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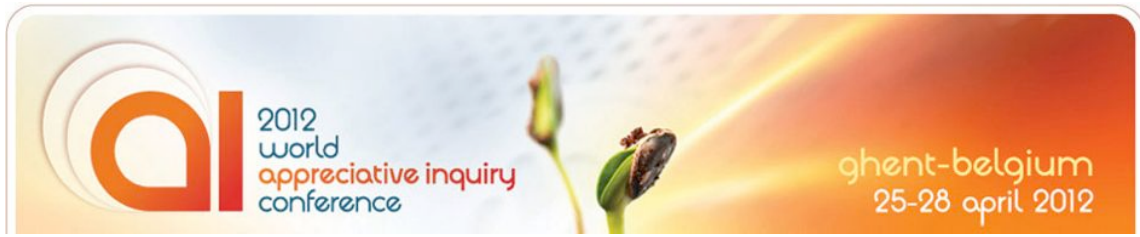
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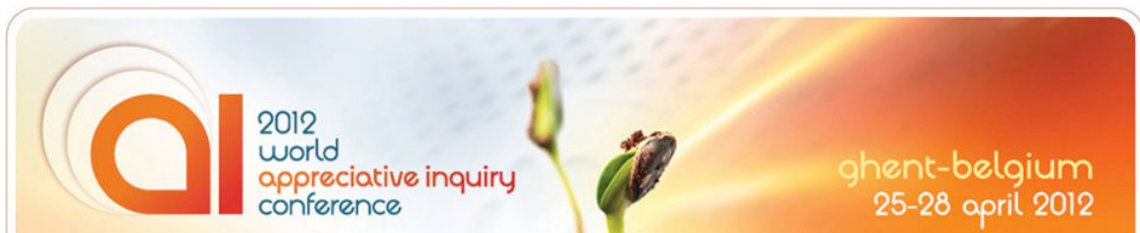
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# Appreciative Problem Solving

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## Abstract

Many industrial production work systems have increased in complexity, and their new business models compete on innovation, rather than low cost. At a medical device production facility committed to Lean Production, a research project was carried out to use Appreciative Inquiry to better engage employee strengths in continuous improvements of the work system. The research question was: "How can Lean problem solving and Appreciative Inquiry be combined for optimized work system innovation?"

The research project was carried out as a co-creation process with close cooperation between researcher and participants and was documented by qualitative methods.

This paper presents an academic literature review on Appreciative Inquiry and problem solving for continuous improvements that did not reveal successful attempts in combining the two. Both the literature and the empirical study showed one of the main challenges to be to connect the two different thinking modes in the daily practice. The empirical study found both approaches useful for creating continuous improvements of the work system and identified different practices of combining them. From the empirical study, the paper identifies three approaches to work system innovation and discusses how Appreciative Inquiry, Problem Solving, and the combination 'Appreciative Problem Solving' can be used to optimize continuous work system innovation. These findings add to the theoretical foundation of the emerging field of Strength-based Lean.

**Keywords:** Appreciative Problem Solving, Appreciative Inquiry, Problem Solving, Strength-based Lean, Work System Innovation, Success Expansion.

## The Emergence of Strength-based Lean Production

Industrial production work systems have been increasing in complexity for a long time (Wiendahl & Scholtissek, 1994), mainly due to increasing automation, need for specialized knowledge, and change frequency to fit new product development. In order to compete, some production facilities are using new business models that focus on their ability to create innovation rather than low cost for mass production (Johansen & Riis, 2005).

This study was initiated at the production facility Novo Nordisk Device Manufacturing and Sourcing that were 'ramping up' new production for medical devices. The business plan is based on the ability to create new work processes and get new equipment to operate while producing efficiently. This business plan implies a lot of technical problems and improvement challenges in the daily work. Novo Nordisk, which the facility is a part of has committed to Lean Production (Womack & Jones, 2003; Liker, 2004) and has worked intensely with this approach since 2003.

In 2005 the facility experienced a very high employee absence and low productivity. After being prompted by the surprising question “if your facility is an ultimate success in two years, how does it look?”, the managers realized the problems were due to the employees’ expectations and fear. They expected a closing down of the facility after phasing out their current product. The facility management then decided to initiate a project to create change by using an Appreciative Inquiry approach to engage the entire system in addressing the problem by turning it into a burning dream instead of a burning platform. They used a variant of the Appreciative Inquiry Summit (Ludema et al., 2003) to engage the whole facility in creating the dream of being ‘most wanted as facility and employees’ and starting up initiatives to achieve this dream. By using a strength-based approach they managed to turn around the situation and lower the absence with 50 %, raising productivity with 44 %, and cutting costs pr. product by 17 %. The ultimate success was realized when they succeeded in attracting a new product for production ramp up two years later (Kongsbak, 2010).

After having experienced Appreciative Inquiry successfully at the strategic level with the whole system, the factory management had a desire to make this approach useful in their daily operational work. The challenge was to combine it with Lean, which the company was committed to. The question was therefore: “How can strength-based approaches such as Appreciative Inquiry be integrated in the daily work processes in a company committed to the Lean production system?” This question led to a multi-year research project on Strength-based Lean in collaboration between Novo Nordisk, the involved consultancy Resonans A/S, and the Technical University of Denmark.

The purpose of the project can be illustrated by a quote from the production director: “When technical problem solving for process improvement is in the core of our work processes it is easy to fall back to a deficit-focused mindset that does not foster effective collaboration.” They wanted to create the collaborative engagement and creativity that they had experienced Appreciative Inquiry could create. At the same time, the Lean problem solving approach with root cause analysis was experienced as very valuable. They needed systematic problem solving to create the continuous improvements that were the foundation for the new product ramp up business plan at the facility. Systematic problem solving was a core strength they wanted to build on. The solution was therefore not to substitute it with Appreciative Inquiry but to find out how to incorporate both thinking ways into the daily work with problem solving and continuous improvements. This is where this research story begins.

### **A Desire to Bridge Two Paradigms**

The challenge was that Appreciative Inquiry and Lean have quite different thinking processes, languages, and assumptions. But a look into their basic principles reveal that they are not contradictory, but rather address different things: The Appreciative Inquiry principles are change principles describing how to create positive change and the Lean principles are operation principles describing how an effective and efficient Lean work system should operate. The basic principles are summarized in table 1 (Cooperrider et al., 2008; Womack & Jones, 2003).

**Table 1: Basic principles of Appreciative Inquiry and Lean.**

<b>Change principles</b>	<b>Operation principles</b>
The constructionist principle	Create value for the customer
The simultaneity principle	Visualize the value stream
The poetic principle	Create flow in the value-creation
The anticipatory principle	Use pull from the customer
The positive principle	Seek perfection by continuous improvements

The challenge of combining the two is thereby not their basic principles, but rather the different assumptions and basic approaches. Examples of some differences are summarized in table 2 (inspired by Hansen & Shaked, 2012).

**Table 2: Typical approaches in Appreciative Inquiry and Lean.**

<b>Approach to create...</b>	<b>Lean</b>	<b>Appreciative Inquiry</b>
value for customer	Eliminate waste	Look for and grow value
efficiency and flow	Remove bottlenecks	Identify and expand best practice
effectiveness and quality	Reduce defects	Study and learn from perfection for the customer
continuous improvements	Identify problems, analyze root causes, and fix them	Identify best practices, explore success factors, and dream & design to improve

An example of the typical built-in assumptions in Lean is illustrated by Staats & Upton (2011) in a project of introducing Lean to knowledge work. After identifying a potential for improvements due to unproductive employees, the authors stated that the remedy for improvement was asking why-questions: *“Instead of assuming that the approach used for a process is right, assume that it’s wrong. [...] Why am I attending this meeting? Why am I filling out this report? Why am I standing at the printer?”* (Staats & Upton, 2011)

The example shows the typical implicit assumption in Lean behind improvement: To improve, you need to look for what is wrong, and then fix it. In Appreciative Inquiry the corresponding assumption would be: The first questions asked begin the change, so inquire into the best of what already is instead of analyzing causes of unwanted action, then, identify a positive vision to guide the improvement.

These, and other explicit and implicit assumptions that differ between Lean and Appreciative Inquiry makes it hard to identify how to approach the daily work when having a desire to use both thinking ways. Their approaches are different, but both can be effective in creating improvements and transformation (Bushe, 2005; Liker, 2004).

The field of Strength-based Lean is emerging from the potential in bridging the two paradigms, not just substituting one with the other. Since both approaches are based on creating change and learning, the topic for this study was chosen to be continuous

improvements (Barrett, 1995; Liker, 2004). While this topic represents difference in approaches, it could be a good opportunity to create a bridge at the conceptual level. Liker (2004) describes continuous improvement and learning by problem solving as one of four central themes in Lean. The research question was then formulated: “How can Lean problem solving and Appreciative Inquiry be combined and used for continuous improvements?”

The goal of the study was to understand how to combine the two in practice to give applicable advice to the production facility.

## Two Different Improvement Approaches

The practical problem solving process in Lean is visualized by Liker (2004, pp. 256) as shown in figure 1. As the model shows, the approach is based on cause and effect investigation. The process can be simplified to three stages: Understand the concern (steps 1-3), investigate the root cause (step 4), and implement the countermeasure (steps 5-7). The visualization and metaphor for problem solving is a funnel of gradually narrowing the focus until the ‘correct’ cause is found, and then investigated by using why-questions. As step 7 states, a solution is not in place until it is standardized and confirmed by evaluation.

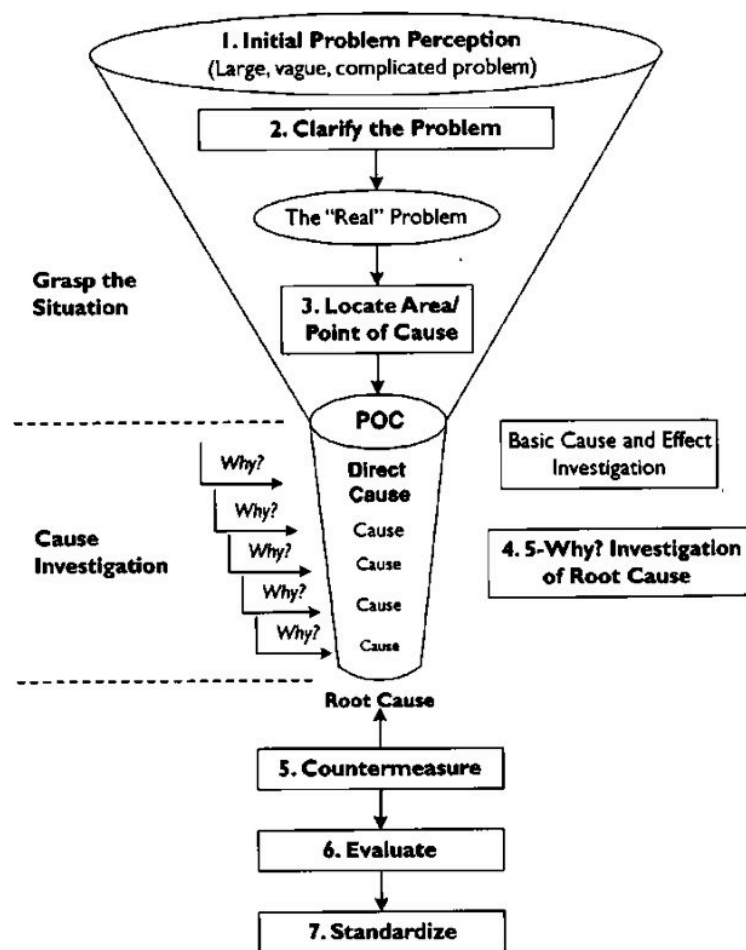


Figure 1: Lean practical problem solving process (Liker, 2004 pp. 256).

Continuous improvement is called *Kaizen* in the Japanese Lean terminology, and is either performed in Kaizen event workshops or directly at the shopfloor where daily problems are identified and problem solving used to create continuous improvements. In the Lean literature continuous improvement should create learning, both individual learning by self-reflection and organizational learning by involving stakeholders and building consensus during the process (Womack & Jones, 2003). Three central Lean keywords for problem solving are (Liker 2004):

- *Genchi Genbutsu*: Go and see the real thing in action to understand and act.
- *Nemawashi*: Make decisions slowly with consensus by involving stakeholders in considering options and rapid implementation.
- *Hansei*: Self-reflection on actions, spirit and attitude.

The concept of Japanese Hansei is described as a process where “*when you do something wrong, at first you must feel really, really sad. Then you must create a future plan to solve that problem and you must sincerely believe you will never make this type of mistake again.*” (Liker 2004, pp. 257). Lean problem solving is based on removing problems by rational investigating of the root cause, and in Japanese culture, sadness may be a necessary step for creating improvement and learning.

The process for creating change in Appreciative Inquiry is taking a different approach. It is based on the following five principles briefly introduced here (Cooperrider et al. 2005):

- **The constructionist principle** states that reality is socially constructed by multiple perceptions and inquiry into imagination is necessary to create change.
- **The simultaneity principle** states that the questions asked begins the change and inquiry cannot be isolated from implementation.
- **The poetic principle** states that organizations are continuously re-interpreted and re-constructed by the narratives told and what is given focus grows.
- **The anticipatory principle** states that actions are guided by images of the future.
- **The positive principle** states that positive thinking provides energy for creating change.

The Appreciative Inquiry approach to change is based on creating a momentum from the best of what already is and gives life, and by creating positive future images to move toward. The simultaneity principle implies that it may be more rewarding to ask for strengths in the system to build on instead of investigating root-causes of undesired action. The poetic principle argues that a chosen focus grow with the re-interpretation of the organization and it may therefore be more rewarding to re-interpret and strengthen the situations where the system is most alive instead of where it is least effective. The anticipatory principle states that guiding future state imaging are important in order to create effective action and change. These principles are conceptualized in the 4D model, a widely used process, as shown in figure 2 (Cooperrider, 2005, pp. 30). In some versions it includes a fifth D: Definition of an affirmative topic choice.

Appreciative Inquiry change is based on growing strengths by positive future images in a positive environment in order to create transformational change, and a positive environment is considered necessary.

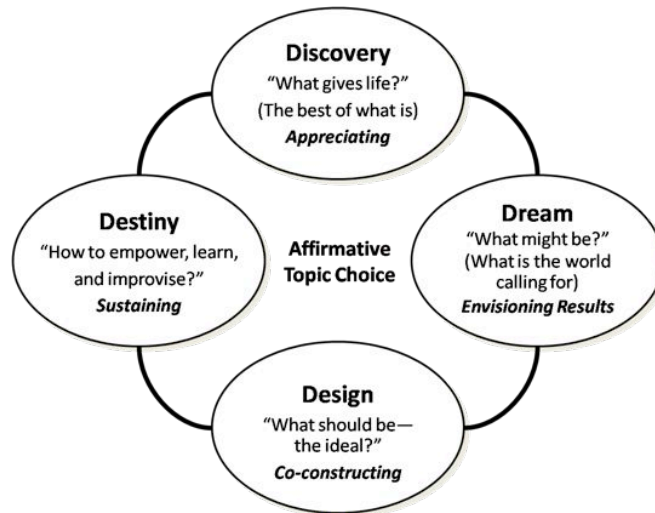


Figure 2: The 4D model of Appreciative Inquiry (Cooperrider, 2005 pp. 30).

### Asking the Literature: How to Combine Lean Problem Solving and Appreciative Inquiry?

An academic literature review was then carried out to get input on how to combine the two approaches for continuous improvement by searching EBSCO Host Academic Search & Business Source Premier, and Thomson Reuters Web of Knowledge for conference proceedings and journal papers. The result is summarized in table 3. There were no hits on “Appreciative Inquiry” AND “Lean”, “Operations Management” or “Production”. Note that the literature review did not include books or practitioner journals, which could also have contained relevant material, but this was chosen in order to identify a research gap to address.

Table 3: Summary of Literature Search on Appreciative Inquiry and Lean Problem Solving.

Search Term	Total hits in the database	Papers concerned with discussion	Papers concerned with combining
“Appreciative Inquiry” AND “Lean”	0 hits	0 hits	0 hits
“Appreciative Inquiry” AND “Process Improvement”	10 hits	0 hits	3 hits
“Appreciative Inquiry” AND “Continuous Improvement”	4 hits	1 hits	2 hits
“Appreciative Inquiry” AND “Engineering”	6 hits	1 hits	1 hit
“Appreciative Inquiry” AND “Problem Solving”	31 hits	5 hits	0 hits
<b>Total hits (no replicates):</b>	<b>42 hits</b>	<b>6 hits</b>	<b>4 hits</b>

The majority of the papers that discussed the two approaches were critical towards problem solving and highlighted the strengths of Appreciative Inquiry, emphasizing that a problem



solving approach could lead to defensive posturing that discourage action and creative thinking (Barrett, 1995; Neilsen, 2005; Shendell-Falik et al., 2007), as well as inhibit knowledge generation in collaborative work (Phlypo, 2008). Appreciative Inquiry creates opportunities for innovation of processes and ways of working together as well as to create enthusiasm and commitment to the organization, while problem solving does not foster excitement, enthusiasm or generate innovation beyond the defined problem's parameters (Shendell-Falik et al., 2007). The latter is due to the nature of problem solving that starts from a defined problem space set by constraints and boundaries with the solution coming from within the alternatives of these limitations (Avital, 2005). Barrett (1995, pp. 37) adds: *"accepting the constraints that generated the problem rarely leads to a permanent solution; instead, it often leads to patterns of coping."* In contrast, Appreciative Inquiry uses affirmative reflection and positive affect to lift up the search for ideal possibilities where the most desired solution is picked (Avital, 2005).

Neilsen (2005) introduces another view; that there is nothing wrong with the problem solving approach per se. When at best, both approaches makes the participants experience themselves at their best while achieving the highest levels of collaboration. He argues that that change requires secure organizational attachment that is often not established with problem solving approaches. It is therefore not the process of doing Appreciative Inquiry but the initial interventions of creating mutual trust that is the key to successful change.

Barrett (1995) introduces how a learning perspective can illustrate the effect of Appreciative Inquiry, e.g. that groups using selective self-monitoring focusing on successful outcomes have higher performance. Barrett (1995) stresses the importance of generative learning and thinking outside the accepted limitations, and argues that Appreciative Inquiry creates better learning systems that possess affirmative competence (being able to appreciate positive possibilities and strengths), expansive competence (challenging old habits with higher ideals that inspire to action), and collaborative competence (ongoing dialogue with diverse perspectives).

This summarizes to three types of arguments of the value of Appreciative Inquiry in relation to problem solving:

- More enthusiasm and commitment to change.
- More generative learning systems.
- More creative thinking and a wider solution space.

The papers that were concerned with combining the two approaches were all arguing how to incorporate Appreciative Inquiry into an existing process or method. Ncube & Wasburn (2008) combines Appreciative Inquiry and a Needs Analysis Model in order to increase proactivity of continuous improvement. They state that the combination avoids an overly positive focus at the expense of shortcomings and underlying organizational problems. They argue about the necessity of understanding problem causes, but their case did not incorporate it into their combined concept. Cuyvers (2010) argues how Appreciative Inquiry could support continuous improvement of quality development by changing focus from control to development. He argues about the necessity for still using measurements and structured methods but does not share insights on how to integrate the suggestions into established processes such as the Deming cycle and problem solving. Baaz et al. (2010) describes the

combination of Appreciative Inquiry principles with an evaluation method of learning from both excellence and challenges. They show how optimal learning is normally inhibited by an over-focus on the challenges. But, by teaching strength-based principles and incorporating Appreciative Inquiry into the method, they could create workshops with better learning and broader suggestions for improvements. Their combined concept involved cause and effect analysis for both excellences and challenges, and they recommend keeping a balanced focus between the two. For example by letting participants recognize problems and discuss causes but encourage suggestions for improvements and by showing problem-oriented individuals their views will also be considered. Holmberg et al. (2009) describe the use of Appreciative Inquiry for software process improvement and show the difference in underlying assumptions behind improvement and learning compared to problem solving based process improvement such as the DMAIC and IDEAL models. They report difficulties in introducing an Appreciative Inquiry mindset to engineers who appreciate the challenge of solving problems, and found that engineers struggled with expressing themselves in appreciative terms and with exploring hopes and dreams collectively. They were less enthusiastic in the dream and design phases, and they usually easily enjoy the challenge of identifying and solving problems. Holmberg et al. (2009) conclude that the satisfaction of problem solving may impede the use of Appreciative Inquiry in similar environments, and they recommend acknowledging the strengths of problem solving before demonstrating the potential of using Appreciative Inquiry. These papers also highlight enthusiasm, learning, and a wider solution space as the most important contributions from Appreciative Inquiry.

While the papers contribute with recommendations and experience, they do not answer the question of how to combine Appreciative Inquiry with problem solving. This knowledge gap needed to be addressed in the research project. The research question should be answered by developing a combined concept. Because of active engagement from the people at the production facility, a co-creation process was undertaken. By engaging the participants as much as possible in conceptual discussions and by engaging the researcher as much as possible in practical participation, it was hoped that the concept would get the best input from both theory and practice. This also meant using an abductive research approach.

### **Identifying the Potential of Appreciative Problem Solving**

Before the development of an appreciative problem solving concept was initiated, an inquiry into the possible potential and attributes was carried out to identify its focus. The research question had emerged from a desire at the facility, and that initial attraction was used as the foundation for a workshop to identify the potential of incorporating Appreciative Inquiry into Lean problem solving practices. A condensate of the answers is summarized in table 3.

They show that the concept could potentially address different levels of problem solving:

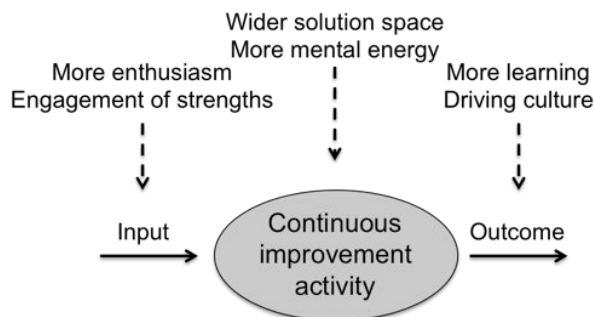
- The input and environment: Engage more strengths at work & engagement in goals.
- The process itself: More mental energy & better solution process.
- The outcomes: More learning & drive of the desired culture.

This corresponds quite well with to the three categories found in the literature review of enthusiasm, learning and wider solution space.

**Table 3: Identifying the potential of introducing Appreciative Inquiry to Lean problem solving.**

<b>Category</b>	<b>Potential stated at the workshop</b>
Engage strengths better at the work place	<ul style="list-style-type: none"> <li>• Engage people’s strengths to bring more competencies into the work place</li> <li>• More life and energy</li> <li>• Better match between competencies and goals</li> </ul>
Create more mental energy & resources	<ul style="list-style-type: none"> <li>• Get people more engaged</li> <li>• Improve trust and cooperation (social capital)</li> <li>• By creating a space for playfulness</li> <li>• Turns short term result focus into long term result focus</li> <li>• Fun to do what you are good at</li> <li>• By more appreciation of what works well</li> </ul>
More learning	<ul style="list-style-type: none"> <li>• Learn from positive deviations &amp; success</li> <li>• People improve more when they have fun</li> <li>• Better understanding by systematic learning of what already works</li> <li>• Enables learning instead of blame and defensiveness</li> </ul>
Better solution process to create improvements	<ul style="list-style-type: none"> <li>• More creativity and a larger solution space</li> <li>• Synergy between people in the problem solving</li> <li>• More people get engaged in the process</li> <li>• More proactive solutions</li> <li>• Enables a focus on attractive quality not just ‘need to have’</li> </ul>
Engage in the goal, not the task	<ul style="list-style-type: none"> <li>• Structure for more empowerment</li> <li>• By visionary leadership</li> <li>• Meaningful goals create more engagement</li> <li>• Makes people bring their ideas and solutions</li> <li>• People stretch more when they want to reach goals</li> </ul>
Drives the desired culture	<ul style="list-style-type: none"> <li>• Use different questions to drive culture and a new focus</li> <li>• Drive a more engaged and cooperative culture</li> </ul>

The identified potential in combining Appreciative Inquiry and problem solving is visualized in figure 3. The identified potential shows that there could be different focus areas to choose to expand for the development of a combined concept.



**Figure 3: Identified potential of combining Appreciative Inquiry and problem solving.**

In order to get insights that could contribute to the bridging, it was decided to get into the core difference between Lean problem solving and Appreciative Inquiry, namely the process and approach to improvement itself, with their different problem and solution spaces.

A continuous improvement activity can result in two types of learning. The first is adaptive learning of response and coping with environmental demands in order to make incremental improvements (Barrett, 1995), similar to what Argyris (2002) calls single loop learning. The second is generative learning that involves thinking outside the limitations of the problem and going beyond the framework that created the current conditions (Barrett, 1995). Argyris (2002) describes this as double loop learning, and he explains that it occurs when improvements are carried out by changing organizations' governing values, and then the actions. He stresses that this requires a shift from organizational defensiveness routines to organizational learning routines.

The improvements are not limited to technical improvements but could address the entire work system, such as its participants, technology, management, organization, work processes, and culture (inspired by Smith & Sainfort, 1989; Carayon & Smith, 2000; Kleiner, 2006). And at a systems level it could also address 'invisible' and intangible factors, such as the organizational social capital (Hasle & Møller, 2007) and relational coordination (Gittell, 2000). When a work system is improved through generative double loop learning, the practice can be called work system innovation.

The new business models for production are based on work system innovation rather than adaptive learning. Therefore, optimization of work system innovation was chosen as the goal for the concept in this case. The task to proceed with was therefore to combine Appreciative Inquiry and problem solving into a concept for optimized work system innovation by addressing their different processes for improvements.

### **Appreciative Genchi Genbutsu: Co-creation at the Shop Floor**

The chosen approach to generate input for the concept could be called *Appreciative Genchi Genbutsu*: Go and see the real thing in action, when it works best, to understand and expand it. This approach was carried out at the production shop floor to identify practice and experiments with combining Appreciative Inquiry and problem solving. The study took place together with a 14-week Lean implementation commissioned from the central Lean office that had focus on creating structures and introducing tools for systematic problem solving. In the following, three exemplars will be described.

**Can Appreciative Inquiry be used for proactive problem solving?** An operation station at a large automated assembly line had always had a very inconsistent performance with up to 200 stops pr. day. The project manager who was trained in both problem solving and Appreciative Inquiry chose to use the latter to improve the station's performance. She inquired into the situations where the process was at its best, when the station had the fewest stops and the best quality. She found out that at certain times it only had 1-3 stops pr. hour. By identifying the factors that were used when the station worked at its best she found a way to reproduce the better performance and ended up creating a much more consistent performance with only 20-30 stops pr. day, reducing down time with 90 %.

The approach of inquiring into the better performance, learning about factors for success, and expanding them in daily operations is one way to use Appreciative Inquiry for proactive technical problem solving by targeting a process and systematically understand and expand success factors. By being proactive and using generative questions during the process, such as inquiring into 'what could be' after understanding 'the best of what is', it could enable double loop learning of being engaged in whole system change instead of just solving a current problem within its predefined boundaries.

**Can a problem solving method be used to learn from success?** After Appreciative Inquiry had been introduced in the factory, they were more focused on learning from success but had no systematic way of doing it in practice. Daily performance boards were still only focused on actions when Key Performance Indicators were below target, 'green' meant ignore and 'red' meant take action.

One team had attempted to incorporate 'the daily success' into their performance meetings to learn from success. Without methods to identify, inquire into, and learn from the situations, the agenda point often created no discussion at all, and when it did it was focused on celebration rather than learning and elevating success factors. Effective learning from success requires identification of occasions, a method for inquiry, and formal structure for capturing and sharing the knowledge (Phlypo, 2008).

Another team experienced a useful method after a successful cross-functional project of introducing a new piece of equipment. The team used a problem solving approach with new questions to look for the root causes of success to initiate improvement. The facilitated investigation created some quite surprising success root causes that were shared with peers and captured for incorporation in future projects. The surprise was not the identified causes but rather that the team shared and highlighted causes that a lean coach later revealed he had tried to introduce earlier without success. Only after experiencing them in practice and systematically investigate them did the team acknowledge their validity. This practice of learning from success therefore contributes with two factors for improving the work system: It creates and captures new knowledge, and it creates an opportunity for knowledge sharing with peers from story telling. The story also highlights how a structured process could be used and that it was found useful to incorporate with a method that people were comfortable and familiar with, in this case a *success expansion* version of the well-known A3 template.

As discussed in the previous example, this could also lead to double loop learning by incorporating generative questions.

**Can Appreciative Inquiry be used to solve technical problems efficiently?** In this third example, an interesting discussion arose after experiencing a traditional problem solving activity. A plastic moulding machine had just broken down as the team leader initiated systematic problem solving (cf. figure 1). In the beginning of understanding the problem they did not get any useful information from the involved technicians. It took a while before a colleague gave a clue: The incident was caused by an operator closing the machine too early, but he was too embarrassed to tell. The team leader had learned that problem solving was a 'no blame game' so he investigated on and found that the direct cause to the problem was caused by closure of the machine before heating it up. In his root cause analysis he asked why

the machine was possible to close before being heated up, which lead to the solution of re-programming the machine to avoid the problem again.

After this, a thought experiment was carried out: Could Appreciative Inquiry have been used instead to solve the problem? The conclusion of the discussion was as follows. After walking through the standard 4D model and asking for ‘the best of what is’, when it worked better, if something could be learned from other more successful machines, what was wanted instead, etc., the conclusion was that without a root cause analysis for identifying the problem, it would be luck if the Appreciative Inquiry approach would solve the problem as efficiently as problem solving did. As opposed to within a social system, a useful reaction when a problem arises with one machine is rarely to focus on two other machines that performs well and try to expand their success; it was necessary to focus on understanding and solving the problem.

New questions emerged. What had happened, if the technician had not been embarrassed but was instead engaged in creating improvement? What if no colleague gave information about the cause? It became clear that technical problem solving process is a social process that depends on collecting information from people and engaging strengths in the team. What could have happened if the process had continued with the generative question ‘what could be’ instead of stopping at the first apparent root cause? Could some of these elements from Appreciative Inquiry maybe be combined with problem solving? This will be touched later.

In the next section the learnings from the shop floor study about ways of combining and approaching work system improvement are presented.

**Three improvement lenses: Problem solving, success expansion, proactive development**

As a result of the observations at the shop floor, three approaches to continuous work system improvement were defined. Within each of the approaches different methods could be used. Three methods from either Appreciative Inquiry or problem solving were observed: Root cause analysis, discovery of success factors, and dream of the future state. Figure 4 shows an overview of the three approaches and the methods observed during the study.

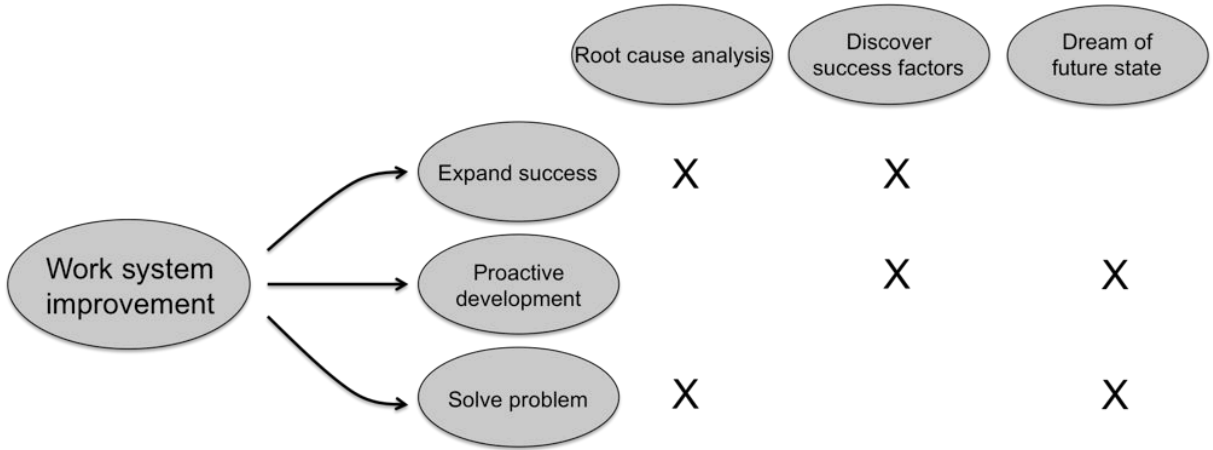


Figure 4: Three approaches to work system improvement, and an overview of methods observed.

**Success expansion:** Improvement initiated by a positive deviance or success that is inquired into in order to learn and expand the success.

In the study, success expansion was carried out by structured root cause analysis as well as discovery methods from Appreciative Inquiry for expanding success factors, such as interviews and structured dialogue processes.

**Proactive development:** Proactive improvement that is initiated by an idea or opportunity for improvement.

In the study, proactive development was observed carried out by discovery and expansion of success factors and by a future state dream process.

**Problem solving:** Improvement initiated by a negative deviance that is addressed in order to solve and improve the situation.

Problem solving was carried out by using root cause analysis and by using a future state dream process.

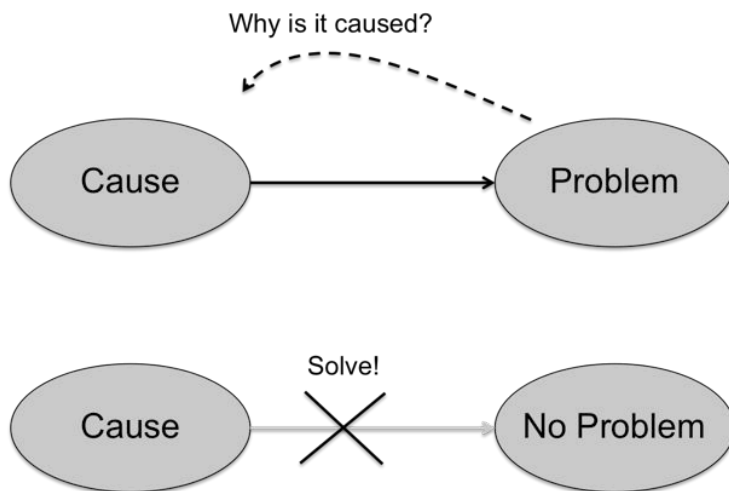
The use of all these three approaches can expand the opportunities for continuous work system innovation. Most traditional problem solving approaches only focus on reactive problem solving, and miss the opportunities in proactive development and success expansion. Traditional Lean is concerned with both proactive (e.g. Kaizen events with future state mapping, Liker, 2004) and reactive problem solving, but is often most focused on reactive problem solving while gradually raising targets to be able to identify and respond reactively to new problems. Processes based on benchmarking or best practice are focused on success expansion, but they are not used for continuous improvement. Appreciative Inquiry processes are most often proactive and focus on expanding success factors toward a future dream, but are not concerned with reactive continuous improvements from identified problems or success.

These three approaches are ways to initiate continuous improvement of the work system. Each was found able to create both adaptive learning and generative double loop learning. More research is necessary to understand if any of the approaches are better than others at creating work system innovation. An observation was that future-oriented questions often initiated more generative learning than past-oriented questions, and that the biggest difference for work system innovation was whether a generative and future-oriented process was initiated or if the process only was focused on eliminating causes. A deeper understanding was acquired by looking into the differences in the process.

### **Appreciative Problem Solving**

The discussion about Appreciative Inquiry in problem solving cases was initiated during the shop floor study. A conclusion from the study was that the employees found root cause analysis inevitable for many cases of problem solving. At the same time, the process of Appreciative Inquiry was also found useful for solving some problems in a technical context, and could even contribute with engagement of the social system in creating improvements.

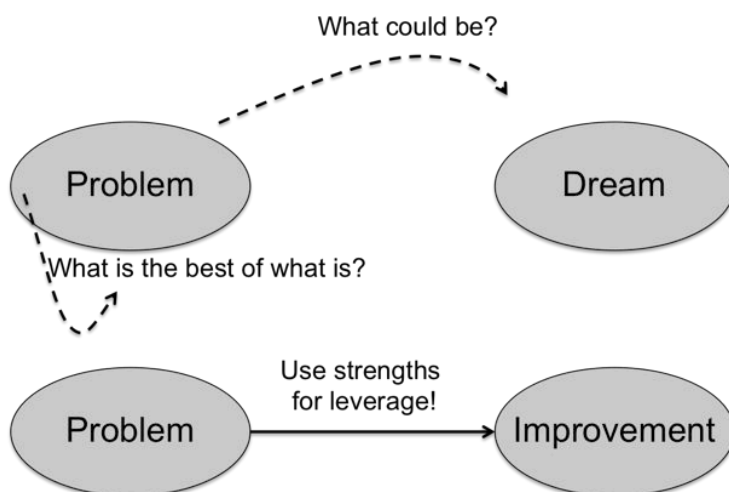
A deeper look into the two different processes revealed how they could be combined. Figure 5 shows a schematic illustration of the basics in a root cause based problem solving process.



**Figure 5: A schematic illustration of the basics in a root cause based problem solving process.**

By targeting the direct cause and then the root cause (cf. figure 1), this process works well for many technical problems and is often very efficient because of its direct approach of understanding the system and the problem. The result is often limited to single loop learning because the root cause analysis is based on the existing boundaries of the problem, and execution of the process is often not very engaging.

Figure 6 shows a corresponding illustration of a simplified Appreciative Inquiry based problem solving process.



**Figure 6: A schematic illustration of the basics in an Appreciative Inquiry problem solving process.**

This process is initiated by inquiring into the system when it is most alive and effective, and then it creates change initiated by a future state dream without having to identify the root cause of the problem. This process has the advantage of engaging the social system and of asking generative questions that can optimize double loop learning. In a technical context, it can have the pitfall of not addressing a direct way of solving the problem.



As described, both processes are usable for improvement. In the Appreciative Inquiry literature, problem solving is often regarded as being more useful for technical problems and Appreciative Inquiry for social and more complex issues (Holmberg, 2009). This view is supported by the observations and discussions during the shop floor study.

What if the system is both social and technical? Could the two processes then be combined in order to get the best from each? This was done by a synthesis of the two process representations, and called Appreciative Problem Solving as shown in figure 7.

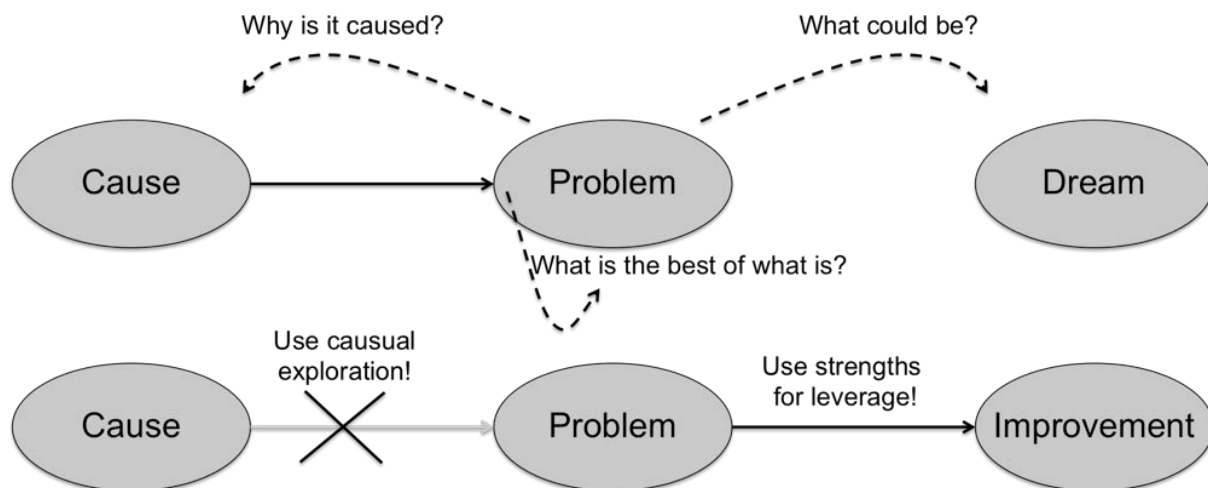


Figure 7: A schematic illustration of the basics in Appreciative Problem Solving.

Appreciative Problem Solving is combining the inquiry of ‘the best of what is’ with a root cause analysis to understand the system, and then it used the ‘what could be’ future state dream to generate improvements aimed at double loop learning. Seen from a process oriented perspective it incorporates the best of the two approaches to optimize generative learning. Furthermore, it would allow for the use of applying the Appreciative Inquiry principles to increase learning and enthusiasm in the activity. It is therefore one answer to the question of how to combine Appreciative Inquiry and problem solving for optimized work system innovation.

The model is currently tested empirically at the production facility in order to further explore the combination of Appreciative Inquiry and Lean problem solving in practice.

## Conclusion

This paper identified the state of the art within the academic literature, and concluded that no studies had previously described the combination of Appreciative Inquiry and Lean or any other problem solving approach for continuous improvement.

The potential for introducing Appreciative Inquiry to improving problem solving was found to be more enthusiasm, learning, and a wider solution space.

The question of how to combine Appreciative Inquiry and Lean problem solving for optimized work system innovation was answered in two ways:

- By introducing three approaches to continuous improvements that combined the approaches used in Appreciative Inquiry and problem solving.
- By introducing a framework for Appreciative Problem Solving that combines the basic processes within Appreciative Inquiry and problem solving.

Further studies are necessary to add knowledge to the emerging concept of Strength-based Lean and to investigate the practical use of the presented ideas.

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