# Why Feature-Based Roadmaps Fail in Rapidly Changing Markets: A Qualitative Survey

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**Abstract.**

**Context:** Companies in highly dynamic markets struggle increasingly with their ability to plan their future product portfolios and to create reliable feature-driven roadmaps. It seems that the traditional process of product roadmap creation that aims at providing a stable plan for all involved stakeholders does not fulfill its purpose anymore. However, the underlying reasons as well as necessary changes to the roadmap process are not widely analyzed and understood.

**Objective:** This paper aims at getting an understanding of current problems and challenges with roadmapping processes in companies that are facing volatile markets with innovative products. It also aims at gathering ideas and attempts on how to react to those challenges.

**Method:** As an initial step towards the objectice a semi-structured expert interview study with a case company in the Smart Home domain was conducted. Four employees from the case company with different roles around product roadmaps have been interviewed and a content analysis of the data has been performed.

**Results:** The study shows a significant consensus among the interviewees about several major challenges and the necessity to change the traditional roadmapping process and format. The interviewees stated that based on their experience traditional feature-based product roadmaps are increasingly losing their benefits (such as good planning certainty) in volatile environments. Furthermore, the ability to understand customer needs and behaviors has become highly important for creating and adjusting product roadmaps. The interviewees see the need for both, sufficiently stable goals on the roadmap and flexibility with respect to products or features to be developed. To reach this target the interviewees proposed to create roadmaps based on outcome goals instead of product features. In addition, it was proposed to decrease the level of detail of the roadmaps and to emphasize the long-term view. Decisions about which feature to develop should be open as long as possible. Expected benefits of such a new way of product roadmapping are higher user-centricity, a stable overall direction, more flexibility with respect to development decisions, and less breaking of commitments.

**Keywords:** product management, product roadmap, agile requirements management, requirements engineering, agile development, innovation management, customer development, UX, lean UX, lean development, portfolio roadmap, portfolio management.

## 1 Introduction

Nowadays the environments for creating new products, services and business models are getting increasingly complex and changing rapidly. Some of the reasons are the emergence of new technologies, high connectivity through the Internet, high availability of knowledge and ressources due to globalization, rapidly changing customer behavior and less predictability of markets and demands. From the point of view of product and service development new development approaches are emerging that are highly customer-centric and data-based with an emphasis on rapid learning. New products and services capture new markets in ever shorter time intervals. New competitors are revolutionizing traditional market structures and require considerable changes from established incubents. This situation has impact on the development and review of product roadmaps. Established enterprises are struggling more and more with their ability to plan their future product portfolios and to create reliable feature-driven roadmaps for the products. Startups also have significant problems with traditional product roadmapping. It seems that the traditional process of product roadmap creation that aims at providing a stable plan for all involved stakeholders does not fulfill its purpose anymore. However, the underlying reasons as well as necessary changes to the roadmap process are not widely analyzed and understood.

This paper aims at understanding current problems and challenges with product roadmapping. It also aims at gathering ideas and attempts on how to react on those challenges. The paper is organized as follows: Section 2 provides an overview of related work. Section 3 presents the research questions and the research study. The results of the study are discussed in Section 4. Finally, an outlook on the future of product roadmaps and further research is sketched.

## 2 Related Work

A comprehensive overview on the topic of product roadmapping in volatile business environments has been described by Suomalainen et al. [1]. Here, we focus on the core terminology of traditional product roadmapping, describe key problems with traditional roadmaps, and sketch some approaches that go beyond this traditional approach.

Kostoff and Schaller generically define a “road map” as a “layout of paths or routes that exists (or could exist) in some particular geographical space. In everyday life, road maps are used by travelers to decide among alternative routes toward a physical destination. Thus, a road map serves as a traveler’s tool that provides essential understanding, proximity, direction, and some degree of certainty in travel planning” [2]. Phaal and Muller consider a roadmap as an aggregation of relevant information to an integrated view on the evolution of a complex system [3]. According to Kappel [4] roadmaps are forecasts of what is possible or likely to happen in order to make better decisions. DeGregorio points out that roadmaps are visualizations of a forecast, which can be applied in a number of key areas such as technology, capability, parameter, feature, product, platform, system, environment or threat and business opportunity [5]. Albright defines roadmaps as living documents that describe a future environment and

objectives to be achieved within that environment. In addition, he mentions that roadmaps are plans for how those objects will be accomplished over time. Furthermore, the author suggests that it is advisable to review and update a roadmap over time, otherwise it is not useful [6].

The process to create a roadmap is called roadmapping [2]. Nearly every company applies its own roadmapping process [7]. A main reasons for this is that enterprises have different markets as well as different cultures [8]. An appropriate roadmapping process for a company depends on many factors such as the level of available resources (people, time, budget), the kind of issues being addressed (purpose and scope), or the available information (market and technology). Roadmapping provides a platform for sharing different perspectives and information. Furthermore, the stakeholders of a roadmap can develop a common vision of where the company is going in the future [9].

Roadmapping can be done on different levels. Kappel categorizes roadmaps in four categories based on their purpose and emphasis. These four categories are “Science / Technology Roadmaps”, “Industry Roadmaps”, “Product-Technology Roadmaps” and “Product Roadmaps” [4]. Phaal et al. identify the following eight types based on their intended purpose: product planning, capability planning, strategic planning, long range planning, knowledge planning, program planning, process planning, and integration planning. In spite of different taxonomies every type of roadmap seek to answer the following questions: 1) Where are we going? 2) Where are we now? 3) How can we get there? [7].

The purpose of a product roadmap is to predict the development of products, features or services over a long period [10]. Typically, product roadmaps are created, reviewed and improved iteratively. For this purpose, human interactions such as face-to-face meetings or workshops play an important role [7].

From the perspective of software product management, the product roadmap provides an overview about the direction of a product, feature or service develoment. Often, a product roadmap provides information about new releases or versions, their schedules and the major topics [11]. Sometimes, a roadmap describes also dependencies between product and platform technology. In some cases, the roadmap contains financial information. For example, estimated revenue and costs are included. In practice, usually the business owner of a product is responsible for the product roadmap. This can include the collaboration and agreement with stakeholders or constant updating of the product roadmap. Usually, a product roadmap has a time horizon of three to five years. [12] In this time frame the roadmap should be undergoing a regular updating process to ensure that the roadmap is developing in the right strategic direction and contains the current state of technical development [1].

Regarding the roadmapping process various approaches have been developed. Lethola et al. [12] suggest that the roadmapping process should consist of the phases “preparation”, “approval” and “communication”. The phases “theme identification”, “core assets” and “roadmap construction” are part of the approach developed by van de Weerd [13]. Vähäniitty [14] considers the process in four steps, which should be performed periodically in order to adjust the roadmap to the changing market situations including new information. The steps are defined as “define strategic mission and vision”, “scan the environment”, “revise and distill the product vision as product

roadmaps" and "estimate product life cycle and evaluate the mix of development efforts planned". Each step has defined objectives. The process is especially developed for creating and updating product roadmaps.

Komssi et al. [15] suggest a six-step roadmapping process based of the analysis of the customer value and customer´s processes. The approach includes the building of a cross-functional team (first phase), the examination of the business strategy (second phase), the selection of a customer segment (third phase), the identification (fourth phase) and analysis (fifth phase) of customer activities and linking the business potential of customer activities into the roadmap (sixth phase).

According to the study "Roadmapping" [16], roadmaps are widely developed, distributed and used in a feature-driven mode. This means that the roadmap contains products or features for a defined time horizon.

In the following, several reasons for using traditional roadmaps and problems with traditional roadmaps are summarized (based on Cagan [17]). Important reasons for using traditional feature-based roadmaps are that the management of a company wants to make sure that the teams are working on the highest-business-value items first. On the other hand, the management wants to be able to predict, when the products or features are ready for market launch. In order to do this, the management usually arranges a quarterly or annual planning session, where the leaders consider the ideas and negotiate a product roadmap. This procedure implies multiple challenges which will be discussed in the following.

First of all, a feature-driven roadmap is only a scheduled list of product or features. In rapidly changing environments such a roadmap includes many uncertainties and is typically undergoing many changes over time. Consequently, a company might lose reliability to external partners and the management might lose an essential controlling tool.

Another issue due to Cagan is that anytime you put a lot of ideas on a document entitled roadmap, no matter how many disclaimers you put on it, people across the company will interpret this item as a commitment to develop it. This leads to a change of focus from the actual needs of the customer to the functionality of the product or the system with its features. The criteria for success is no longer customer satisfaction, but to deliver them "on time". This procedure leads to the risk that the enterprise moves in the wrong direction and in some cases might run out of business.

Furthermore, Cagan mentions that at least half of the ideas on a product roadmap are just not going to work. The most frequent reasons are that the customers are not excited about an idea. This circumstance can be attributed to the underlying assumptions about the user or the feature itself. Here is an example: an assumption could be that the user would like to have an intelligent roller shutter control for the summer. However, the real customer might only need a cool room. Therefore, the assumption that the intelligent roller shutter control is the right solution for this customer is not necessarily correct. If there is a better solution available for the customer, the product "intelligent roller shutter" might not be able to survive in the market.

Several approaches on how to evolve traditional roadmapping have been proposed. Pichler [18] distinguishes between a so-called feature-based roadmap and a so-called goal-oriented product roadmap. The feature-based roadmap can be seen as the format

that is traditionally used for product roadmaps. It defines the dates for upcoming releases and the features that are included in each release. It does not define corresponding goals that are expected to be fulfilled with each release. In contrast the goal-oriented roadmap includes the following information: the release dates, a goal associated with reach release, and the features associated with a release. Figure 1 shows the difference between these two types of product roadmaps. The goal-oriented product roadmap shifts the conversation from discussing features to agreeing on strategic objectives, making smart investment decisions, and aligning stakeholders [19]. Goal-oriented roadmaps do not consider explicitly if certain features on the roadmap are suitable means for reaching the respective goals.

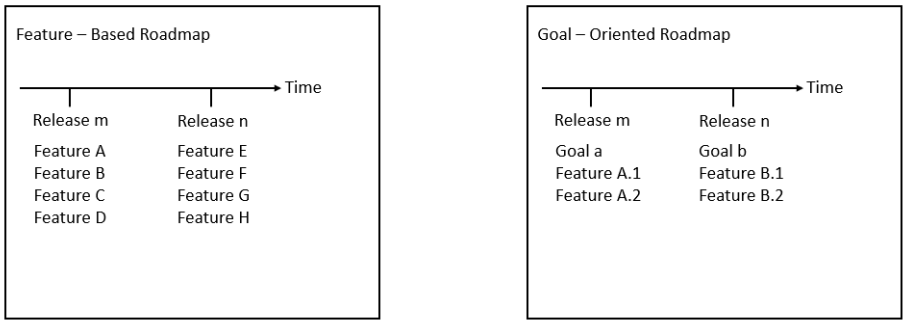


**Fig 1.** Feature-based Roadmap vs. Goal-oriented Roadmap [18]

Jeff Patton has created an approach called User Story Mapping. It starts with the identification of the customer journey along the horizontal axis. In the case of a web shop, the customer journey could be "search for a product", "view product details", "add a product to shopping card", and "buy the product". In a second phase the core user stories are determined, prioritized, and mapped to the customer journey. Examples for user stories are "enter credit card info", "enter delivery address", and "confirm order". In the further phases the definition of the releases take place [20]. An interesting aspect of User Story Mapping is that releases can be planned by walking down the vertical axis and defining goals. Appropriate functionalities can be considered and tested before implementation with respect to reaching the release goal. This way, User Story Mapping can be seen as a new way of product roadmapping that goes beyond traditional formats and approaches.

## 3 Study Approach

This section gives an overview of the study approach. It starts with presenting the research question and continues with a description of the study context, i.e., the case company. Afterwards, the study design including the data collection and analysis, the study execution, and the discussion of validity are sketched.

For the study the following research questions are defined:

RQ1: Which approaches and methods for creating and updating a product roadmap are currently applied by the case company?
RQ2: What challenges and success factors are associated with product roadmapping in the case company?

### 3.1 The Case Company

The study has been conducted at the Robert Bosch Smart Home GmbH (HOME), referred to as case company in the following. The case company is a business unit of the BOSCH Group. It was founded in 2016 as an independent subsidiary. It is engaged in smart home activities and offers a wide range of products, features and services in the business field of smart home. Products developed by HOME are, for instance, intelligent heating control and automated house surveillance. The actual number of employees is about 150. For this study interviews with four employees from the case company were conducted who were involved in the roadmapping process [21].

### 3.2 Study Design

The study was conducted by using a qualitative survey method. The qualitative survey method was chosen because the study has the objective to obtain new insights with respect to procedures, challenges and success factors in the area of "product roadmapping" in the context of a case company. To achieve this objective, the experience, opinions and views of the experts needed to be obtained. Therefore, the qualitative survey method (including semi-structured interview, observation, and content analysis) was preferred over the quantitative survey method [22].

Moreover, Fink identifies several opportunities, in which a qualitative survey method is appropriate. The following four aspects are relevant regarding this study: 1) The study is focused on investigating the knowledge and opinions of experts in a particular field. 2) The study intends to collect information in the interviews with own words rather than with using predefined choices. 3) There is not enough prior information of the study subject to enable either the use of standardized measures of the construction or a formal questionnaire. 4) The sample size is limited due to access or resource constraints [23].

### 3.3 Data Collection and Analysis

Semi-structured expert interviews with participants of the case company were used to collect data. The expert interview is a method of qualitative social research. [24] In an expert interview the participants can answer the questions by using free speech and a self-chosen terminology. In the following, typical characteristics of an expert interview are listed.

**Table 1.** Characteristics of an expert interview [25]

| **Motivation** | **Professional interest** |
|---|---|
| Process: | Constructive |
| Motivation of the interviewee: | Presentation/Transfer of knowledge |
| Criteria of exclusion (interviewee): | Interviewee is not an expert |
| Criteria for exclusion (interviewer): | Unfamiliarity with the topic |

An interview guide was developed to structure and focus the interview with the predefined topics and to ensure the thematic comparability of the various interviews (the complete interview guide is available in Appendix 1). In addition, the interview guide was created in order to avoid that important aspects are ignored [26].

The developed interview guide consists of three parts. It begins with an opening part including the background of the interviewed person. The main part contains questions with respect to the predefined topics. Finally, the closing part considers topics which were not considered up-front in the interview guide [27].

For a detailed data analysis, all interviews were audio recorded and transcribed. The most important findings were identified and examined through a analytic content analysis.

### 3.4 Study Execution

The study participants were selected experts from the case company. According to Mieg [25] the experts can be characterized as persons who have authorisation to a certain field and are involved in decision making processes based on their position. In this research the authors refer to those experts, who have specified knowledge and skills about product roadmapping and are involved in roadmapping activities.

The case company was represented by four interviewees. All interviewees held positions in the middle management. The participants represented the departments sales business operations, IT coordination, product management and brand and marketing communications. The purpose and the procedure of the study were shared with the interviewees via an up-front email.

The individual expert interviews were conducted in the office at the case company on September 21, 2018. The average length of the interviews was 47 minutes, with the range spanning between 33 and 52 minutes. One researcher conducted all interviews in face-to-face conversations. An overview of the background of the interviewees is shown in Table 2. The experience refers to the amount of years in which the person was involved in roadmapping activities.

**Table 2.** Overview of the interviewees

| Interviewee | Role | Experience |
|---|---|---|
| Interviewee 1 | Head of Sales Business Operations Department | 20 years |
| Interviewee 2 | IT Coordinator | 1 year |
| Interviewee 3 | Head of Product Management Department | 12 years |
| Interviewee 4 | Marketing and Brand Manager | 20 years |

### 3.5 Validity

Yin [28] proposes to consider the construct validity, the internal validity, the external validity, and the reliability for assessing the validity and trustworthiness. We use this framework as the basis for the discussion of validity of our study. Other frameorks exist such as the framework from Campell and Stanley [29] that are also applicaple for this kind of studies.

**Construct validity** refers to the correct operational measures for the concepts being studied [28]. As a means for establishing construct validity the goal and the purpose of the interviews were explained to the interviewees before the interviews. In addition, the way of data collection through semi-structured interviews allowed for asking clarifying questions and avoiding misunderstandings.

**Internal validity** refers specifically to whether an experimental treatment/condition makes a difference or not, and whether there is sufficient evidence to support the claim [29]. This criterion can be tested with respect to the validity claims for communicative actions, according to Habermas [30]. These criteria are defined as follows: 1) Clarity describes to which extent the interviewees understand the questions or whether there occur any linguistic discrepancies; 2) Legitimacy refers to the cooperativeness of the interviewees; 3) Trueness refers to find no contradictions in the statements, 4) Sincerity consider the completeness of the statements. The following discusses the internal validity according to Habermas:

- Clarity: The interviewees were experts with many years of experience in the field of roadmapping. Each participant was a native speaker in the interview language German. In cases where the questions were unclear to the participants, they asked further questions.
- Legitimacy: Each interviewees were interested in the research and answered the questions in a detail manner. So, in summary there was a very cooperative atmosphere.
- Trueness: The experts came from different disciplines, so they asked the questions from various perspectives. The analysis showed that there were no major contradictions between the perspectives.
- Sincerity: Each interviewee answers the question extensively and there was no indication of missing parts of the topic.

The **external validity** is defining the domain to which the studies can be generalized [28]. Regarding this study the external validity is restricted, because the results are only valid in the context of the case company. Thus, the results are not transferable to other fields of investigation. Anyhow, the company might be similar to other German companies in the IoT or Smart Home domain. Therefore, an analytic generalization might be possible to such similar companies.

The **reliability** describes whether a study produces stable and consistent results. For example, the data collection procedures can be repeated with the same results [28]. The reliability was supported by providing an interview guide that is publicly available. Although the study was just an initial effort to answer the research questions, the analysis has been conducted in a systematic and repeatable way. Therefore, a replication of the study and a reduction of researcher bias is supported.

# 4 Results

This section sketches the product roadmapping practices of the case company (answering research question RQ1). Afterwards the challenges and the success factors that were seen in the case company are outlined in two different sections (answering research question RQ2).

## 4.1 Product Roadmapping Practice

The current product roadmap format of the case company resembles a coordinate system. On the y-axis you find domains like security, climate or lighting. The x-axis represents the time dimension (see Figure 2). Usually a time horizon of 12 months is used. The products and features are put on the roadmap according to their associated domain and their planned development time (i.e., start and end date). Moreover, each feature contains the information when the rollout (i.e., the software deployment to the customer) is ready or in the case of hardware when the market launch is to be expected. This procedure provides a clear overview of the planned market launches to external and internal partners.

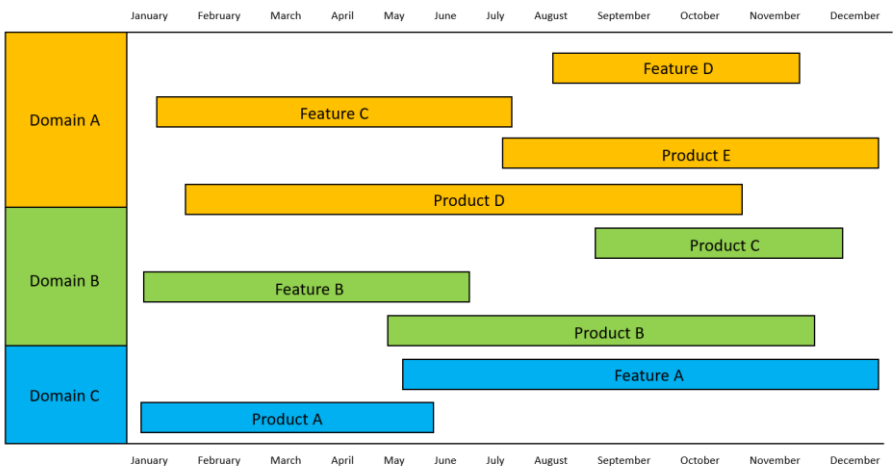


**Fig. 1.** Product roadmap format at the case company

Currently the management board is responsible for the product roadmap. However, the management is delegating the product roadmap creation into the hands of the product management. In practice, the head of the product management department is responsible for the product roadmap. This responsibility includes creating and updating the product roadmap as well as the coordination of other stakeholders with respect to the roadmap. These stakeholders are the departments "Portfolio Management", "Engineering", and "Marketing and Sales".

For creating the product roadmap and for adding new products, features or services the following approach is applied: *"Currenty we have the procedure that the management and I, the head of the product management department define criteria to asses a product, service, or feature proposal. Typical examples for such criteria are 'Does the product have a unique selling proposition?', 'Is there a demand from the perspective of the customer?', and 'How much revenue is estimated?'. Each of these criteria is given a specific weight. This could be, for example, a factor 4 for the estimated revenue while the customer demand might be calculated with a factor 3. Every product, feature or service is then evaluated and receives a score based on the mentioned criteria. This score reflects a priority, i.e., the higher the score the higher is the priority and the product, feature or service is more likely to be put onto the roadmap at an earlier time*." (Head of Product Management Department). Furthermore, an analysis of the social media channels and service-tickets is conducted. The results of these analyses are also included in the decision process and can lead to minor adjustments.

New ideas for products, services or features can stem from many different sources, especially customers. In case of an update for an existing product, surveys with users will be conducted.

Every month, the product management has a meeting with the other stakeholders in order to make a concrete decision about which products, services, and features should

be put on the roadmap. At this meeting, the product managers are presenting their findings of their market research and discuss them with the other stakeholders. The market research is conducted by the department "Product Management" and includes which products or features are expected from customers and what products are developed by the competitors. Another input to the meeting is so-called GfK data. This GfK data describes consumer behavior and can be used to identify potential delivery areas.

In the next step the development department estimates the development time. The estimation takes the budget and the available resource into account. The estimation also aims at answering the question whether a completion of the planned feature is possible in the scope of the target release. If it is not possible to deliver on time, the product, feature or service might be moved to a later release.

The prioritization of the previously selected products, features or services is mainly based on financial aspects. *"A financial forecast is conducted with the goal to find the products, features or services that have the highest impact on achieving the revenue targets of the company. This financial forecast has the highest impact on the prioritization.*" (Head of Product Management Department*)* Other criteria that are used in the prioritization are the strategic alignment, the customer demand as well as the contribution to the development of a competitive advantage.

Another topic of the monthly meeting is the revisiting of the current roadmap. The participants analyze the impacts of the last four weeks and try to identify deviations from the roadmap or needs for changing the roadmap. A typical situation is a change of capacity or budget. Such a situation might be that the company cannot develop a planned hardware because of a lack of budget. Another example is that the engineering has to fix a lot of bugs the next two sprints. This might lead to a delay in the completion of the planned features and to a deferral of the products on the product roadmap. Consequences could be that features with a low prioritization are removed from the product roadmap or a market launch gets delayed. Also market-driven events (e.g., from DIY stores and electronic stores) or technological innovations might lead to a change of the product roadmap. *"The rise of conversational interfaces such as Amazon's Alexa is an example for a technological innovation that has a significant impact on many product roadmaps in the smart home domain. Without the integration of such devices or ecosystems, the competitiveness of many smart home products would be threatened.*" (Head of Sales Business Operation Department). The revisiting of the product roadmap includes a review with respect to delays of prioritized products.

### 4.2 Challenges of the Product Roadmapping Process

The case company operates in an innovative and highly dynamic market environment with rapid changes and disruptive participants entering the market. This imposes several challenges to the roadmapping process. Table 3 gives an overview of the challenges that were mentioned in this study.

The product roadmap developed by the case company covers a 12 months period. Thus, *[…] concrete products or features are defined over an incalculable long time horizon with many uncertainties […] Nowadays, a long-term-planning with reliable and stable information (i.e., with features, products and services) is no longer possible*

*due to rapidly changing markets."* (IT Coordinator) The volatile market environment and difficulties with predicting development activities require frequent updates of the product roadmap. Reasons for these changes are, for instance, a decline in demand for certain products, development delays due to unforseen events or other important things. Frequent changes to the roadmap currently lead to high additional cost and sometimes delayed marked launches of new products.

Furthermore, a constantly changing roadmap is likely to decrease the employee´s awareness for the overall strategy and company vision. Moreover, the new planning consumes a lot of capacity of the participating employees which could be used more efficiently.

*"One factor for creating a roadmap is that marketing needs to plan campaigns long-term ahead and sales requires an reliable outlook of the product portfolio including the future products and features to present it to potential customers*." (IT Coordinator) In both cases the mentioned departments require a certain reliability to which point in time a product, feature or service will be available.

Finally, *"in some cases ideas for new products, services or features come from management or investors with the expectation that these ideas will be implemented without any delay and independently from the current planning. Often, the implementation of these ideas leads to an unforeseen change of the product roadmap."* (Head of Product Management Department) The result is a shift of some features to a later point in time and hence often means a delayed product launch.

**Table 3.** Challenges with current product roadmapping

| **Product Roadmapping – Current Challenges** |
|---|
| Many uncertainties exist due to rapid changes of markets, technologies, and customer behaviors. |
| Time horizon of a roadmap is too long. |
| Frequent changes of the current roadmap are necessary. |
| Frequent changes of the roadmap impose severe consequences (high cost, delays, and planning overhead). |
| Difficult alignment of the roadmap with product vision and long-term company strategy. |
| Marketing and sales require long-term predictions for features, products and services in order to plan their activities (such as campaigns). |
| Management or investors sometimes overrule product roadmaps. |

### 4.3 Success Factors of Product Roadmapping

Another objective of this study was to gain insights into the success factors of product roadmapping. Table 4 gives an overview of the expected success factors for future roadmapping activities that were mentioned in this study.

The experts from the case company mentioned that a good understanding regarding the market as well as the ability to live with uncertainties are important success factors. *"A good understanding of the market is necessary for creating a good roadmap. Maybe*

*also the abibility to deal with uncertainties is necessary. This means accepting that nobody exactly knows which product we will launch in a year […] and also accepting that the roadmap will become fuzzy looking in the long term horizon."* (IT Coordinator) This means that each employee must accept that a roadmap provides detailed information only over a short period of time (e.g., product planning for the next 3 months). In the case of a volatile environment with rapid changes it is impossible to plan in detail for a long-time-period. The planning should be conducted continuously to ensure that the roadmap is always up to date and that the company can always rely on a detailed plan for a short-term period.

The experts also mentioned that a roadmap should help to give all stakeholders an idea of the product vision and the direction the company will go in the future.

Another central theme that was mentioned as success factor in the interviews is that the needs of the customers should be included in the roadmapping process, […] *"the fulfilment of customer needs is the prerequisite for creating successful products that generate revenue."* (Head of the Product Management Department) A central question has to be: *"In which way do the contents of the roadmap contribute to solving a current problem of the customer?"*(IT Coordinator*)* The financial review was also mentioned as a success factor.

**Table 4.** Success factors for product roadmapping

| **Product Roadmapping – Success Factors** |
|---|
| Ability to live with uncertainty. |
| Good understanding of markets and customer behaviors. |
| Detailed planning only for a short period of time. |
| Continuous planning. |
| Connecting the roadmap to the fulfillment of customer needs and business goals. |
| Alignment of the roadmap with product vision and company strategy. |

## 5 Outlook and Further Research

As part of the study we also asked the participants about their proposals for improving product roadmaps and related process in the future. We also aim at building a substantive theory of goal-driven or outcome-driven roadmaps that can be applicable in a wider context. We expect that we will also narrow down research questions when gaining a better understanding of the research area.

The interviewees mentions that future roadmaps should be structured in a problem- or outcome driven form. This means that the roadmap should not contain products, features or services, but instead current needs and problems from the perspective of the customers (i.e., customer outcomes) and the related business goals (i.e., business outcomes). Thus the roadmaps are widely outcome-oriented and the way to reach this outcome (e.g., which features are built to solve the customer problem and/or reach the business outcome) is left open. This procedure allows that all aspects such as future

technologies and trends can be taken into consideration. It also allows to conduct experiments in order to determine if certain features are suitable to reach the outcomes (ideally before implementing them).

Therefore, future product roadmap should be designed in an outcome-oriented way. This means that the information contained in a long-term roadmap should only reflect the current needs or problems of the customers as well as the business goals and not the possible solutions. This allows the company to stay flexible in deciding which solution fits best and therefore leads to a better fulfillment of the customer demands. Moreover, it is assumed that an outcome-driven and user-centric approach for the roadmapping process offers an effective planning of the operative measures and more space for creativity.

In summary, the traditional procedure for the roadmapping process is not suitable anymore for an agile and innovative environment. Hence a new approach is required. This new approach has to provide a flexible customizability to adapt to rapid market changes as well as provide sufficient planning security with respect to outcomes. Other disciplines such as marketing and sales will also need to change their way of working. It might be that they need to plan long-term marketing campaigns based on outcomes instead of available features.

The challenge for many companies will be to adjust and replace their traditional product roadmaping and introduce a new modern roadmapping process that makes them ready for a volatile highly dynamic environment. Further investigations regarding the abilities of an outcome-driven and user centric roadmapping process (including the roadmap format and organizational and cultural aspects) are necessary in order to find a new approach that fits today's dynamic and complex environments.

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## Appendix 1. Interview Guide

**Background of interviewee:**

1. What is your current position in your company?
2. How many years have you been working in the company?
3. How long are you involved in the topic product roadmapping?

**Company Information:**

4. Can you briefly describe the business sector your company operates in and the products it develops?
5. What kind of development process do you use?
6. How often do you deploy new versions to customers?

**Current roadmapping practices:**

7. Who is responsible for the development of the product roadmap in your company?
8. Which information does the product roadmap contain?
9. What is the procedure of product roadmap creation?
10. Who is involved in the product roadmapping process?
11. Which information is used for creating the product roadmap? Where does this information come from?
12. How do you prioritize the product roadmap?
13. How do you make decisions which contents are included or removed from the product roadmap?
14. How do you review the product roadmap?
15. What are criteria for a good product roadmap?
16. In which way do you integrate other stakeholders such as other departments, customers, or suppliers in the product roadmapping process?
17. In which situations are you changing the product roadmap and how do you change it?
18. What is the process for changing the product roadmap?

**Challenges, success factors and improvement proposals:**

19. Are there any challenges or obstacles regarding the product roadmap process?
20. In your opinion, which factors are supporting the product roadmapping process?
21. Do you think your current practices of product roadmapping are ideal? If not: How should they ideally be performed in the future?

**Final questions:**

22. Do you have any further comments about product roadmapping issues in the context of your company?
23. Do you have any further questions related to this interview or the study in general?