

More Innovation, Less Waste – The Secret of Efficient Development Processes (Part 2)

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Lean Innovation, Lean Development and Lean Engineering are common topics of conversation. The joint goal is the improvement of the impact and efficiency of innovation and development processes. These are not surprising goals since the R&D process sets the course for the ability of the company to comply with Lean principles as products move along the value stream. Even future products, their marketability and manufacturability are determined at this stage. For the company, it is especially important to be able to differentiate itself from the global competition through innovation and at the same time offer compelling product benefits to its customers. Short development times and reduced R&D efforts move increasingly into the foreground.

The last issue of the Complexity Management Journal discussed the evolution of Lean Thinking, from the origin of Lean Production theory to Lean Administration to Lean Innovation. To develop the Lean Innovation principles, the University of Aachen and Schuh & Company have invested many research resources over the past years. Several analysis and implementation projects proved the twelve Lean Innovation principles to be viable. A condensed version of the approach will be presented in this article.

“The 12 Lean Innovation principles represent the results of our analysis about what differentiates the innovation management of Lean Champions from the average.”

Michael Lenders, Ph.D.

The idea of Lean is extended to the R&D area to include the increase of R&D impact in terms of truly successful and innovative development output. The Lean focus on efficiency increases, as it has become so well known for manufacturing environments, does not reach far enough for development processes. Therefore, the R&D specific approach referred to as Lean Innovation should be applied. In our experience, 40% of today's innovation projects cannot be realized because of a lack resources. Any gain in efficiency, productivity and output that can be achieved because of Lean Innovation is therefore even more important.

Lean Innovation: A holistic approach that fulfills the specific demands of innovation and development management.

The Lean Innovation approach combines the design of development processes and new products without waste. It improves the R&D impact in terms of output of successful and innovative products and services. The approach is based on the five principles of Lean Management, which were described in detail in the previous journal. Several basic methods are available to implement these principles in production and administrative processes (Fig. 1).

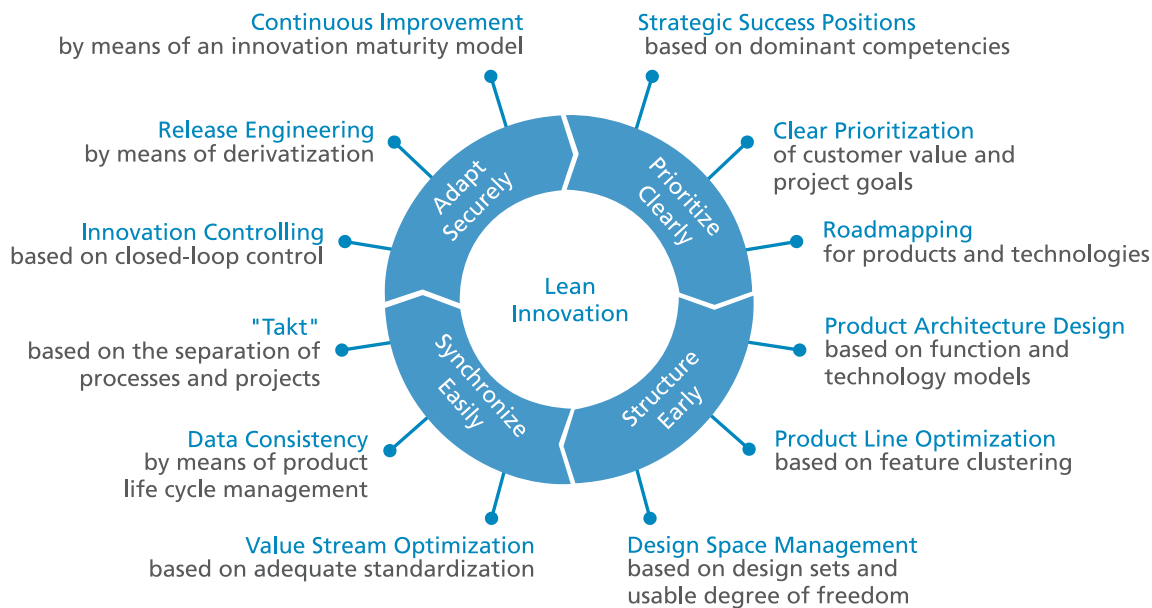


Figure 1: 12 Principles of Lean Innovation

Overall, Lean Thinking proposes three procedures:

- Eliminate waste
- Reduce unavoidable non-value adding activities
- Optimize value adding activities

Therefore, the goal of innovation and development without waste is to embrace the nature of product development as a creative process, while at the same time increasing the development efficiency.

To transfer the Lean principles to the innovation and development areas, twelve central principles were defined. These principles produce a long-term and sustainable increase of innovation opportunities for a company (Fig. 1). The twelve principles can be divided into the following four groups:

- Prioritize Clearly
- Structure Early
- Synchronize Easily
- Adapt Securely

Prioritize Clearly

Prioritizing clearly is the “incarnation” of a value orientation within innovation management. If innovation resources are strategically incorrectly prioritized, success in the market is at best incidental; regardless of how efficient the processes are.

1. Strategic Success Positions: An effective innovation strategy provides for a proactive composition of strategic success positions (SSP) through innovation management. An SSP addresses the intentional creation of important and dominant competencies. Strategic success positions form the requirements to achieve true market dominance and above-average results over the long-term. Figure 2 illustrates the systematic approach to determine strategic success positions.

2. Clear Prioritization: The starting point of an innovation is the easy and clear communication of product advantages. The value system captures the ideas of the stakeholders and structures them transparently. Often, conflicts between goals, hidden in the specification sheet, lead to waste of development output. Therefore, project goals are clearly classified to recognize conflicts of goals early on. Objectives that are not goal-oriented and contradictory are recognized by the system and resolved in a strategically correct manner.

3. Roadmapping: Technology and product planning occur in a long-term roadmapping process. The planning has to be consistent and independent from the short-term cycles of the market. By applying a system to detect technologies early, new areas are tapped soon after discovery and in a customer-oriented manner. Technology planning focuses the technology resources on few, yet important activities. This way, waste through unfocused technology developments can be avoided. Product planning is the result of a systematically performed idea generation and evaluation process that is synchronized closely with the technology planning.

4. Product Architecture Design: The systematic design of the product architecture is the prerequisite for the development of scale effects despite increasingly individual products. Synergies on the product and process level are tapped by modeling functions and technologies. A current product architecture comprises such function and technology models and makes commonalities across the entire product range and across different levels accessible. Examples are common parts, design standards or fixed production process sequences. A consequent application of these principles aids in avoiding waste through missed opportunities to utilize scale effects.

Structure Early

Structuring early implements effective frontloading by defining guidelines for value-oriented product planning. It is essential to eliminate the causes of waste early on during projects, but particularly during the subsequent value-adding steps.

A deciding factor is to not only determine physical equalities of a product, but to also realize functional, technical or technological opportunities for standardization. Because of the strong cross-product integration on those three levels, single modules do not have to be developed for specific product types anymore. In order to manage the associated increased complexity,

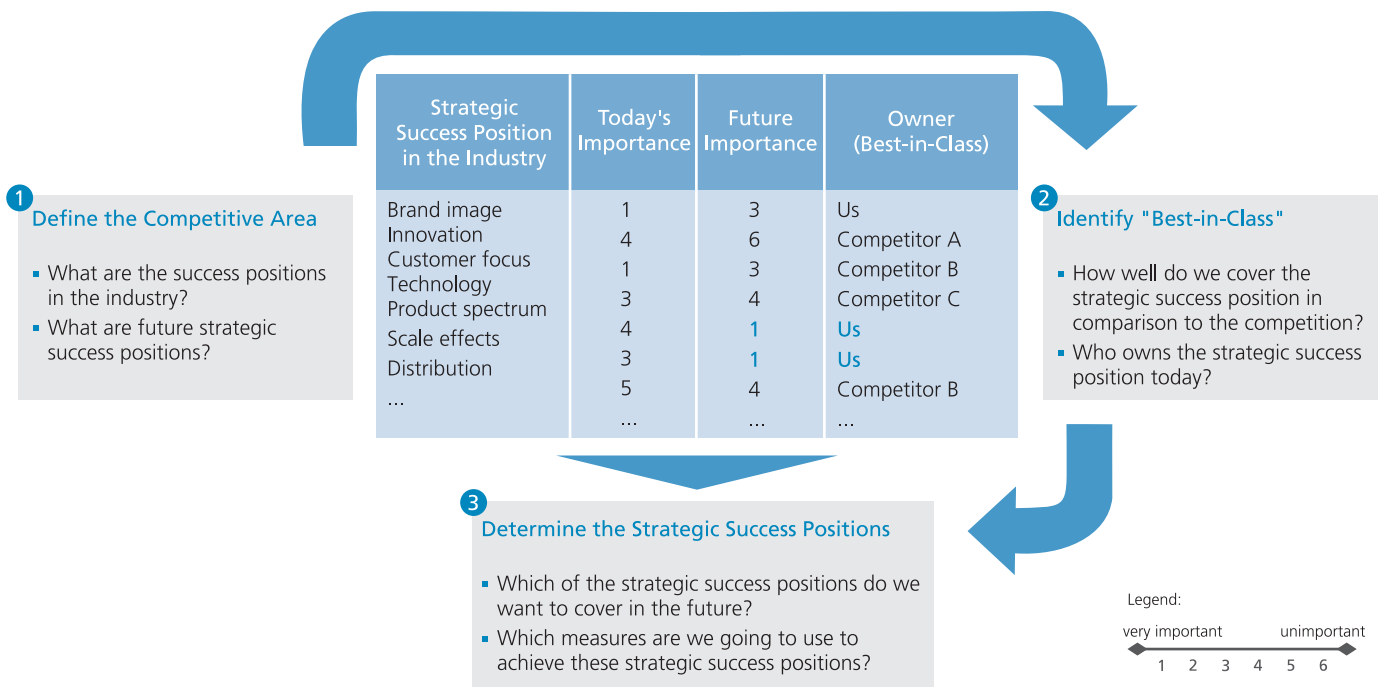


Figure 2: Approach to Determine the Strategic Success Position of Innovation Management



the product functions are defined with degrees of freedom in a function model (Fig. 3). These define which freedoms are allowed for the design based on the interdependencies across products. Larger degrees of freedom produce more options to configure the product until the functionality is achieved to the point of product specific component development. When designing the product structure and sub-assemblies, the technology model forms the basis to ensure that the product can be produced within the desired structure.

“Early structuring is the basis for successful complexity management in product development.”

Stephan U. Schittny, Ph.D.

5. Product Line Optimization: Increasing product variety causes waste because of a lack of transparency about costs and benefits of product-related complexity. By classifying product features by customer benefit and cause-fair complexity costs, product variance caused by the market can easily be evaluated with regards to waste caused by excessive complexity without adequate customer value.

6. Design Space Management : The management of design space is important to ensure significant product success with short time-to-market and avoid iterations. Effective design space management defines transparent degrees of freedom for each innovation task. All solutions have to be evaluated properly in such a manner. Groups of alternative solutions, so-called “Design Sets”, are pursued even if they are redundant until a definitive decision is made.

The goal of design space management is to create a broad range of solutions and to eliminate options at set milestones based on the set degrees of freedom. Solutions are only eliminated when they are deemed to be poor based on sufficient information.

Synchronize Easily

The interaction of each discipline involved in the innovation project is comparable to a symphony. Many experts and artists work simultaneously together, yet only through perfect synchronization is a piece of art created. The ability to easily synchronize everyone involved is of utmost importance.

7. Value Stream Optimization: Wait times and rework are the biggest interruptions to a continuous value stream for innovation processes. The optimization of the value stream distinguishes between creative and repetitive processes. Administrative processes are stan-

Solution Management Is Degree of Freedom Management

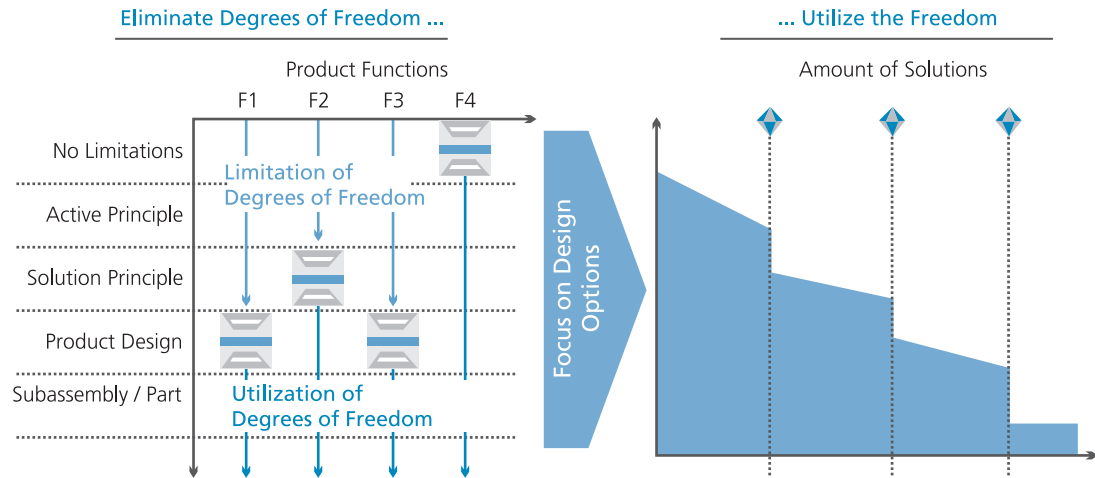


Figure 3: Degree of Freedom Management

standardized with a “successful practice” approach, while the creative processes need defined transparent goals and an exact scope of actions. The key to avoid waste is to adapt standardization for such processes.

8. Data Consistency: The basis for synchronized innovation processes is consistent data. Waste of development capacity through incomplete or wrong information should be avoided and waste through non-value adding support activities such as searching and adaption should be significantly reduced. Product life cycle management provides processes, methods and tools to ensure that product information is available at the right times, with the correct quality, and at the right location.

9. Takt: Because of the consistent separation of project and process management, the adherence to planning and delivery dates is increased significantly and capacity peaks are successfully leveled out. Proper project management ensures the transparent implementation of project structure, resources and milestone planning. Project management follows standardized processes, which are easily planned and synchronized because of demand-oriented takt.

Adapt securely

Lean Innovation demands adaptability from innovation management. Adapting securely describes the goal-oriented enhancements of products and processes with regard to identified chances for improvement.

10. Innovation Controlling: Innovation controlling empowers the employees involved in the innovation process to perform improvements independently. Therefore, transparent goals and short feedback loops about achieved results within the process are necessary. Waste of innovation resources through ambiguity and by missing goals are avoided.

11. Release Engineering: Complex products often exhibit functionalities and modules with highly variable life cycles. Without product releases it is almost impossible to keep products current in the mind of the customer over the long term, especially when they have long life cycles. Unplanned release cycles, however, quickly lead to waste because of unnecessarily high complexity along the whole process chain. The goal of release engineering is to steer the life cycles of single product

functions in such a direction, that the product always appears new to the customer. Release planning is a methodical interface between product structuring and life cycle management.

12. Continuous Improvement: For Lean Innovation, continuous improvement is described in five steps along the innovation maturity model. The model describes how changes in structures and behavior can continuously improve the effectiveness of the lean innovation principles. Ideal and target states serve as orientation to all employees and are especially important to enable continuous improvements.

Conclusion

Increasing competitive pressures require companies to adopt innovative and creative approaches to position themselves against the competition. The consistent transformation of lean ideas into the creative processes of R&D, increase a company's competitiveness in the global markets.

Once the Lean philosophy is consistently implemented in the areas of innovation and R&D, effectiveness and efficiency increase over the long term. Our research shows that when Lean Innovation is successfully implemented, innovation productivity can increase by up to 200%. The output of product and process innovation increases, while resource consumption remains constant. Internally, as well as externally a high degree of innovation is perceived, making the company more interesting to consumers, investors and (potential) employees.

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