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## Editorial

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Ralf Isenmann is an Associate Professor at the Faculty of Business Studies and Economics, a senior lecturer at the Institute for Project Management and Innovation (IPMI), and a senior researcher at the Research Centre for Sustainability Studies (artec), University of Bremen, Germany. He received his *venia legendi* from the University of Bremen for a professional academic thesis (Habilitation) on internet-based sustainability reporting and his PhD from the University of Kaiserslautern for a doctoral thesis on environmental management. His research interests are in the interfaces between (i) innovation management with a focus on technology roadmapping, (ii) sustainability management, and (iii) information management.

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## 1 Introduction

In the 30 years since technology roadmapping first became a topic of broader interest in academia, business, and administration, it has rapidly evolved to a valuable technique for identifying new opportunities and addressing risk and uncertainty in the management of technology. In contrast to the variety of concepts proposed in literature and to many applications in various industries, however, technology roadmapping is rather used as a standalone technique, yet.

While roadmapping seems to become part of technology management affairs, at least to a certain degree, interaction with corresponding methods along innovation planning, product development, and project management are of greater importance today, in particular linkages with other instruments and tools of operational innovation planning need to be developed and established.

- For example, how can the potential of technology roadmapping to support operational innovation planning be exploited, e.g. for project planning and controlling, resource allocation, capacity scheduling, capability planning, and human resources planning, among others?
- How can the future outlook visualised in roadmaps be transformed into clear steps, and well defined activities with measurable indicators, while identifying critical system requirements and milestones for meeting targets?
- Which tools may provide help to break down roadmaps into alternate technology roads, and which concepts could bridge the gap to promising innovation plans?

## **2 Bridging a current gap in the theory and practice of technology roadmapping**

Despite a number of publications around technology roadmapping in the last few years, however, there has been little research on how to bridge the gap from the strategic perspective of technology roadmapping to the operational level of innovation planning. Hence, there is a need to focus on efforts how companies could face these challenges, be it conceptually from an academic perspective or through the eyes of practitioners describing (best) case studies. It is not yet clear how technology roadmapping could actually be linked successfully to other approaches like portfolio management, scenario planning, quality function deployment, cost analysis etc., especially as a more holistic understanding is necessary to achieve long-term success, often crossing traditional borders of business functions, institutional units, and whole (multi-)organisation applications.

The goal of this special issue is to investigate and describe how technology roadmapping could be brought together with complimentary tools to be integrated in technology management, finally to advance the use of technology roadmapping to operational innovation planning and to support managerial decision-making in a proper manner. According to that goal, this special issue intends to shed some light on promising movements delivering forward-looking concepts, new tools, and best practice examples describing ways to link technology roadmapping and operational innovation planning.

As such, the six selected papers contribute to provide the current state of the art for an interdisciplinary readership from the corporate, political, and academic world as well as for experts in technology management and associated fields like R&D, project management, and representatives from various industries or the government. Responding to the international IJTIP call for papers for this special issue, a total of 14 manuscripts has been submitted for possible publication from all over the world. In order to provide a special issue of high quality, we applied a double blind review. All papers have been reviewed at least by two reviewers, all are outstanding scholars and leading researchers with expertise and reputation in the field related to the focus of the reviewed paper. Particularly we are grateful to the IJTIP editorial board members, who served as reviewers sharing their knowledge to improve the contributions. Further, we express our gratitude to Eckhard Lichtenthaler, Editor-in-Chief of the IJTIP, for his motivating assistance and valuable support while providing this special issue.

### 3 From technology roadmapping to operational innovation planning

The special issue includes six papers. These papers are investigating and describing how technology roadmapping could be combined with other instruments to a powerful toolset in technology management from different perspectives. In so doing, they address some of the current challenges identified in latest technology roadmapping literature and where companies are struggling at present (e.g., Moehrle and Isenmann, 2008; Beeton, 2007; Cosner et al., 2007; Bucher, 2003).

- Phaal, Simonse and den Ouden outline perspectives of next-generation roadmapping, which will be increasingly used as a core integrating mechanism for supporting strategic dialogue in a company. The concepts are illustrated by means of the Innovation Roadmapping method developed within Philips Applied Technology.
- There is a similar argumentation in the next paper, but from the perspective of a different company (Siemens AG). Farrokhzad, Kern and de Vries describe a supportive approach for decision-making known as the Innovation Business Plan. At the heart of this Innovation Business Plan is a portfolio-based roadmapping approach.
- Lee, Yoon and Park draw the attention to the links between technology roadmapping and other tools. They suggest a web-based supporting system, which ensures easy creation, dissemination and upkeep of technology roadmaps and also enables controlled, integrated and retrospective management of technologies.
- Kanama examines the integration of the Delphi method (especially the Japanese NISTEP variant) with technology roadmapping. His approach bridges the gap between long-term Delphi forecasts and innovation planning (see also Cuhls and Moehrle, 2008).
- In an industry case study Lischka and Gemuenden apply technology roadmapping to high technology gas turbine blade manufacturing in parallel with the restructuring of plant layout. They show how technology roadmapping contributes to a well-structured process to convert innovation into successful improvement of a manufacturing unit's competitive situation.
- Last not least, Vinkemeier links technology roadmapping with Balanced Scorecard approaches, leading to the Balanced Innovation Card. His examples from industry make clear how well these two instruments fit together.

The insights presented in this special issue help to explore:

- How technology roadmapping could be further developed from a standalone technique to an integral part of strategic management of technology?
- How to link it with operational innovation planning?

On the one hand, the concepts, tools, and case studies included here are illustrating considerable efforts which actors on different levels have undertaken since technology roadmapping became prominent three decades ago. Closely linked to the still increasing relevance of technology roadmapping, on the other hand, it becomes also clear that there is a lot of work that needs to be done to actually run technology roadmapping in a way while exploiting its potential to its fully extent.

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