journals were used to construct the ante-narratives.

For this study two ante-narratives (Boje, 2001) were constructed, representing the messy story line of daily work life. The first ante-narrative is about a project team meeting between a project leader at the housing association, we'll call him John, and other representatives of the housing association, contractors, subcontractors, an architect and a BIM-consultant. This is one of the first meetings that John organized in this setting, since the managing-director of his department introduced BIM-software, and the principle of supply chain partnering, thus the method of working was new to all the attendees. The second ante-narrative describes the process that John and his network undergo in their search for a smoother supply chain partnering processes.

The reason for constructing two ante-narratives, was that it allowed us to analyze the application of the ADaPteR-Cycle in a snapshot (ante-narrative 1) as well as in a longer-term process (ante-narrative 2). The ante-narrative about the single meeting allowed us to analyze our data at a micro-level, while the second ante-narrative allowed us to see if ADaPteR-Cycles is applied over a longer period of time in a long-term project. We think that both approaches reveal interesting aspects concerning applying the ADaPteR-Cycle in daily work life of project managers.

ANTE-NARRATIVE 1: A MEETING INITIATED BY PROJECT LEADER JOHN

John initiated a meeting with representatives of the housing association and representatives of the contractor and subcontractor, an architect and a BIM-consultant. In total 9 people (including the researcher) attended the meeting. Before the meeting starts, John told the researcher that he is a bit nervous. Last meeting did not go well. There was a lot of discussion and too little structure. Therefore, people got irritated. For this week, John gave homework to everybody, and he expects that that will help to make decisions more easily.

John opened the meeting and said that the target is to fill in an 'intervention matrix'. This was an excel-sheet with technical interventions for the renovation project that they are working on. But first, the architect showed three designs for the project that they work on. The attendees started to discuss social safety and locking a few compartments in the designs. A contractor's representative asked John what the organization's policy on safety and locks. John could not answer this question. After 20 minutes of discussion, John proposed to get back to the intervention matrix. But a new discussion about replacing gas for cooking and heating arose. Someone asked for the organization's policy on gas, but again, John could not answer the question. A BIM-consultant asked '*Why are we talking about gas, while according to the intervention matrix we should be talking about facades?*' The meeting goes on like this. Discussions started and finished without clear conclusions. Several times people asked for the organization's policy on different topics, but John could not answer.

The contractor became irritated, *'What's all this about, it's not a game we're playing! You must say something about your policy!'*

At one point, John asked if they needed a break. But the contractors needed to leave early, so they just went on. Discussion continues and at one point the contractor says *'We should not think in impossibilities, rather we think in possibilities. [...] We should think differently.'* He asked the architect to sketch what the gallery would look like, if they would entirely rebuild it. Another attendee said: *'But the director has to make these decisions, right. If he likes it, we'll do it.'* (He was referring to the housing association's internal process, in which that the project leader may propose an intervention but needs approval from the director before implementing it).

Meanwhile, John seemed to become impatient. He wanted to round things off. John tried to bring the meeting to an end. *'Guys, you'll be leaving in a bit...'* But the contractor said *'We still have seven minutes to go'*. John replied *'Ok, we go on then'*, but he seemed as to get more and more impatient. Then a several attendees left and the rest took a break.

The researcher spent the break talking to John and the BIM-consultant. John said that he is satisfied. *'It goes effortlessly. I don't have to guide this at all'*. John thought about how he could make the process even more smoothly. Doing homework is very important to him.

We resumed with the meeting. Several scenarios were discussed, and new discussions about specific aspects of the scenarios arose. For example, there was a discussion about heating systems and installations. John says about a certain solution: *'If we choose to exploit this building for 15 more years, we should intervene as little as possible. It costs a lot of money, and for 15 year you don't want all the fuss with plumbers and stuff.'* To which one of John's colleagues replied *'If we want to replace these systems, we have to have a very good reason to convince the director.'* Related to this discussion, John searches for the organization's policy on heating services. Then, the meeting came to an end. John proposed homework assignments and everyone left the room.

ANTE-NARRATIVE 2: FOLLOWING PROJECT LEADER JOHN IN HIS DAILY ACTIVITIES

After the meeting described in the previous ante-narrative, we kept following John in his daily work activities and his search for more effective supply chain partnering by using BIM-techniques. We followed John in his normal, ongoing daily work life, and we also attended more special events.

The data show that in general John, his colleagues, and the researcher spent a lot of time talking to each other and analyzing the situation that they were in. They came up with ideas to solve the practical problems that they face. It is possible that the presence of the researcher influenced this behavior, perhaps making it more collective and explicit. In one of those conversations John, Matthew (also project leader of renovation projects) and the researcher brainstormed about questions that John was confronted with in the first meeting, such as the policy on social quality. They tried to collect certain questions in a mind map.

One of the ideas, that John and the researcher had developed, was to create a manual for supply chain partnering. John took the lead in this, and the researcher acted as a sparring partner. John and the researcher went to John's manager to ask for

time to do this. An underlying purpose of getting time allotted to writing the manual was to get acknowledgement. John's manager agreed, under certain conditions. One of the conditions was that the process design should accommodate HA's existing administrative accounting system and another condition was that colleagues should be involved in developing the manual. At a certain point in the process, John actually produced a preliminary manual. In this manual John wrote that he observed that people believe in the success of supply chain partnering, but knowledge and clarity about basics is needed to make it a success. The aim of the manual, as John wrote, was to share his experiences *'in order to help you guide your supply chain in the right direction to get the best results'*.

Meanwhile, John's normal daily work life just went on. For example, he spoke to his colleague from the department of 'regions'. After this conversation, John became convinced that his manager was an important bottleneck in their internal supply chain process. John and the researcher discussed his options to deal with this new insight, but John could not decide at that moment what he would do. We also gathered with different colleagues to talk about various related topics, such as whether the purpose of the BIM-sessions was producing a proposal for investment or a feasibility study for different scenarios. At a certain point, John and the researcher organized a team meeting in which John tried to start a discussion about barriers that they face in their development towards supply chain partnering. It became a very lively meeting that flew off in all directions. One of the outcomes of this meeting was that John and the researcher were assigned with organizing a pressure cooker meeting.

This meeting, and the process of talking informally to colleagues felt meaningful for John as well as for the others. For example, at some point in the process John said that he felt that *'he finally is developing himself. It does not concern my job, but still'*. Also, Matthew was very enthusiastic about the creative process. *'This is real project management'*, he said. Later on in the process, the researcher noted that she thinks that *'everything in the organization will change'*. One of the attendees of the project team meeting said afterwards: *'Finally, we talked about what it's really about'*.

A few months later the pressure cooker meeting took place. After a few struggles, John and the contractors managed to come up with ideas for the renovation complex that they worked on. John showed the results to his colleagues from the department of 'regions', but this colleague was not satisfied with the results. The colleague had been expecting something different. John's managers also expected something different and expressed their disappointment. John was angry about this situation.

ANALYSIS OF THE ANTE-NARRATIVE

Awareness

It is not possible to directly observe another person's awareness. For this reason, the coding process was highly problematic. The experience of awareness might arise suddenly (a so called *Eureka moment*), or it might simmer semi-consciously for a longer period of time. Below we will explain how we interpreted our data in terms of awareness.

An example that we labelled as awareness is when John says that he is nervous. We interpreted this as John being aware of his physical sensation and implicitly the anticipation of experiencing difficulties in the meeting. It also encompasses the determination that something needs to be done. One of the things that John

determined (designed) that he needed to do was assigning everyone homework to prepare for the meeting. ‘Assigning homework’ can also be labelled as part of the performance phase. After all, this action is intended to design the process and make it smoother. And this example also involves reflection, John was aware of his nervousness and started reflecting on the previous meeting, which developed into awareness of the difficulties likely in the new meeting. The example ends with John reflecting on the meeting. We can, therefore, consider this as an (natural) example of the ADaPteR-Cycle.

Another example of awareness is when somebody says that the director has to make decisions. By saying that, this person shows he is aware that the attendees are discussion matters that they cannot decide themselves. His utterance is a performance designed to interrupt and end or redirect a discussion that cannot be fruitful. However, at the same time, this sentence can be interpreted as a design proposal, because it can also be read as ‘*Let’s just propose it to the director, and see how he feels about it*’. The data don’t show whether this process design proposal is accepted or not.

Concerning awareness, another important aspect in this meeting was that John was confronted with different kinds of questions about the organization’s policy. For example, one of those questions was, ‘*What is your policy about safety of hardware?*’ John could not answer these policy questions. Without a larger context, the researchers would not label this as the ‘Awareness-phase’ of the ADaPteR-Cycle. However, the second ante-narrative shows that such policy questions were an important driver for John to do take actions, for example brainstorming with a colleague and collecting the variations of these policy questions. Actions such as the brainstorming can be seen as a complete ADaPteR-Cycle or Awareness, Design, Performance and Reflection, nested within the ongoing cycle.

The combination of the first- and second ante-narrative gave a new insight concerning awareness. In the first ante-narrative John is concerned with how time consuming such a meeting is, and he gets impatient. He also wonders whether this new way of working is quicker than the traditional way. Many actions follow to reduce the amount of time spent on such meetings with external partners. But when we also analyze the other data, we observe that John spends a lot of time on, for example, talking and discussing his ideas with his direct colleagues, his managers, and others. However, John never questions how much time these actions with his colleagues take. There seems to be an implicit assumptions that says something like ‘*Formal meetings should be quick, organized and effective, and it is ok to spend a lot of time on informal meetings and that does not necessarily have to be organized and effective*’. We do not assume that this is a right or wrong implicit assumption. We only observe an example that shows a seemingly arbitrariness of *what* people are (becoming) aware of.

The actions that such awareness provokes in terms of design, performance and reflection, are therefore not based on an explicit reasoning process. While additional research would be required to demonstrate this, it is consistent with the notion that they attendees are ‘seeing’ issues in the intuitive manner Dreyfus and Dreyfus (2005) attribute to experts.

Design

John's decision to develop the intervention matrix as a means to make the meeting run more smoothly is an example of a design. Although that purpose seems clear, the attendants didn't behave as anticipated in the design. At several points, John (and also the BIM-consultant) proposed to go back to the intervention matrix, but quickly people resumed discussing topics not in the intervention matrix. This example shows that there is not only a design, there is also the performance of the design: the communication of intent and the chairing of the meeting of the meeting. At this point, John became aware that the attendees are not sticking to his design, and feels a need to intervene. This results in a decision to act (design) and a performance, although it is likely that the design step is entirely tacit. This can be considered as an ADaPteR-Cycle at a micro level, a cycle within a cycle.

We observed that design, especially if it is an explicit process, often encapsulates an ADaPteR-Cycle within it, but one in which the performance is simulated. This goes for technical design, as well as process design. While talking about design options, for an object or a process, the anticipated performance and results of these options are delineated and reflected upon in order to be able to make a decision. In the discussion of the hardware attendees proposed ideas and others responded anticipating and evaluating the performance of each solution. In these conversations, the participants did not explicitly display all four steps of the ADaPteR-Cycle, for example the awareness step, the description of the problem, was often tacit or implied by in acts of designing and reflecting. The argument is that, before people propose solutions, they must have become aware of a problem they are trying to solve.

Another sentence that was labelled as design was when a contractor said: '*We should not think in impossibilities, rather we think in possibilities. [...] We should think differently.*' It concerns design of how he thinks that people should be thinking both in and beyond the meeting. This is a design-proposal for a way of thinking in general and therefore transcends the level of the meeting itself.

Performance

Concerning the third phase of the ADaPteR-Cycle, we understand that performance is never solely performance. Attending a meeting can be labelled as performance as such. What people *do* in a meeting is actively contributing to the discussion, putting design proposals, sometimes put something in the intervention matrix, present ideas, etc. but by doing that, they always design, reflect and/or become aware of something at the same time.

Another observation is that not only in the meeting of the first ante-narrative itself, but also throughout the longer-term process people constantly, formally as well as informally, discuss, put design proposals, present ideas, etc. If it is not done face-to-face, they use emails, phones, or other communication tools. Daily work life is an ongoing stream of actions and reactions. That makes processes at work floor messy. There is one performance after the other. ADaPteR-Cycles are recognizable, but also at many times remain unfinished. For example, John started to write a manual for supply chain partnering and involved his colleagues in this. A lot of time was spent on this, but this action was never finished (as far as the data show).

Reflection

An example of reflection is the conversation that John and the researcher have during the break of the meeting. Here we can see a cycle spinning off from the main cycle.

The performance is interrupted by a cycle of RAD – leading to changes when the performance is resumed. This reflection transcends the level of this particular meeting, but is at a higher abstract level of what the most efficient way of collaboration is. John’s words show that he is aware that this meeting is part of a bigger new strategy of collaboration and he questions whether this is a good strategy.

As discussed before, during the meeting, people discuss possible technical interventions. Each individual makes comments in an apparently arbitrary manner, unrelated to what has gone before, and without announcing their reasoning. Again, they seem to be ‘seeing’ in the manner of experts according to Dreyfus & Dreyfus (2005). In their reflections they used different criteria, based on their individual points of view, but these remain implicit. Arguments for technical interventions are based on, for example, technical-, financial-, esthetic-, and safety-reasons. The reflection criteria arise on the spot. In this argument, reflecting becomes an act of politics and convincing each other, instead of a rational assessment of a design. This applies as much to the process design (at the level of the meeting but also at a higher abstract level) as it does to the technical design.

DISCUSSION

Summarizing these observations we find the following

- 1) The behavior of project managers does not come in clearly identifiable blocks which can be associated with ADaPteR steps without interpretation. Any attempt to understand the flow of action in the behavior of a project manager involves interpretive selection and ordering similar to that necessitated in making an ante-narrative, and for the same reasons, life is messy.
- 2) Individual phases of the ADaPteR-Cycle are fairly easy to recognize, but at first may seem to occur without order or pattern. It is sometimes both reasonable to necessary to infer that phases have occurred on the basis of observable phases – no one tries to solve a problem they are not aware of. Phases may also occur tacitly, or unconsciously. Or it may seem to a project manager that the design is implicit in the awareness. However, people are capable of reflecting on their previous awareness, design and performance even when these were tacit. However, interpretations of the same situation may vary from person to person.
- 3) We can rarely speak of one ADaPteR-Cycle at a time. Rather there are cycles running parallel to each other, cycles within cycles, and cycles splitting off of each other. Thus, there may be design and (simulated) performance within reflection, or reflection within design.
- 4) That in any collective effort, each individual will be experiencing their own cycles, which will overlap and spin off of each other.

Further, although limited to some extent by the manner in which the data were collected, we can see examples of the project manager and other project team members reasoning in the manner of proficient and expert professions. That is, not by carefully describing all aspects of any situation, and seeking a rule to apply, but by ‘seeing’ what aspects are relevant, and going directly to proposed solutions without appealing to general rules or explicit reasoning.

CONCLUSION

The intention of this study was to provide a lens through which to view project management action as to provide confirmation of the use of designerly approaches to problem solving by project management. In order to do that, literature research was used to develop the ADaPteR-Cycle. We analyzed the use of the ADaPteR-Cycle in daily work life of a project manager.

The analysis shows that phases of the ADaPteR-Cycle are recognizable, but the phases are highly interdependent and integrated. Therefore, it is difficult to separate the phases. We also observe that people go through multiple cycles at multiple levels at the same time, and the levels affect each other. People might go through ADaPteR-Cycles collectively. Individually, going through an ADaPteR-Cycle of one person, might initiate or affect the ADaPteR-Cycle of another person. Project managers are not always aware that they go through an ADaPteR-Cycle. Lastly, going through ADaPteR-Cycles does not guarantee success.

The approach of this study appeared useful to gain insight in project managers' actions and their use of designerly approaches. But more ethnographic study into project managers' daily work activities is needed to understand how they operate, why they operate like that, and what the results of their operations are. Such research should focus on themes like rationality, rhetoric, power, emancipation, and autonomy. Also, deeper understanding and phenomenological research about how awareness – and the processes that follow - works is needed.

As we can see here, any attempt to identify the ADaPteR-Cycle in the data is similar to the construction of an ante-narrative – it is a selection and ordering of portions of the action not a complete representation of the whole.

REFERENCES

- Ahern, T., Leavy, B., and Byrne, P. J. (2014). “Complex project management as complex problem solving: A distributed knowledge management perspective.” *International Journal of Project Management* 32(8), 1371-1381.
- Aken, J. E. van, Berends, H. and Bij, H. van der (2007) *Problem-solving in organizations: a methodological handbook for business students*. Cambridge University Press. Cambridge.
- Alexander, C. (1964). *Notes on the Synthesis of Form*. Harvard University Press. Cambridge.
- Benner, P. (1982). "From Novice To Expert." *AJN The American Journal of Nursing*, 82(3): 402-407.
- Berggren, C., and Söderlund, J. (2008). “Rethinking project management education: Social twists and knowledge co-production.” *International Journal of Project Management*. 26(3) 286–296.

- Blomquist, T., Hällgren, M., Nilsson, A., and Söderholm, A. (2010). “Project-as-practice: In search of project management research that matters.” *Project Management Journal*, 41(1), 5-16.
- Boje, D.M., (2001). *Narrative Methods for Organizational & Communication Research*. Sage Publications Inc. London.
- Boland, R. J. and Collopy, F. (2004). *Managing as Designing*. Stanford University Press. Palo Alto.
- Bosch-Rekvelde, M., Jongkind, Y., Mooi, H., Bakker, H., and Verbraeck, A. (2010). Grasping project complexity in large engineering projects: The TOE (Technical, Organizational and Environmental) framework *International Journal of Project Management*. 29(6): 728-739.
- Brown, T. (2008). “Design thinking.” *Harvard Business Review*. 86(6), 84.
- Cano, J., and Lidón, I. (2011). “Guided reflection on project definition.” *International Journal of Project Management*. 29 525–536.
- Carlgrén L, Rauth I and Elmquist M (2016) “Framing Design Thinking: The Concept in Idea and Enactment.” *Creativity and Innovation Management*, 25(1), 38-57.
- Cicmil, S., Williams, T., Thomas, J., and Hodgson, D. (2006). “Rethinking Project Management: Researching the actuality of projects.” *International Journal of Project Management*, 24(8), 675-686.
- Cooke-Davies, T., Cicmil, S., Crawford, L., and Richardson, K. (2008). “We're Not in Kansas Anymore, Toto: Mapping the Strange Landscape of Complexity Theory, and Its Relationship to Project Management.” *IEEE Engineering Management Review*. (36), 5-21.
- Cross N (2006) *Designly ways of knowing*. Springer. London.
- Deming, W. E., and Renmei, N. K. G. (1952). *Elementary principles of the statistical control of quality: a series of lectures.*, Nippon Kagaku Gijutsu Remmei.
- Dorst, K. (1997). “Describing Design, A comparison of paradigms.” Ph.D. Thesis. Delft University of Technology. Delft.
- Dorst, K., and Cross, N. (2001). “Creativity in the design process: co-evolution of problem–solution.” *Design Studies*. 22(5), 425–437.
- Dorst, K. (2010). The Nature of Design Thinking. DTRS & Interpreting Design Thinking. Proceedings of the 8th Design Thinking Research Symposium.

Dreyfus, H. L., & Dreyfus, S. E. (2005). Peripheral Vision: Expertise in Real World Contexts. *Organization Studies*, 26(5), 779-792.

Duke, R., and Geurts, J. (2004) *Policy games for strategic management – Pathways into the unknown*, Dutch University Press. Amsterdam.

Dunne, D., and Martin, R., (2006). “Design Thinking and How It Will Change Management Education: An Interview and Discussion.” *Academy of Management Learning & Education*, 5(4), 512–523.

Flyvbjerg, B., (1998). *Rationality and Power - Democracy in Practice*. University of Chicago Press. Chicago.

Gobet, F., & Chassy, P. (2009). Expertise and Intuition: A Tale of Three Theories. *Minds and Machines*, 19(2), 151-180.

Goldschmidt, G. (2014) *Linkography, Unfolding the design process*. MIT Press. Cambridge, MA.

Gruber, M., De Leon, N., George, G. and Thompson, P. (2015). "Managing by design," *Academy of Management Journal* 58(1), 1-7.

Hassi, L., Laakso, M., (2011). “Design Thinking in the Management Discourse: Defining the elements of the concept.” *International Product Development Management*. 18th international product development management conference.

Heintz, J. L., Lousberg, L. H. M. J., and Prins, M. (2015). “Re-Designing Project Management: Steps towards a project management curriculum for a sustainable built environment.” *Proceedings of CIB International Conference Going North for Sustainability: Leveraging knowledge and innovation for sustainable construction and development*, 23-25 Nov 2015, London.

Hodgson, D. E., and Cicmil, S. (2006). *Making projects critical*. Palgrave Macmillan. Basingstoke.

Johansson-Sköldberg, U., Woodilla, J., and Çetinkaya, M. (2013). “Design Thinking: Past, Present and Possible Futures.” *Creativity and Innovation Management*, 22(2), 121-146.

Kelly, D. (2001). *The art of innovation: Lessons in creativity from IDEO, America's leading design firm*. Doubleday. New York.

Kimbell, L. (2011). “Rethinking Design Thinking Part 1.” *Design and Culture*, 3(3), 285 – 306.

Kolb, D. A., Boyatzis, R. E., and Mainemelis, C. (2000). “Experiential Learning Theory: Previous research and new directions.” In *Perspectives on cognitive*,

- learning, and thinking styles*, Sternberg, R. J., and Zhang, L. F. eds. Lawrence Erlbaum. NJ.
- Koskela, L., Howell, G. (2002). “The underlying theory of project management is obsolete.” Paper presented at the *Proceedings of the PMI Research Conference*.
- Lalonde, P.-L., Bourgault, M. and Findeli, A. (2012). “An empirical investigation of the project situation: PM practice as an inquiry process.” *International Journal of Project Management*, 30(4), 418-431.
- Lawson, B (1997) *How designers think: the design process demystified* (3rd ed.), Architectural Press. Oxford.
- Leeuw, A.C.J. de (2002). *Bedrijfskundig Management. Primary process, strategy and organization*. Koninklijke Van Gorcum. Assen.
- Liedtka, J. (2015). “Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction.” *Journal of Production Innovation Management* 32(6), 925–938.
- Lizzio, A. and K. Wilson (2007). "Developing critical professional judgement: the efficacy of a self-managed reflective process." *Studies in Continuing Education*, 29(3): 277-293.
- Lousberg, L. H. M. J., and Heintz, J. L. (2017). “Developing the master project manager.” Paper presented at the 24th Annual Conference of the European Real Estate Society (ERES 2017), Delft University of Technology.
- Louw, T., Rwelamila, P. (2012). “Project Management Training Curricula at South African Public Universities: Is the Balanced Demand of the Profession Sufficiently Accommodated?” *Project Management Journal*, 43(4), 70–80.
- Lundin, R., and Söderholm, A. (1995). “A theory of the temporary organization.” *Scandinavian Journal of Management*, 11(4), 437-455.
- Mahmoud-Jouini, S., Midler, C., and Silberzahn, P. (2016). “Contributions of Design Thinking to Project Management in an Innovation Context.” *Project Management Journal*, 47(2): 144-156.
- Martin, R. L. (2009). *The design of business: why design thinking is the next competitive advantage*. Harvard Business Press. Cambridge, MA.
- Morris, P. W. (1994). *The management of projects*. London: Thomas Telford.
- Morris, P. W. (2013a). “Reconstructing Project Management Revisited: A Knowledge Perspective.” *Project Management Journal*, 44(5), 6-23.

- Morris, P.W. (2013b). *Reconstructing project management*. John Wiley and Sons. Chichester.
- Moon, J. (2004). *A Handbook of reflective & experiential learning. Theory and Practice*. RoutledgeFalmer. London.
- Muratovski, G., (2015). “Paradigm Shift: Report on the New Role of Design in Business and Society.” *She Ji The Journal of Design, Economics, and Innovation*. 1(2), 118-139.
- Nijhuis, S. (forthcoming). Exploring project management education.
- Ojiako, U., Johansen, E., Edum-Fotwe, F. and Greenwood, D. (2008). Facilitating the development of project managers as reflective and creative practitioners. *Northumbria Working Paper Series: Interdisciplinary Studies in the Built and Virtual Environment*, 1 (1). pp. 67-74.
- O’leary, T., and Williams, T. (2013). “Managing the Social Trajectory: A Practice Perspective on Project Management.” *IEEE Transactions on Engineering Management*, 60(3), 566-580.
- Packendorf, J. (1995). “Inquiring into the temporary organization: New directions for project management research.” *Scandinavian Journal of Management*, 11(4), 319-333.
- Pant, I., Baroudi, B., (2007). “Project management education: The human skills imperative.” *International Journal of Project Management*, 26(2), 124–128.
- Phua, F.T., (2013). “Construction management research at the individual level of analysis”, *Construction Management and Economics*, 31(2), 167 – 179.
- Pink, S., Tutt, D., and Dainty, A. (2013). *Ethnographic Research in the Construction Industry*. Routledge. Oxon.
- Ramazani, J., Jergeas, G. (2015). “Project managers and the journey from good to great: The benefits of investment in project management training and education.” *International Journal of Project Management*, 33(1), 41–52.
- Sahlin-Andersson, K., and Söderhlom, A. (2002). *Beyond project management: New perspectives on the temporary-permanent dilemma*. Liber. Malmö.
- Schön, D.A., (1983). *The reflective practitioner: how professionals think in action*. Basic Books. New York.
- Simon, H. A. (1969). *The sciences of the artificial*. MIT Press. Cambridge, MA,

Svejvig, P., and Andersen, P. (2015). “Rethinking project management: A structured literature review with a critical look at the brave new world.” *International Journal of Project Management* 33(2), 278–290.

Thomas, J., and Mengel, T. (2008). “Preparing project managers to deal with complexity – Advanced project management education.” *International Journal of Project Management*, 26(3), 304–315.

Verhees, F. (2013) *Publiek-private samenwerking: adaptieve planning in theorie en praktijk*. Rijks Universiteit Groningen.

Venselaar M., Gruis, V.H., Verhoeven, F., (2015). “Implementing supply chain partnering in the construction industry: Work floor experiences within a Dutch housing association.” *Journal of Purchasing and Supply Management* 21(1), 1-8.

Venselaar M., (2017). “Work Floor Experiences of Supply Chain Partnering in the Dutch Housing Sector.” Ph.D. thesis, Delft University of Technology, Delft.