

WHAT QUALITY MANAGEMENT CAN LEARN FROM DESIGNERS ABOUT BEING QUALITATIVE

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ABSTRACT

Quality Management (QM) initiatives and practices generally stress the importance of “focus on customers” and to “base decisions on facts”. However, in Western World QM practice it appears as if facts often become equivalent to numbers - “we need facts” becomes “we need to see it quantified in numbers” and “measuring is knowing”. In sharp contrast, the growing field of Design Thinking (DT) conclude that qualitative approaches are key when it comes to get closer to the citizens or customers, establish new levels of understanding, and thereby inspire new and better solutions. The purpose of this paper is to explore what quality management can learn from designers, and design thinking practice, about using more qualitative approaches for learning and in developing knowledge.

INTRODUCTION

Quality Management (QM) must have the ability to develop knowledge in order to support and enable learning of both first- and second-order as stated by e.g. Sitkin et al. (1994), elaborating on the difference between “Total Quality Control” and “Total Quality

Learning”. A popular notion of this need for knowledge development and learning is seen in the TQM cornerstone or principle declared as “base decisions on facts”, see e.g. Hellsten & Klefsjö (2000). However, in practice it appears as if facts often becomes equivalent to numbers - “we need facts” becomes we need to see it quantified in numbers.

Given the roots of QM in statistical sampling, statistical models, and a statistical view on the production system, see e.g. Shewhart, (1931, 1939), a bias towards applying statistical analysis and quantitative approaches to just about any problem or learning need might be expected. Measuring, in terms of getting figures, is stressed in QM literature as equivalent to knowing, see for example Rampersad (2001) who states that “...measuring is knowing” (p.6). In other words, when it comes to QM and quantitative approaches the well-known saying “if you have a hammer, everything looks like a nail” might be applicable, as illustrated in Figure 1.



Figure 1: Could it be that QM is using the well-known and well mastered hammer of quantitative approaches for things that really are not nails?

That is clearly a problematic based on the nature of knowledge and the learning needs. In research terms, there will also be qualitative learning needs or problems to be solved. According to e.g. Morse (1991) that could be when (a) a concept is “immature” due to a conspicuous lack of theory and previous research; (b) a notion that the available theory may be inaccurate, inappropriate, incorrect, or biased; or (c) the nature of the phenomenon may not be suited for quantitative measures. QM sticking to the quantitative is also in sharp contrast to the growing field of Design Thinking (DT). A field that generally argue that qualitative approaches are key when it comes to getting closer to the citizens, establishing new levels of understanding and thereby inspiring new and better solutions, see e.g. the 2016 design guide developed by Nesta and IDEO (<http://www.nesta.org.uk/publications/designing-public-services-practical-guide>).

The purpose of this paper is hence to explore what QM can learn from designers, and DT practice, about using more qualitative approaches for learning and in developing knowledge.

CONCEPTUAL FRAMEWORK

In this section, a core concepts related to the purpose of this paper are introduced.

QUALITY VERSUS QUANTITY, AN ANCIENT DICHOTOMY

“Quality is a complex and multifaceted concept” as stated already by Garvin (1984, p.39), when identifying five very different approaches to the definition of quality. However, the definition and specifically the distinguishing of quality from quantity goes way back in philosophy. Aristotle did e.g. distinguish them in “The Categories” when stating that quantity refers to the extension of an object. On the other hand Aristotle stated that quality characterizes the nature of an object (see e.g. Aristotle et al, 1983). Although e.g. Kant later questioned Aristotle’s categories in Critique of Pure Reason (1788), he accepted the distinct separation of quantity and quality for his own system of categories. Given that background, it appears as if the contemporary understanding and natural language concerning quality and quantity remain connected to the meaning imposed by Aristotle more than 2000 years ago. In short quality still refers to the characteristic or feature of something while quantity refers to the amount or number of something.

A TRADITION OF MIXING UP THE CATEGORIES OF QUALITY AND QUANTITY

In QM the originally distinct categories of quality and quantity appear to have become mixed up in many contexts. Garvin (1984) do for instance discuss that “the Product-based Approach” to defining quality view quality as a precise and measurable variable. This approach is clearly a brutal mixing up of the two distinct categories of quality and quantity. Interestingly Garvin

(1984) further discuss that this quantitative approach to quality first appeared in the economics literature. More specifically it appeared in relation to durability, simply because quality differences in that area could so easily be treated as differences in time, in something measurable. “Quality differences could, therefore, be treated as differences in quantity, considerably simplifying the mathematics” (Garvin, 1984, p.26-27). As seen above, the mix up may be related to a tendency towards calling broadening and calling everything “quality”. An early example in this direction is the term “objective quality” originating from Shewhart (1931). Objective quality is then defined as something that is measurable “independent of the existence of man”, in contrast to subjective quality that refers to “what we think, feel, or sense as a result of the objective reality” (Shewhart, 1931, p.53). In other words it could be claimed that Shewhart here suggest that quantity is quality, more precisely quantity is “objective quality”. Quality characteristics then became something measurable and quantitatively expressible.

Later on, this innovation and extension of the quality category became the inspiration and base for the now widespread “Kano model” that attempted to bring new perspectives to, and try to explain, the correlation between Shewhart’s categories of objective and subjective quality. In doing so, Kano et al. (1996) proposed a new two-dimensional recognition of quality. This recognition includes the idea of five distinguished categories of quality elements. The relationship between the “state of physical fulfillment”, being objective quality, and the customer’s “satisfied feeling”, being subjective quality, is proposed as different for each of these five categories of quality elements.

In retrospective, while both Shewhart (1931) and Kano (1996) made important contributions to the QM field, they also appear to have contributed to a mix up of the categories of quality and quantity. Relating back to our time, it should be noted that this tendency to mix up or equal quality with quantity is also part of the wider concerns of New Public Management (NPM). A concept that now have attracted enormous criticism (see e.g. Alford, 2002, Osborne, Radnor and Nasi, 2013, SOU 2013:40).

MIXED METHODS, ARGUING FOR THE NEED OF APPROACHING QUALITY AND QUANTITY DIFFERENTLY AND IN COMBINATION

As for the authors of this paper, it is not an issue of arguing that the qualitative or the quantitative approach to knowledge development and learning is “the right one”. On the contrary, from a QM perspective it is about being conscious about when to select what approach and how to best mix the strengths of the qualitative and quantitative approaches or methods respectively. In the research literature such a capturing and mixing of the best of both approaches is referred to as “mixed methods”, recognizing that all approaches have limitations (Creswell, 2003). For example, this approach

is used if there is a need to both generalize the findings and develop a detailed view of the meaning of a phenomenon or concept for individuals, such as external or internal customers. In this type of mixed approach, the researcher first explores generally to learn about what variables to study and then studies those variables with a large sample of individuals. Alternatively, the researcher may first survey a large number of individuals, then follow up with a few of them to obtain their specific language and voices about the topic (Creswell, 2003).

PRACTICE-BASED LEARNING LOGICS

As suggested by Ellström (2010) two complementary organizational logics called “the logic of development” and “the logic of production” can be used to analyze learning and innovation. These two logics have apparent similarities with the organizational ambidexterity framework and the terms “explore” and “exploit” as seen in e.g. March, 1991 and later O'Reilly and Tushman, 2013. What is interesting is that the adaption of qualitative or quantitative approaches for learning and knowledge development appear to differentiate the two. According to Ellström (2010) the learning taking place according to “the logic of production” becomes adaptive or reproductive. The basic condition of such learning is to reduce variation. And successful learning is to perform more rapidly or with a lower percentage of error (Argote, 1999; Argyris and Schön, 1978; March, 1991). Given that description it appears as if quantitative understanding, the measurement of time, errors and variation becomes a key in an organization dominated by “the logic of production”.

In contrast Ellström (2010) argue that the learning taking place according to “the logic of development” becomes developmental. The logic of development, entails action and learning that calls for risk-taking and a capacity for critical reflection, together with sufficient scope and resources for experimenting with and testing alternative ways of acting in different situations. In this view, conflicts and ambiguity are not potential threats to learning or to efficient performance, but rather potentials for triggering developmental learning processes. Contrary to the logic of production, the logic of development has a focus not on reducing variation and attaining homogeneity, but, rather, a focus on exploring variation and diversity in thought and action. Given that description it appears as if qualitative understanding, the deeper understanding of why and how becomes a key in an organization dominated by “the logic of production”.

DESIGN AND PARTICIPATION IN PUBLIC SERVICES

Sangiorgi (2011) argue that in the design debate about public services, participation is seen as a key resource to deeply change the traditional hierarchical model of service delivery and the perception of citizens themselves. Taking the idea of participation even further, Cottam and Leadbeater (2004) proposed “Open Welfare” i.e. an open model to public services delivery

based on ‘mass, participatory models, in which many of the ‘users’ of a service become its designers and producers, working in new partnerships with professionals’ (p. 1). Participation has also been motivated as being the basic right of democracy, a process leading toward better citizens and as a way to generate more efficient and effective programmes and policies (Cornwall, 2008).

METHODS

The research question of this paper has grown out of two specific contexts or cases that the authors of this paper have been involved with during the last years. Both cases are related to municipal quality development and both have had a combined agenda of educating personnel in how to develop quality as well as driving quality improvements for real in the municipality. The cases are here used in order to inform and provide hands-on insights from practice in order to strengthen the more conceptual arguments of the paper. They are hence used as much to argue for the interest and importance of the purpose of this paper as to provide answers to it.

The first case (case A) covers the initiation of an ambitious broad scope Lean initiative in a Swedish municipality. An initiation that includes a wide spectrum of activities from a Lean leadership development program to a Lean coach educational program that includes the conduct of Lean improvement pilot projects. One of the key observations from this initiative so far is that there have been a lack of interactions, participation and really insightful knowledge development in relation to the citizens of the municipality. This despite a very explicit communication of the importance of “understanding the customers” and “creating value for the citizens” within the educational modules and the initiative as a whole. Naturally, this have given rise to questions such as:

- Why are the Lean improvement teams not more “out there”?
- Have the Lean improvement teams really understood the perspectives and needs of the citizens, the once they are improving for, in relation to their projects?
- Are there other methods or approaches that could be used to make it happen?

In sum, the observations and insights from case A very much sparked an interest concerning the purpose of this paper. In parallel, the team of authors have been involved in and followed a second initiative aiming at teaming up for making improvements happen in another Swedish municipality. Even though this initiative (case B), “Change radically” (in Swedish “Förändra radikalt”), fundamentally have the same aim and context as the Lean initiative, the approach here observed differs in many ways. This initiative is sprung from ideas and methodology of Design Thinking (DT), and service design. In doing so, case B have provided insights and

an interesting opportunity for comparison when it comes to identifying practices and learnings to be drawn from designers and DT.

The methodology and research design used for understanding the two cases is inspired by action research as defined by Reason and Bradbury (2001): “a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities.” (2001, p. 1). In being so it involved several sources of data including:

- Participatory observations during the workshops and interactions taking place as part of the process.
- Interviews with participants as well as the initiators and facilitators of the initiatives.

The analysis has been made in terms of a serie of reflective discussions between the members of the research team as well as in dialogue with participants from of each case. As part of the process the comparative insights and conclusions evolved stepwise bringing together action and reflection, theory and practice, in participation with others. An important attitude of this approach is that “there is nothing so practical as a good theory” (Lewin, 1951, p.169). But also the notion that theory can and should be generated through practice as argued by Brydon-Miller et al. (2003).

RESULTS AND ANALYSIS OF CASE A – “LEAN FOR CITIZEN VALUE”

This section provides a richer description of the first case used as a basis for this study.

BACKGROUND AND INITIATION

In case A: Lean for citizen value, we have been taking part of the introduction of a Lean improvement initiative in a municipal context. The chosen organization is a municipality in Sweden, with approximately 11000 inhabitants. In 2015 the municipal decided to apply Lean in order to get a structured way of working with continuous improvements along with increased commitment and participation from the co-workers. The aim of the lean-initiative is to enhance the ability to create value the citizens. The initial phase of the implementation was focused on understanding and knowledge development. Case A began by educating and training employees at all levels. To enhance learning and lead the implementation the organization decided to educate and train twenty change-leaders called Lean-coaches. Early in 2015 employees at all levels in the organization had the opportunity to apply to become a Lean-coach. Twenty lean-coaches was then

educated by external facilitators and in parallel five pilot projects was initiated to serve both as training arenas for the lean-coaches and as early success areas to support the overall Lean initiative.

CHOICE OF CHALLENGES/PROJECTS (WHAT?)

The lean-pilot project aimed to develop knowledge and provide a training arena for cross-functional teamwork preparing the lean-coaches for taking the lead in continuous improvement projects. The lean-pilots were also intended to be role models for the other divisions at the municipality. A third purpose that the municipality wanted to achieve with the pilots was to improve sick leave numbers. The divisions in focus for pilot 1-4 were selected since they had a history of problems with high number of sick leave days. Pilot 5 were selected as a reference case based on the fact that they have presented very good sick leave results lately, see table I.

RECRUITMENT OF TEAMS (WHO?)

The lean-coaches worked in groups of 3-5 and the groups were randomly selected. All lean-coaches are originally employed in different subunits at the municipality. Their role within the pilots was primarily to develop the lean-competence of co-workers and managers. They also had the role to initiate, follow up and improve the pilots’ continuous improvement projects. One could say that they were given the role as “pilot project managers”. The front-line staff at each of the divisions were assigned by management to be part of a Pilot in the Lean-pilot project. A further description of the five Pilots are seen in Table I.

Table I. Overview of pilot areas in case A Lean for citizen value.

Lean Pilot	Municipal division	Roles involved in the pilot project
Pilot 1	Elderly care	5 lean-coaches 2 managers 4 front-line staff members
Pilot 2	Preschool	4 lean-coaches 1 manager 6 front-line staff members 1 lean-coach is employed within this area
Pilot 3	Primary school	4 lean-coaches 1 manager 11 front-line staff members
Pilot 4	Building and urban planning”	3 lean-coaches 1 manager 8 front-line staff members 1 lean-coach is employed within this area
Pilot 5	The administration of integration service	3 lean-coaches 2 managers 4 front-line staff members

DURATION AND TIME SPAN (WHEN?)

The lean-coaches pilot projects started off in the end of 2016 and the educational part of the pilots were presented in June 2017. The actual work with the pilots were planned to run for 9 months but due to reluctance to let the Lean-coaches start their work with the pilot the time Lean-coaches could spend with the Pilots was reduced to 2-3 months. The reason for delaying the start of the pilot work is not known in detail but one factor was an anxiety of the outcome and result of the pilots. The success of the overall Lean project is clearly crucial to the municipality and the top management expressed a high concern and fear of that the Lean-coaches would risk to be received negatively by the pilot teams if they went out “to early”. It was also expressed that the performance of the Lean-coaches “have to be good!”.

PROCESS (HOW?)

The journey of this initiative was guided by the educator facilitator and based on a pulse of milestones. The overall process were based on the learning cycle PDSA.

The process, originally planned to include several interactions with the facilitators and several interactions and deep studies of the pilot areas where in the end diminished to one or two loops of interaction with the pilot teams as seen in Figure 2.

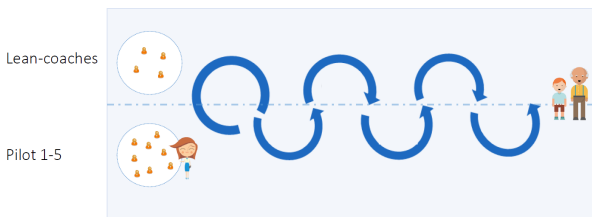


Figure 2: Overall process in Case A - Lean for citizen value. The Lean-coaches worked mainly with the internal teams in the pilots in one or two loops of interaction. The citizens or customer were not directly involved in any of the pilot projects.

SPECIFIC METHODS AND TOOLS FOR UNDERSTANDING VALUE AND DEVELOPING KNOWLEDGE (HOW IN DETAIL?)

Looking more into detail about how the pilots of the case understood value and developed their knowledge it is evident that the Lean coaches could not access the pilot teams as they wanted and wished and when they finally could, time was a constraint. The choice of methods and choice of tools should be interpreted in this light. The results from the pilots indicate better value for the internal teams, involvement from the pilot teams but no direct involvement of the customer and only one out of five pilots indicate directly increased value for the customer. In the other pilots the value for the customer is indirect, the customer might benefit from a more efficient internal process. The specific methods and tools applied were typical Lean tools as seen in Table II.

Table II: Overview of tools, techniques and primary result in case A - “Lean for citizen value”.

Lean Pilot	Tools and techniques
Pilot 1	5S Checklists and information brochures (Standards) Brainstorming Affinity mapping Gemba
Pilot 2	5S Visual control Gemba Brainstorming Fishbone diagrams/Root-cause analysis
Pilot 3	5S Visual control Brainstorming (Slöserijakt) Fishbone diagrams Process mapping (Swimlane)
Pilot 4	5S Visual control
Pilot 5	Process mapping (Swimlane) Root-cause analysis 5S Checklists (Standards)

RESULTS AND ANALYSIS OF CASE B - “DESIGN THINKING FOR DIFFERENT, BETTER, AND CHEAPER!”

This section provides a richer description of the second case used as a basis for this study.

BACKGROUND AND INITIATION (FROM WHERE?)

This initiative that officially goes under the name “Change Radically”, in Swedish “Förändra radikalt”, originated by Swedish Association of Local Authorities and Region (SKL) and Sweden’s innovation agency Vinnova. The initiative was initiated with the aim of strengthening the innovative power of municipalities in Sweden. The more specific purpose of the project was to try new approaches for development of new solutions to existing challenges. The initiative was carried out for the first time between March 2014 and June 2015. The municipality of Oxelösund participated together with 9 other municipalities. Service design was used as a method of change. In Oxelösund, the project convinced the municipality's management that cross-border work gave rise to more innovative ideas. As a consequence, Oxelösund municipality invited other municipalities in the region of Sörmland to participate in the “Change Radically” initiative in a joint innovation process in 2016 and in 2017.

RECRUITMENT OF TEAMS AND CHOICE OF CHALLENGES/PROJECTS (WHO AND WHAT?)

"Change Radically" was marketed internally to all departments in the municipality and externally to other municipalities. The message was "bring your challenge at hand and we will solve it together!" The working groups and individuals who felt they had need for radical development and trusted the design process used reported their interest and were invited to participate.

All types of activities and all levels in the municipalities and the region were welcome to attend. However, there were certain criteria for which challenges could be raised into the project. The challenges would have to have a clear user focus and be something that the organization planned to work with or had tried to solve without success. Nine different innovation groups with different identified development needs were included in the annual process of 2016. Seven working groups fulfilled the design process.

DURATION AND TIME SPAN (WHEN?)

The initiative is based on a pace of annual design processes starting up each year in April and being finalized in December the same year. The teams meet in four workshops under the period. In between, each team work with their analysis and design activities on their own with optional coaching if needed.

PROCESS (HOW?)

The journey of this initiative was guided by two facilitators who work within the Oxelösund municipality. The project managers themselves had undergone external method training in design methodology from a private consulting firm. The work was conducted in 2016 in the form of workshops where the nine innovation groups met, exchanged experiences and worked on their challenges.

The goals for the development project and needs for deeper knowledge creation were identified in workshop number one. In the same workshop, each of the nine groups' developed a "research design" for getting to understand the challenge at hand, first-hand. Between workshop number one and two, the nine groups themselves have worked to gather insights about the users' needs and situations typically using interviews, diaries and observations. Two months after the first workshop, in workshop number two, the collected information was analyzed, looking for key insights. The workshop also identified overall solution based on these insights. About two months later again, in workshop number three, more concrete ideas and solutions were generated. Thereafter the nine working groups run tests with the users before workshop number four where the tests was evaluated, new experiences gained and further iterations was planned as seen in Figure 3.

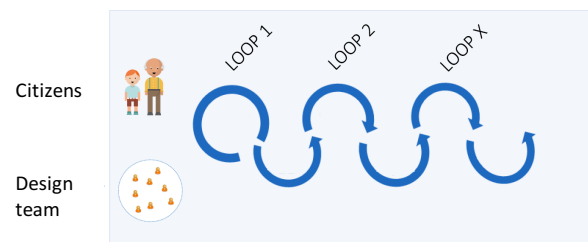


Figure 3: Overall process in Case B - Design thinking for different, better, and cheaper! The design teams worked directly with the citizens or customers during several loops of interaction.

SPECIFIC METHODS AND TOOLS FOR UNDERSTANDING VALUE AND DEVELOPING KNOWLEDGE (HOW IN DETAIL?)

The nine working groups had in the first workshop gained knowledge of how to understand a value creation process and how they could develop their knowledge about the beneficiaries' thoughts and experiences. The teams did so by applying the following tools:

- Be the user; by trying to be the user, you get first-hand experience that can help you better understand the user's situation.
- Participant observation; by observation (without interacting) of what is happening in different situations one can gain knowledge about the user's situation.
- Qualitative interviews; by asking open questions, the user can control the interview. It is the user who defines what is important to talk about. Even during the first workshop the participants was urged to call a user on the spot. It was a very illustrative method used to push the teams to take direct contact with the ones they are designing for.
- Diary; by allowing a user to make notes about his day, he visualizes moods and behaviours.
- External Reconnaissance; How have organizations done elsewhere?

COMPARATIVE ANALYSIS

In comparing the two cases with the lens of the purpose of this paper, "to explore what quality management can learn from designers, and design thinking practice, about using more qualitative approaches for learning and in developing knowledge", several insights appear. Some of them also occur on a comprehensive level and refer to attitudes rather than the use of specific qualitative methods or tools, as seen in Table III.

Table III: Overview of important differences between case A and B.

Aspect of differentiation	CASE A: "Lean for citizen value"	CASE B: "Design thinking for different, better, cheaper!"
Main focus	The internal operations and the wanted end results	The citizens and the design process. Have faith in the process
Attitude towards failure	Fear of doing wrong: "it must be good"	Make new mistakes. Try, fail and learn
Attitude towards planning versus doing	Start with planning so that you then can do it right	Go out and start doing, no excuses for not being out there
Approach to understanding and developing value	Search for "facts" in terms of e.g. sickness leave statistics and solve them.	Try to understand qualitatively before rushing to a solution. Search for insights!

What to learn can be summed up in three learning areas:

BASE DECISIONS ON INSIGHTS AND STORIES, RATHER THAN JUST "FACTS"

Going back to the QM cornerstone or principle declared as "base decisions on facts", see e.g. Hellsten & Klefsjö (2000). In case A/Lean, facts tended to become equivalent to numbers - "we need facts" became we need to see it quantified in numbers. In contrast, the search for stories and "insights", as seen in case B and DT appeared to provide a different level of curiosity and learning. Other fields of research stress the power of human stories for getting insights, empathy and learning. This is something QM might learn from.

START WITH GET OUT AND DO, RATHER THAN BECOME STUCK IN PLANNING

In comparing the approaches used for understanding value in QM and Design Thinking (DT) with the classical learning cycle of "Plan-Do-Study-Act" (PDSA) (Deming, 1993) it is striking that the planning paradigm of QM might have become a hinder of coming to action in case A. The emerging behaviour of planning rather than doing as seen in case A was in sharp contrast to the DT mindsets and practices seen in case B - pushing the teams to start doing and interact with citizens immediately, even during the first workshop. This is something QM might learn from.

FAIL OFTEN IN ORDER TO SUCCEED SOONER, RATHER THAN DO IT RIGHT THE FIRST TIME

A learning closely related connects to the traditional QM motto "quality first: do it right the first time". As much as such a motto might be helpful in motivating

employees to stick to the standard procedure it really does not help innovation or development. What it does is that it risks pushing fear into the system. A spread of such a fear could be seen in case A/Lean when top management decided to stop the Lean coaches from interacting with the divisions and the teams because of a concern that "it had to be good" the first time. This was in sharp contrast to the DT mindset seen in case B arguing failure as a powerful tool for learning. Failure is then seen as an inherent part of the process because we will never get it right on our first try. Fail often in order to succeed sooner is e.g. a traditional motto of IDEO, the design firm. This resonates with what Ellström (2010) calls "the logic of development". This is something QM might learn from.

CONCLUSIONS AND DISCUSSION

This paper has explored and discussed what quality management can learn from designers, and design thinking practice, about using more qualitative approaches for learning and in developing knowledge. In doing so two cases have been used to argue for the potential of such a learning and contribute to this purpose. As a result three learning areas have been proposed in terms of:

- Base decisions on Insights and stories, rather than just "facts"
- Start with get out and do, rather than become stuck in planning
- Fail often in order to succeed sooner, rather than do it right the first time

In reflection, these learnings relate as much to a shift in mindset and attitudes as to a shift in the specific tools or methods used in QM practice. These conclusions aligns with the thoughts of Ellström (2010) arguing that the processes of learning occurs in a wider context or logic connected to certain attitudes and norms. The interplay between and relative strength of the logics of production and development are indeed an interesting area for further research.

Being inspired of DT practice and approaches, the paper hope to contribute to developing the ability of QM practitioners to better mix the current strong quantitative practices of QM with more qualitative approaches for knowledge creation and learning. A further hands-on exploration of such a mixing is part of a future research agenda. As part of the discussion it must also be noted that the two cases here presented by no means are seen as representable for all QM or DT initiatives. However, we found them instrumental as a starting point for the discourse of this paper. It should also be stressed that both cases were educational initiatives. For both cases one of the goals were to educate and teach the participants Lean and design thinking practices. For the Lean case (case A) the educational goal increasingly became the primary goal as constraints came to stop much of the actual improvements from being realized.

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