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More Innovation, Less Waste – The Secret of Efficient Development Processes (Part 1)

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Content

3 Editorial

Main Topic:
Development, Innovation and
Technology Management

Contributions

- 4 More Innovation, Less Waste –
The Secret of Efficient Development Processes (Part 1)
Stephan U. Schittny / Michael Lenders (WZL)
- 10 The Journey is the Reward –
Roadmapping, an Important Piece of Holistic Inno-
vation and Technology Management
Stephan U. Schittny / Markus Wellensiek (IPT)
- 14 Lean Innovation –
Recommendations for a Successful Implementation
Christian Neubaur / Michael Lenders (WZL)
- 19 Legal Notice

Editorial

Once the Lean Philosophy is internalized, the step from Lean Production to Lean Innovation does not seem like such a big leap! Nevertheless, many companies still seem to struggle when having to leave well-known territories.

“How should this be possible? We need to be creative”, is often a first reaction. That’s true, but creativity is not everything today. Never lose track of effectiveness and efficiency!

This issue of the Complexity Management Journal discusses methods and approaches to finally cut waste out of the development process.

Start your own journey!

Best regards,



Jörg Starkmann
CEO, Schuh Complexity Management, Inc.



Stephan Krumm
CEO, Schuh Group

More Innovation, Less Waste – The Secret of Efficient Development Processes (Part 1)

Stephan U. Schittny/Michael Lenders (WZL)

Lean and customer-oriented production processes lead to a significant increase in the efficiency of production. That is no news to people familiar with the concept. After the success of Toyota's production system became well known through Jim Womack's and Dan Jones' books in the 1990's, bits and pieces of the lean production philosophy are now found in almost all industry sectors. Today, the lean production philosophy is increasingly adopted in administrative areas as a measure to improve efficiency. Even research and development departments have lately taken to its teachings. This transfer does not come as a surprise. The R&D capabilities of a company determine its future and its ability to apply the lean principles in the production phases. They also create future products, and their marketability and manufacturability in terms of design to fit customer needs, quality, cost, manufacturing, etc.

Over the past years, Schuh & Company together with the University of Aachen, Germany, devoted an extensive amount of time to translate the lean principles to fit the innovation and development process. Several studies, work groups and research projects were performed as part of this process. Over the past months, the results have been successfully implemented in projects with companies from different industries. The effectiveness of the developed "Lean Innovation Principles" has proven successful. The current and upcoming issue of the Complexity Management Journal will discuss these principles (Fig. 1) in detail.

Apple and Southwest Airlines are good examples to show the importance Lean Innovation has for business success. In today's dynamic and global competitive environment, these companies have significantly increased their attractiveness for customers and investors. They rely on innovation and thus are able to sustainably distinguish themselves from the competition.

Southwest Airlines utilizes innovative business processes and models. Examples are new internal relationship managements that minimize ground time of their airplanes drastically and thus, improve their cost base. This brought about the so-called "low-cost airlines", which are focused on quality and offerings that are honored by the customer.

Increases in efficiency have been achieved many times with lean production methods. An additional focus for lean in R&D lies with increasing the output of truly successful and innovative developments. In order to achieve this goal, the lean principles have to be transferred to fit the creative processes that are so typical for R&D work, and so different from other areas where these principles have been applied in the past.

This R&D specific application of the Lean Philosophy should be referred to as "Lean Innovation". This article will further discuss current research and development trends of this area of Lean.

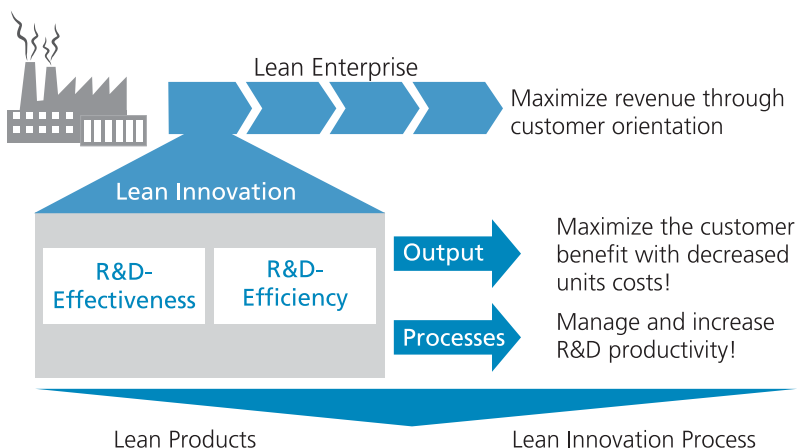


Figure 1: Lean Innovation is a Central Success Factor of a "Lean Enterprise"



The Lean Production Philosophy – A Starting Point

The wording “Lean Management” was first coined in the mid 1990’s by Womack and Jones as part of the well-known MIT study. The comparison of the performance of Japanese and Western companies as well as the correlation to the respective corporate structures, processes, strategies and activities build the basis for the development of those management philosophies.

While Lean Management has in the past often been misunderstood, the term has a much broader interpretation today. The past understanding of Lean was associated with slimming the company down and job losses, yet today’s interpretation stands much more for “adding value without waste”. It aims to preserve jobs and even create new ones. The approach goes beyond a pure efficiency increase in production areas and really aims for a new performance culture within the company.

The Lean Thinking philosophy, which we are familiar with from Lean Production, can be outlined in five core principles:

- **Customer orientation:** Align the value of products and services with customer needs
- **Identification of the value stream:** Eliminate waste and optimize activities that create value for the customer
- **Flow principle:** Perform all production steps smoothly and without delays until the final product or service is delivered

- **Pull principle:** Run a demand-driven production without surpluses or rejects
- **Strive for perfection:** Constantly question your achievements and strive for continuous improvements with regard to the first four steps.

According to the original definition of the Lean Management philosophy, the organizational structure has to be “lean” in the first place. Lean organizations are defined by short decision making processes, flat hierarchies and a constant focus on how products and services can create value for the customer. Customer demand triggers all activities (pull-principle).

Process steps and activities, which do not directly increase the customer value, are considered waste. They are eliminated unless other reasons such as laws, security, etc. prohibit their elimination. Seven types of waste (muda in Japanese) are generally identified in production processes: over-production, unnecessary inventory, inappropriate technology, unnecessary motion, defects, wait time and transportation.

Several methods and tools are available for the implementation of the Lean Management philosophy in production and administrative areas. They build a well recognized framework. A selection of some methods is described below (Fig. 2).

- **Empowerment:** Employees have the authority to make decisions for their department without prior coordination with superiors, and can perform improvements. An employee can, for example, halt production

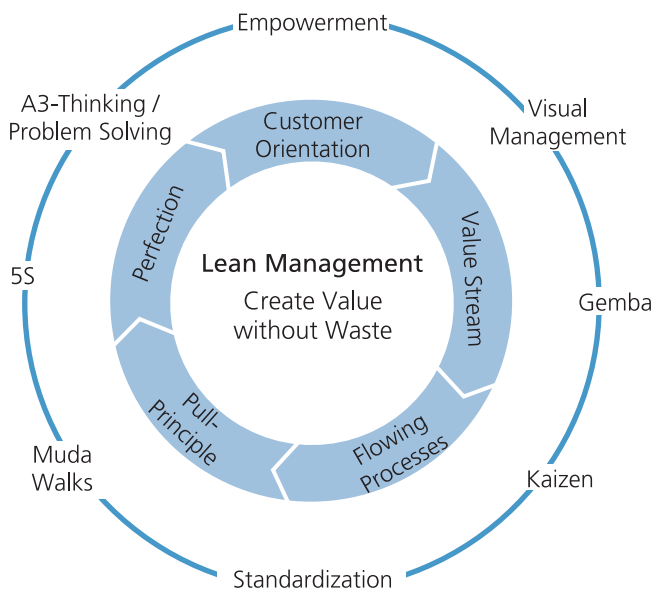


Figure 2: The Five Basic Principles of Lean Management: To Implement these Principles, Proven Methods Are Available

if problems occur – or a customer service representative can send a replacement product to the customer in case of complaint.

- **Visual Management:** Allocation of information at the workplace to allow for easy, self-organized and goal-oriented management of tasks. Tools address and display readily available information about goals, work progress, quality level, work place logistics through Kanban cards, and create transparency to optimize tasks.
- **GEMBA (Japanese: the real/actual place):** Gemba represents the location where the true processes take place and problems that occur need to be solved. This means that in order to identify the problem or solve it, it is necessary to go to where this problem actually occurs. Problems cannot be solved from the conference room.
- **KAIZEN (Japanese: Change for the better):** In business life, Kaizen stands for continuous improvement that involves everyone at little or no cost. A

Kaizen culture follows three basic principles: processes and results, systematic thinking and acting, no assessment and finger-pointing.

- **Standardization:** The advancement and implementation of standards within the organization.
- **Muda Walk:** Short and focused tour of the work place (Gemba), to experience / show where potential for improvement or waste in process and structure exist when examined right. This includes a skilled approach with corresponding questions that avoids finger-pointing or scolding.
- **Five S (5S):** An approach to systematically organize workspaces and keep them clean and orderly. 5S campaigns are often performed as part of Total Productive Maintenance efforts in production. 5S is derived from five Japanese words:
 - Seiri: Sorting
 - Seiton: Create order
 - Seiso: Cleanliness
 - Seiketsu: Standardizing
 - Shitsuke: Discipline
- **A3 Thinking / Problem Solving:** Toyota utilizes so-called A3 reports to implement standardized procedures and as a formalized depiction of several activities such as solutions to problems, status reports for projects, changes of guidelines, etc. This tool serves as an effective form to communicate knowledge to all involved employees and ensures efficient teamwork. The A3 problem solving approach encompasses the following steps:
 - Identify a problem or need
 - Analyze and understand the current status
 - Perform a root-cause analysis
 - Develop measures to eradicate the causes of the problems

- Develop a target state
- Develop an implementation plan including a check of the desired results
- Discuss the plan with all parties involved
- Get approval for the implementation plan
- Implement the plan
- Evaluate the results

nate waste in administrative departments and to increase efficiency.

- Organizational analysis
- Order structure analysis
- Value stream analysis
- Activity and information structure analysis

Lean Administration Follows Similar Principles as Lean Production

In comparison to production processes, which generally handle physical products, administrative processes often comprise additional informational aspects. Administrative processes are invisible, immaterial, immeasurable, can be interpreted differently, hard to define and of different value. As a result, the lean principles and tools have to be adapted accordingly. Table 1 shows the relationship between waste in production and waste in administrative processes.

In addition to the previously described lean methods for production, additional tools can be relied upon to elimi-

Lean Innovation: A Holistic Approach that Embraces Innovation and Development Management

Lean Innovation is a holistic approach. It focuses on the one hand on the design of development processes and new products without waste. At the same time it integrates an increase of efficiency into the processes. The other goal of Lean Innovation is to augment the impact of R&D by increasing the output of truly successful and innovative developments. In a collective fashion it follows the three guidelines of Lean Thinking (Fig. 3):

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

	Production	Administration
1.	Over production	Busy work
2.	Large inventory	High work backlog / reserves
3.	Unnecessary transport	Unnecessary information flow
4.	Wait time / Idle time	Wait time / Idle time
5.	Inappropriate use of technology or inappropriate work processes	Inappropriate use of technology or inappropriate work processes
6.	Unnecessary motion	Unnecessary motion
7.	Reject and rework	Quality problems and inquiries

Table 1: The Seven Types of Waste in Production and Administration

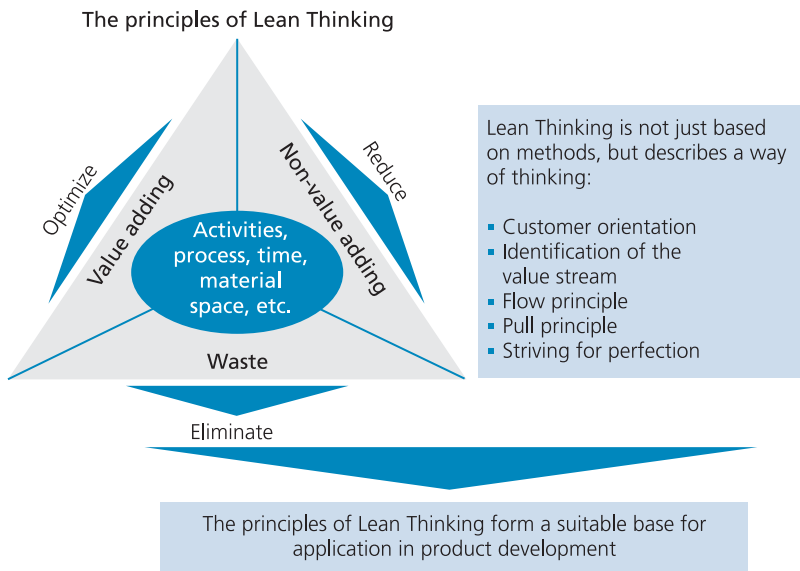


Figure 3: The principles of Lean Thinking

Waste is defined as all human activities, which utilize resources but do not create value. For Lean Innovation waste can consist of unnecessary process steps, as well as product features that the customer does not need. Non-value adding activities, in contrast to value adding activities, do not contribute directly to the reduction of product costs. For Lean Innovation however, non-value adding activities may be necessary if they create preconditions for value generation or are necessary for other reasons, such as risk minimization or legal requirements. The concurrent development of alternative concepts can act as an example here, that does not add direct value, because essentially only one concept is realized. Indirectly alternative concepts increase the probability that because of a broader information basis, a better concept is chosen in the end.

The respective work steps in product development are based on the creative results of the previous development stage. Development processes therefore cannot be planned and managed as consecutive processes like it is possible for production processes. While the production process benefits from a reduction in variation, product development relies on this variability in many situations. This fact has to be incorporated when planning and controlling development processes.

The goal of innovation and development without waste is to live up to product development as a creative process, while at the same time increase the development efficiency along the entire lifecycle of the new product.

To implement Lean in the areas of innovation and development, twelve principles should be relied on. They allow for a long-term and sustainable increase in the company's ability to innovate for the company (Fig. 4). These twelve principles are arranged into four groups:

- Position strategically
- Structure early
- Synchronize easily
- Adapt securely

Position strategically: A continuous check and adjustment of corporate strategies is necessary to ensure the competitiveness of a company in the ever changing market environment. According to Lean Thinking, the sub-strategies of innovation and development have to be built upon each other in order to support the corporate strategy in a goal-oriented and holistic manner. Clear communication across all departments ensures that the employees are familiar with and pursue the same goals. This enhances the motivation of the employees and ensures a strategic implementation.

Structure early: This is the basis for successful complexity management in R&D. An important focus for innovation and R&D departments lies in mastering the complexity of different projects and activities. By structuring early, processes are aligned in the most efficient manner and consistently deliver value. The application of this principle relies on a motivated project team and the inclusion of precise, transparent and prioritized requirements and values. It also builds the basis for an efficient and straightforward execution of the consolidated project and product.

Synchronize easily: Tact and alignment are the basis of the value stream orientation of R&D.

Smooth processes that maximize project internal and inter-project effects of scale require continuous and

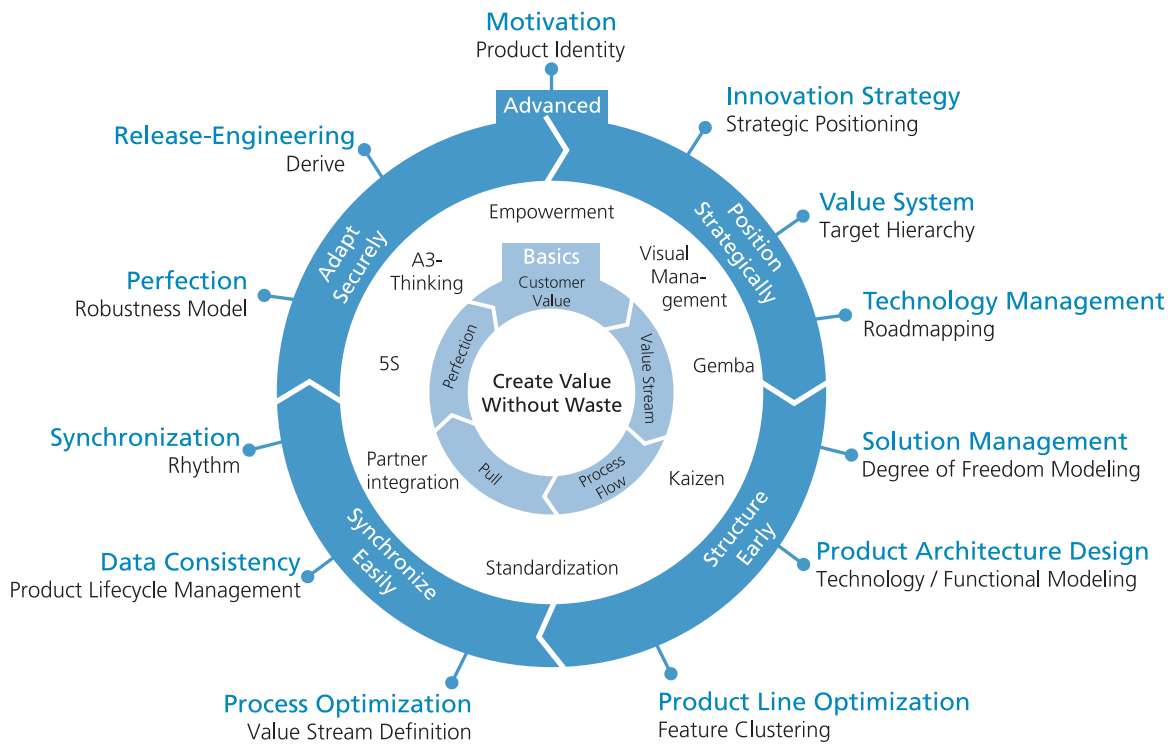


Figure 4: 12 Principles of Lean Innovation

consistent synchronization of all activities. Easy synchronization calls for a value stream definition, capacity planning and synchronization.

Adapt securely: Adapting securely serves to ensure the constant accommodation of robust products to evolving requirements. An adapted release management guarantees the constant fine-tuning of the product functions.

Conclusion

A systematic implementation of the Lean Innovation method leads to an increase in effectiveness and efficiency in the areas of innovation and R&D. In other words, the output of product and process innovations is increased while the resource consumption stays constant. Customers, investors and potential employees also perceive this excess in innovation outside of the company.

Lean Innovation is thus a substantial success factor for competitiveness and business success in the global market.

The next issue of the Complexity Management Journal will offer the opportunity to get a deeper look at the topic of Lean Innovation. The 12 Lean Innovation Principles will be discussed in greater detail.

Contact

Stephan U. Schittny, Ph.D.

Phone: +49 2405 459 02

stephan.schittny@schuh-group.com

Michael Lenders, Ph.D.

Laboratory for Machine Tools and Production Engineering of RWTH Aachen University

The Journey Is the Reward – Roadmapping, an Important Piece of Holistic Innovation and Technology Management

Stephan U. Schittny/Markus Wellensiek (IPT)

In today's global competitive environment, innovation is becoming the dominating factor for assuring a company's differentiation and therefore competitiveness. In response to the global economic downturn, many companies performed drastic, often reactive and hasty, cost cutting initiatives in innovation and R&D departments. Such popular measures lead to competitive problems and disadvantages in the mid-term.

Companies in this situation, now have to ask themselves the following question regarding innovation and technology management: "How many and which innovation projects have to find their way back on to the development agenda and which ones can remain on hold?" The dilemma was to survive the crisis in the best possible manner, but now that the outlook is more positive, these companies still need to offer the right, differentiating product portfolio to the market to stay attractive.

The first step to answering the above-mentioned question, is to define and address changing customer, market and competitive requirements. Secondly, the selected actions have to be carried out in a way that allows for the required output to be realized. To focus and manage both, portfolio and processes, the innovation and development portfolio (the "what") as well as the development and technology management (the "how") have to be addressed.

The best way to address the future product portfolio is through a holistic innovation and development management that is in line with Lean Innovation R&D portfolios. The management is made up of five main steps as outlined in Figure 1. In order for innovations to be successful, they have to be aligned to the development strategy. Such a strategy considers components of the corporate strategy, business unit strategy, market strategy and product strategy. Idea management describes the areas where new product or technology ideas are tested towards their compliance with the development strategy.

Not all customer requirements or technological advances may fit the overall development strategy. Here the good ideas will be split from the bad ones. Only the good ideas will be channeled into the next phase. The next step, roadmapping, is most important prior to starting the development process and will be described in more detail in the following sections. When starting the actual development process, companies should always distinguish between specific customer projects and generic pre-projects. Additionally, traditional topics such as project management, performance measurements and knowledge management, play a vital role in the success from turning the initial idea into a viable product.

Roadmapping: Targets that Are Unknown, Cannot Be Achieved

An inter-divisional and cross-functional examination of market and technology trends is a key factor to define and describe the targets for the evolution of an innovation and development portfolio (the "what"). Based on the results, planning the timeline and content of the portfolio and its respective technologies and innovations, has to be commonly defined and approved. An integrated and targeted communication to all participating departments is essential to guarantee sustainable implementation. In large development departments, the intense communication becomes even more important, since increasingly complex structures inhibit transparency and understanding of correlations and interdependencies.

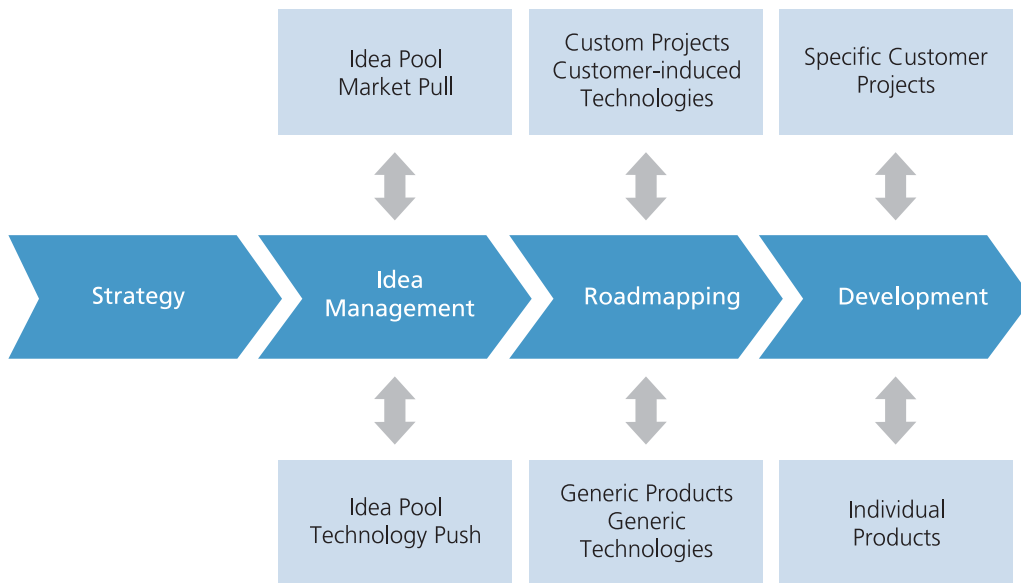


Figure 1: Components of Holistic Innovation and R&D Management

The product & technology roadmap is a methodological approach that has been proven in various projects. It helps to gain transparency and fulfill the above-mentioned requirements.

A Methodological Approach to Product & Technology Roadmapping

Product & technology roadmaps offer a clear and comprehensive overview of current and planned products as well as the technology portfolio. Furthermore the required projects and developments with their underlying decisions, interdependencies and causalities are clearly visualized. As the name “roadmap” implies, it is a useful tool for the “steering” manager to navigate his company vehicle through a changing and foggy terrain. Not only does the roadmap enable the company to establish its current and future position, it also allows planning and visualizing intermediate steps and alternate scenarios to achieve these outlined goals. Hence the roadmap acts as an important tool to operationalize the company’s product and technology strategy.

Figure 2 shows a generic illustration of a technology roadmap that has been successfully applied in many of our consulting projects. Its main elements constitute the timeline, the different content levels (market, product, technology) and the links between the different objects visualized by bars.

The main benefit gained from the product & technology roadmap, is the creation of transparency and the platform for discussion and communication between departments. Since usually multiple departments such as R&D, production, sales, product management, etc. are involved, the product & technology roadmap can support cross-departmental, process-oriented thinking. Thereby the development process performance is increased. The result is a more effective and efficient product and technology planning process. In addition, the percentage of wrong decisions and the reaction times to changes in the competitive environment are reduced. The gained transparency enables the identification and evaluation of several actions for unforeseen changes. With an inter-divisional product & technology

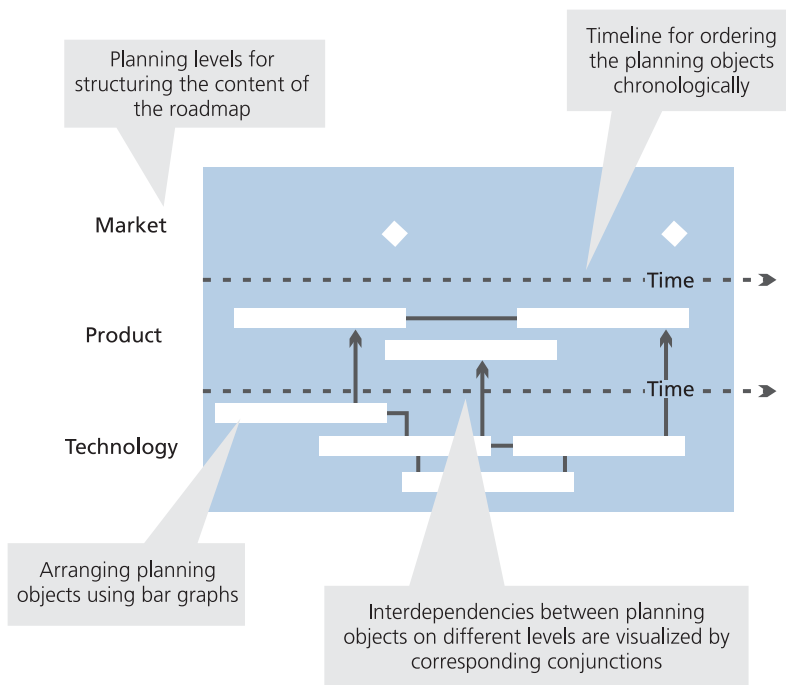


Figure 2: Elements of the Product & Technology Roadmap

roadmapping process in place, complex and difficult decisions regarding technology and innovation can be discussed in a focused and comprehensive manner. A focus on the right items is ensured and incorrect decisions can be avoided. But product & technology roadmapping does not replace the actual planning activities. Moreover, roadmapping coordinates existing plans and illustrates the results in a manner that facilitates discussion and communication of content. Thus the product & technology roadmap represents the core element of strategic development and technology planning.

Success Factors of Product & Technology Roadmapping

While product & technology roadmapping has become an established tool, its implementation and usage often come with difficulties. Our project work and a multitude of expert interviews led to a list of successful and sustainable implementation practices of product and technology roadmaps.

1. Cross-functional cooperation. A key success factor is the close cooperation of all relevant departments of the company (R&D, procurement, production, marketing, etc.) during the initial creation of the roadmap. This enables a quick and easy identification of mistakes in planning and the prompt derivation of the right corrective actions. Furthermore it assures a high level of commitment of all involved departments.

2. Company and situation-specific definition. Each roadmap has to be defined in alignment to its specific purpose and circumstances, e.g. business area planning, make or buy decisions or technology application and development planning. A situation-specific illustration increases manageability and acceptability.

3. Evaluation based on specific criteria. The technology evaluation within the roadmap is also dependent upon company-specific constraints and targets. It is obvious that technology leaders have to apply other criteria for evaluation than followers. But the use of the same criteria and methods for evaluating along the whole process, from early detection to operational planning, across all departments is of major importance. Furthermore, financial planning and evaluation have to accompany the process from the beginning and get even more detailed over the course of time.

4. Focus on roadmap illustration and process. As long as the roadmap allows for the coordination of the content, e.g. market, product, technology, its layout can be chosen freely. The map's value is created by its content and not its illustration. The roadmapping process itself brings together the responsible persons from different departments and thereby encourages comprehensive discussion about the technology plan.

5. Central process mapping – decentralized planning. The roadmapping process has to be described including responsibilities and process participants. A successful approach is to control process ownership centrally and to delegate responsibility for the content of the roadmap to decentral functions. Despite this separation, roadmapping remains a central leadership task with a need for high level management attention.

6. Orientation towards technological guiding principles. Technological guiding principles are practical assistance in the roadmapping process. These guiding principles describe the general direction the company is heading to and build the basis for making decision throughout the roadmapping process.

7. Employ internal and external expertise. The technology roadmap is based upon two main pillars, internal knowledge from the involved departments of the company that is complemented by insights gained externally. Successful roadmapping relies on a focused interaction of the right experts and an open corporate culture.

8. Accept the uncertain – think in alternatives. One objective of roadmapping is to enable successful planning and flexibility to potential changes in uncertain situations. Flexibility is greatly supported by roadmaps as it facilitates the coordination between different departments. To facilitate a quick reaction time, multiple scenarios should be considered when creating the roadmap.

9. No focus on IT implementation. The market offers a vast range of different IT tools to generate roadmaps. These programs can help to structure the process, but do not represent the solution itself. Only the right experts can identify the interdependencies of the planning objects on different structural levels. This process can hardly be automated.

Conclusion

Product & technology roadmapping is a central and extremely helpful component of holistic development and technology management. It offers a comprehensive overview of the current and planned products and the positioning of the portfolio in the market. Consequently, the required projects and developments as well as decisions, interdependencies and causalities are illustrated in a manner that allows easy cross-departmental communication and discussion. Thereby the roadmap greatly supports the often lacking operationalization of a company's overarching strategy.

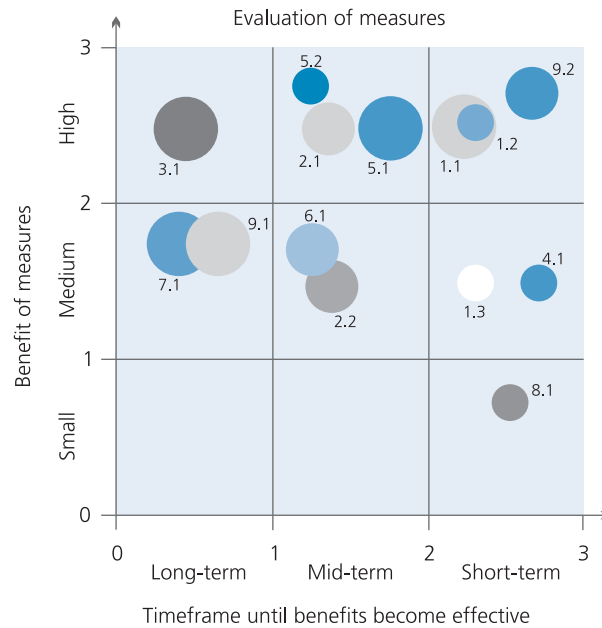


Figure 3: Evaluation of Portfolio and Prioritization of Measures of Different Implementation Options

The maturity level and the interaction of the different components, such as roadmapping and idea management, are systematically assessed during the audit of development and technology management. The improvement potential is derived from the results of the audit and different options and measures for implementation are developed. Figure 3 illustrates an evaluation portfolio of different measures dependent on their expected benefit, the timeframe until the benefits become effective and the calculated costs (cross section dimension).

Contact

Stephan U. Schittny, Ph.D.

Phone: +49 2405 459 02

stephan.schittny@schuh-group.com

Markus Wellensiek

Fraunhofer Institute for Production Technology IPT

Lean Innovation – Recommendations for a Successful Implementation

Christian Neubaur/Michael Lenders (WZL)

The success of many companies is closely related to their ability to innovate. Apple, Amazon or Phonak are just a few companies that right away come to mind as successful innovators. Yet, to date, there is no correlation between investments in R&D activities and company success across industries when comparing operative results (Fig. 1). This understanding brings to mind the question of how investments in innovation can be successfully managed, and what factors are needed to implement a successful Lean Innovation strategy.

Lean Innovation is not just a topic for innovation leaders that can often expend large amounts of their budgets on R&D. Lean Innovation furthermore enables all companies to utilize their current resources with focus. Such a focus increases the efficiency of developments, and secures and improves the relative competitiveness of the company. Our experience shows that four basic prerequisites should be met in order to realize a significant increase in the productivity of R&D activities.

1. The Basic Understanding – Create Customer Value

The implementation of Lean Innovation and its methods can be understood as a holistic approach. The overall goal lies in creating a lean and innovative culture, in order to ensure the efficiency of innovation and competitiveness within the global market place. The foundation for above-average innovation is the concentration of development resources on products and services

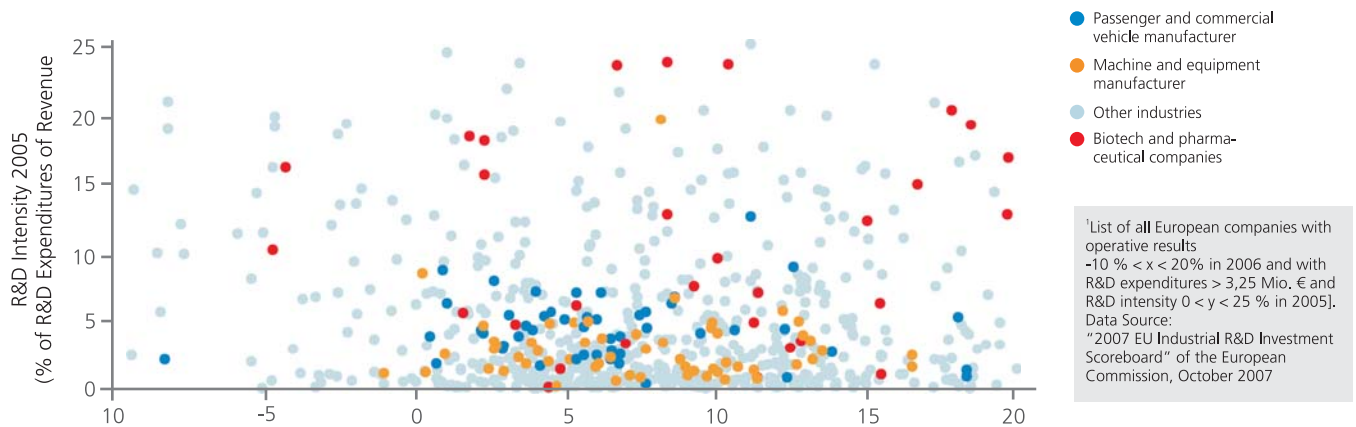


Figure 1: Correlation between R&D Intensity and Achieved Company Results [Compare Schuh 2009]¹

that create value for the customer. Lean Innovation advances the company's customer orientation and only accelerates innovation that drives customer value. The successful implementation of Lean Innovation relies on the employees' ability to always reflect their work with regards to the customer orientation. All decisions and developed solutions should live up to the demand of maximizing customer benefits. Each employee, project manager and leader should ask the two questions below when performing day-to-day development work, project management or portfolio management: "Am I familiar with the precise requirements of the target group?" and "Do I work on fulfilling the customer requirements without compromise?"

The central starting point for the implementation of Lean Innovation lies in the absolute alignment of all development activities and product features. Everything that does not directly add customer value should be questioned. Two abilities become the focal points: The main customer segments have to be identified, while at the same time the customer segment's utilization of the product has to be precisely known. As the degree of innovation in the product increases, the uncertainty of making an accurate prognosis about customer purchasing decisions increases as well. Our project work shows that under this circumstance, it is beneficial to rely on alternative solutions for such products. The ability to choose a final concept at a late stage of the development process is critical and therefore reduces the risk of wrong choices that do not meet the exact customer requirements.

Innovation does not automatically stand for resource intensive new developments. An optimal arrangement between the existing offerings and the customer needs is a basic prerequisite for improved development efficiency. Focus is often more important rather than just new development. Establishing an understanding of a customer oriented innovation culture requires that every employee works towards reaching the predicted consumer behavior. Creating additional value for the customer can only be achieved in such a manner.

2. The Right Methods – Structure and Synchronize

The approach of "design for process" integrates the internal processes of product development and value proposition with the analysis of customer behavior into a continuous method. An extensive examination of the product utilization by the customer, enables the development team to draw conclusions about the customer behavior. The necessary product requirements for the products and services can then be deducted. The customer often cannot precisely articulate new requirements and innovations. A deep understanding about how the resulting product requirements are applied by the customer is therefore vital in order to identify requirements that exceed customer preferences. In an additional step, these requirements need to be translated into product features and functions.

Use cases are one way to translate the requirements. They can be based on lead user surveys, conjoint analysis and other information that is available about the market success and use of the product. In addition, a consistent and systematic product program, combined with the previously mentioned information about the markets, allows for an increase in the accuracy of forecasts about market requirements for the future products (Fig. 2).

The next step, after defining the customer requirements as part of the "design for process", is to structure and manage the solutions. The different customer requirements are acknowledged and their configurations are outlined as standard or optional features. In our experience, this step should be performed during the early phases of the development project because the determination of standard and optional features of products influences the cost structures to a large degree. When assessing the product functionality, it should always be reflected to what extent the customer needs are fulfilled. Not all configurations are successful and lead to more customer interest or elevated product sales.

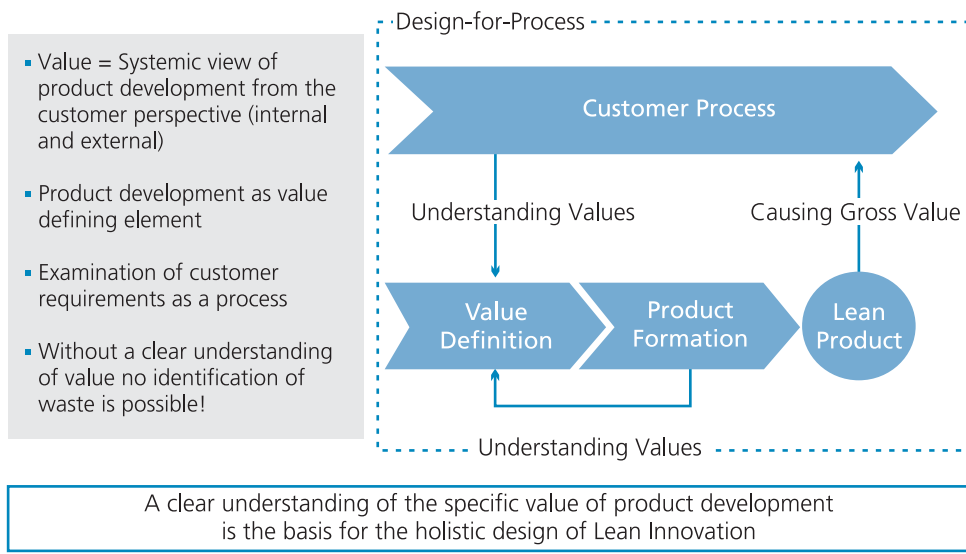


Figure 2: Design for Process as Core Element for Lean Innovation

Existing functionalities are to be reviewed and new ones should only be offered when a customer need was clearly identified. Besides structured solutions for development projects, the synchronization of the development processes is of major importance. This holds true with regards to two perspectives. One aspect concentrates on integrating different development projects to realize synergies across product lines and lifecycles. Two tools have worked well for companies; planning the scope of the development work and complying with defined synchronization points. The other aspect centers on the synchronization of customer requirements in accordance with the value stream analysis in order to gain efficiencies. The focus is on defined processes, data streams and information flow within the development process. Weaknesses are optimized in accordance with value-adding elements and the ensuing realignment of the value stream aims for a continuous increase in process efficiency. This step also identifies possibilities to standardize recurring activities of change processes for example. A success factor for the value stream analysis

of development processes is the constant synchronization between development competences and capacities and the innovation demanded by the market.

3. Strong Leadership – Align Employees with Project Goals

Utilizing the right tools is not the only success factor. Another main success factor is the right awareness of the development team about their contribution to the company success. As long as the sole task of the developer is the development of products and he is only focused on finding new ways to the problem, it is not surprising that not all innovations face the same customer demand. It is therefore important to develop the right awareness within the development team. Whether the product adds customer value should not just be checked at certain milestones, but it should become part of the development cycle itself. Every workshop, team meeting, and discussion should consistently address

adding value for the customer. Achieving this focus is part of the leadership task and is ensured by specifying, checking and continuously and clearly communicating project goals. The leadership should adjust activities (what is developed) and behavior (how it is developed) if necessary (Fig. 3).

After aligning the team towards one uniform goal, an adequate information exchange and discussion of different topics needs to be organized. New ideas are generated by bringing together different teams such as purchasing and development. Multiple observations of problems enable different perspectives. The establishment of topic specific committees is ideal for a working and interdisciplinary dialogue, as well as to ensure a balance between the different parties. These committees are held in a neutral style in order to enable discussions and communication that eliminate differences between the different team cultures. A constructive contribution towards the innovation process is only achieved by allowing such open communication.

Development projects that diversify the existing product range need to be constantly focused on the requirements of the market that should be tapped. Many companies

struggle with developing products with specifications that are below the current offerings. Coined by previous experiences, the development team has a hard time in hitting entrance requirements. Especially in this case, strong leadership and constant reference to the project goals are necessary.

4. Continuity for Success – Step-by-Step Implementation

To anchor the achieved improvements over the long-term in the company culture and to achieve a continuous improvement, the described activities should be embedded in an initiative that follows the model of Lean Innovation maturity. Such a maturity model illustrates the different steps towards full implementation. The development of R&D processes follows a path of continuous improvement along five steps. While at the beginning level “ad hoc” no orientation towards lean management principles in R&D is noticed, a gradual increase of the lean orientation up to the final step “lean optimized” can be observed. In this fully optimized state, the R&D culture is completely focused on lean innovation guidelines and continuous improvement is truly lived.

Operative and Strategic Innovation Management Problems	Technical Problems	Employees and Competence Problems	Interface Problems
<ul style="list-style-type: none"> ▪ No timely creation of product support services ▪ Open legal questions ▪ Problems collaborating with external partners ▪ Difficulties with market access 	<ul style="list-style-type: none"> ▪ Unexpected technical or technological need for adjustments ▪ Difficulties with the use of new technologies 	<ul style="list-style-type: none"> ▪ Lacking employee competence (functional or personal) ▪ Problems of motivation for the employees involved in the projects ▪ Lacking integration of existing competences 	<ul style="list-style-type: none"> ▪ Unclear goals at project start ▪ Product specification unclear or changing ▪ Project management and planning deficits ▪ Problems collaborating with the project team or within the company

Figure 3: Preventing Common Problems Can Significantly Reduce the Duration of Product Development

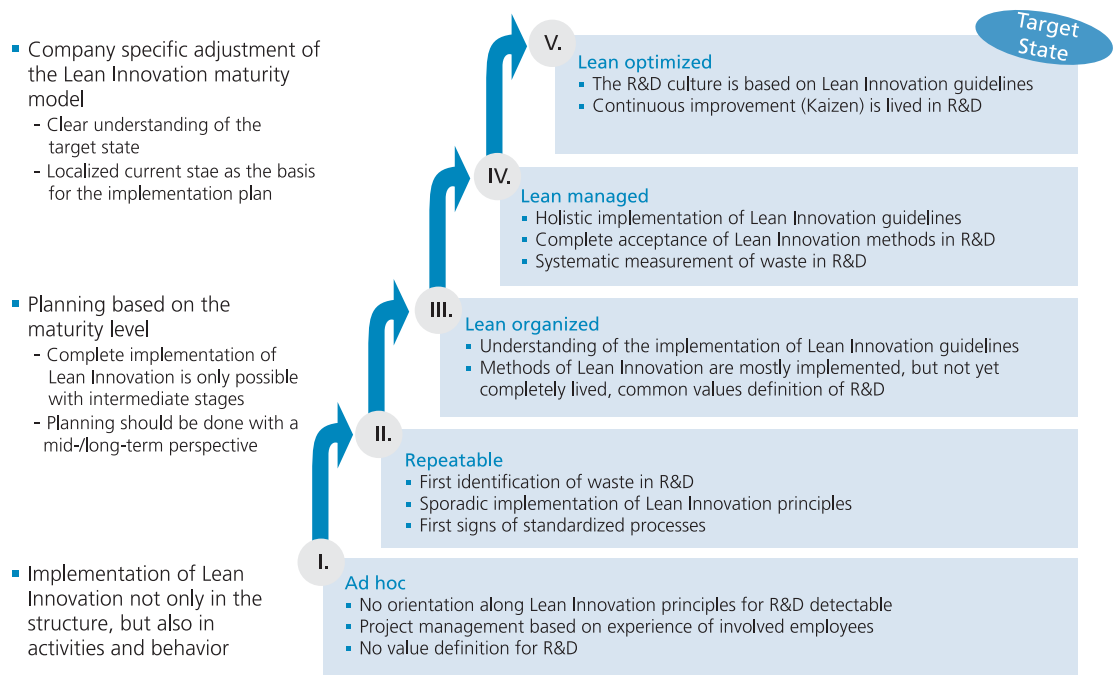


Figure 4: Recommended Actions “Plan the Implementation According to the Step Model”

For each one of these five steps, a company specific adjustment of the maturity model is performed in order to achieve a holistic fit for all different levels. (Fig. 4).

Conclusion

Overall, it shows that the path towards an innovation efficient company can only be generated by an intensive and comprehensive examination of the customer segments. The path has to be supported by methods, and consistently lead and lived by management at each step along the process.

Contact

Stephan Krumm, Ph.D.

Phone: +49 2405 459 02

stephan.krumm@schuh-group.com

Michael Lenders, Ph.D.

Laboratory for Machine Tools and Production Engineering of RWTH Aachen University

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Schuh Complexity Management, Inc.
3625 Greenside Court
Dacula, GA 30019, USA

Phone: +1 770 614 9384
Fax: +1 678 730 2728
E-Mail: info@schuh-group.com
Internet: www.schuh-group.com

Editorial Board:
Bettina Rennekamp

Layout:
Kezban Ergin

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Offices

Schuh Complexity Management, Inc.

3625 Greenside Court
Dacula, GA 30019, USA
Phone: +1 770 614 9384
Fax: +1 678 730 2728
E-Mail: info@schuh-group.com

Schuh & Co. GmbH

Monnetstraße 9
52146 Wuerselen, Germany
Phone: +49 2405 459 02
Fax: +49 2405 459 300
E-Mail: info@schuh-group.com

Schuh & Co. Komplexitätsmanagement AG

Langgasse 13
9008 St. Gallen, Switzerland
Phone: +41 71 243 60 00
Fax: +41 71 243 60 01
E-Mail: info@schuh-group.com