

# Give Lead Users the Lead. Requirements Engineering as a Method for Systematical Elicitation of Future Market Demands within the Innovation Process

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## ABSTRACT

This extended abstract presents a process model and a practical approach toward the integration of requirements engineering into innovation management processes.

**Keywords:** Requirements Engineering, Innovation Process, Customer Integration, Lead User, Product Life Cycle, Process Integration

## 1. PROBLEM

Existing reference processes for innovation management generally do not focus on a systematic integration of different stakeholder perspectives. From a business point of view, this may result in a reduced awareness of market requirements and thus, a failure of commercialization or a delayed introduction of new products to the market. Change requests in product design that occur during the testing phase will lead to an unnecessary waste of time and money. Even if a company runs an innovation process, which integrates lead users into early stages of idea and innovation development, there is often a lack of systematic and methodological customer requirements, e.g., based on results of lead user workshops. Requirements gathered at the beginning of the development process are often not properly kept track of until the final implementation. Therefore, it is strongly proposed that an approach toward a clear market orientation during all stages of the innovation process should be developed.

Furthermore, companies need to consider how to manage the complexity of new products while, at the same time, they are facing short innovation cycles. Constraints on innovation regarding time and money leave little room for trial-and-error methods. In addition to this, the geographical distribution of research laboratories makes informal communication among scientists, developers, customers, and other stakeholders difficult. As stated in this paper, methods of requirement engineering as used in software development projects may provide new insights

and a useful approach for practical implementation to elicit customer needs during the innovation process.

## 2. CURRENT UNDERSTANDING

The open innovation paradigm postulates a vivid outflow and inflow of ideas into companies. Nevertheless, there is little advice on practical implementation of this concept. Starting-points and process descriptions remain vague and leave practitioners with few methods ready for application.

Lead users provide a basic approach to integrate external ideas into the innovation process. Current research on customer integration widely agrees on their importance since many studies have confirmed the high relevance of their contribution to new product success. However, research on integration beyond the first stages of innovation processes is rare. The close collaboration is rather exception than standard. This shortcoming needs to be resolved if lead users were to be integrated into the innovation process on a regular basis.

From the background of this current understanding, this paper aims at providing a process approach for the integration of external ideas and lead users into the innovation process based on methods of requirements engineering.

## 3. RESEARCH QUESTION

The full paper will investigate possibilities of integrating requirements engineering as a supplement to existing market-oriented approaches into the innovation management process. The authors will examine common starting-points for the integration of requirements engineering and propose guidelines for how the theory can be put into practice.

Thus, the expected research contribution of this paper is based on the exploration of the following question: What are a company's advantages gained from an integration of

requirements engineering methods into the innovation management process and how can these methods be implemented in practice?

#### **4. DESIGN/METHODOLOGY/APPROACH**

Requirements engineering is a method used in software development to elicit, analyse, validate, and manage requirements for complex systems. Requirements are defined at an early stage of product development. The requirements engineering process ensures that all stakeholders can contribute their views on the written requirements. The resulting requirements document describes functions, constraints and overall definitions of the product that have to be kept track of until the final implementation and validation.

The authors assume that an integration of innovation management and requirements engineering will help to reduce the above mentioned problem of systematic user integration into the whole innovation process. It seems reasonable to conclude that the considered methods used in requirements engineering can support the fuzzy front of innovation management.

The approach presented in this abstract is based on an innovation reference process from the ISYPROM project. ISYPROM is a joint research project co-funded by the German Federal Ministry for Research and Education (BMBF) with 12 partners from industry, research, and education (see [www.isyprom.de](http://www.isyprom.de)). The ISYPROM process is based on the SIMILAR process by INCOSE (and compared with processes according to the NASA Systems Engineering Handbook and the VDI Guideline 2206), including the whole product life cycle and thus, exceeding a mere product development process.

Analysing the different activities in each of the innovation stages, the authors try to link aspects between both the requirements engineering and the innovation process. Analogies between these processes are used to integrate the activities of requirements engineering at the corresponding stages of the innovation process. The combined process provides an outline of activities along the innovation process. Then, recommendations for a process implementation are presented.

#### **5. FINDINGS**

Integration of requirements management into innovation processes as presented in the full paper indicates significant advantages for the design of innovation processes. However, the practical implementation of the

requirements engineering poses great challenges for companies. Requirements engineering is not yet an established methodology outside of software development projects. Nevertheless, the authors come to the conclusion that it can be beneficial to other sectors as well and become a means of managing the complexity of new product development. Considering the relevance of software for the majority of innovations, it becomes clear that a more systematic approach is overdue. It seems to be apparent that companies better face up to the international competition and manage complex developments with requirements engineering. Communication difficulties between stakeholders and amongst international research staff can be alleviated by a clear and concise description of necessary requirements. Companies can keep innovation cycles sufficiently short and ensure marketability through requirements.

#### **6. CONTRIBUTION**

The process design, as outlined in this abstract, provides a new way of thinking about systematic requirements management in the development process. Stakeholders are integrated in order to give an insight into future market needs and trends. The methodology will therefore enhance the understanding of market and customer requirements. This way, companies can improve their innovation capabilities.

#### **7. PRACTICAL IMPLICATIONS**

Companies that act as global players can improve their international innovation activities and strengthen their competitiveness based on a requirements management integrated innovation process. The development of different components of a new product can be distributed among departments without losing track of features and functions. For companies, it becomes easier to elicit a product's requirements for local markets and adjust the product accordingly. Companies stay close to the market and customer needs and the complexity of products, e.g., a high amount of software components, can be managed systematically.