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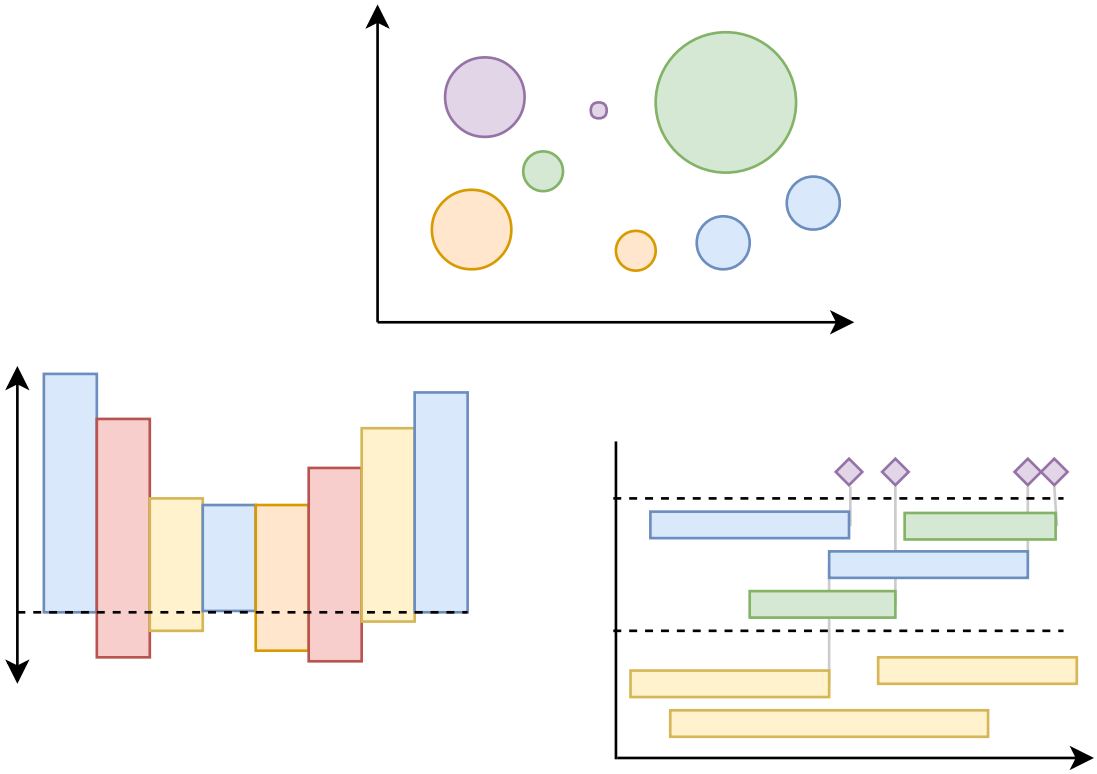

A Holistic Approach to Integrated Roadmapping

A case study at Philips Business Unit Coffee

Master of Science in Product Development Thesis

CARL N.K. TOLLER

Department of Industrial and Materials Science
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2019

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Abstract

The market for coffee and coffee machines has experienced changes over recent years, e.g. through the introduction of portioned filter and capsules. Concurrently, the increasing interest in coffee as consumable is creating opportunities for growth and innovation. However, today's competition requires Philips BU Coffee to deliver products quicker and better adapt to shifts in market trends. Roadmaps, a strategical development tool, plays a crucial role in enabling this.

As an effort to continue to innovate and meet the changing demands from coffee consumers, the process for roadmapping is needed to improve. Using the A3 methodology, this thesis investigated the current state of roadmapping and project portfolio management. The findings showed a multi-project setting as well as roadmap discrepancies. A root cause analysis was conducted which identified four root causes.

Further, a literature study and best practice inquiry were performed to obtain insights on possible countermeasures. Finally, two options were selected after elimination and evaluation of all concepts. The first countermeasure was to introduce an integrated roadmap in the software Planisware to obtain a single source of truth and remove the discrepancies. The second countermeasure was the development of tools to support the process and aid in adhering to it. These proposals were checked with all stakeholders which all gave a positive response.

In conclusion, the proposed framework enables Philips BU Coffee to perform portfolio assessments and roadmapping using a single source of truth. The development through Planisware gives transparency and allows for the decision making to be based on objective analysis. The holistic approach ensures that the organization is aligned and have the answers to can, should, and when to innovate. Stepping into the next generation of roadmapping will give Philips BU Coffee the possibility to share their passion for coffee for decades to come.

Keywords: roadmap, roadmapping, project setting, PPM, product development flow, resource allocation

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Dank u wel!

Carl N.K. Toller

Gothenburg, January 2019

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List of Abbreviations

AD	-	Advanced Development
BG	-	Business Group
BU	-	Business Unit
DBT	-	Design-Build-Test
FTE	-	Full-Time Equivalent
I&D	-	Innovation and Development
LCM	-	Life-Cycle Management
LPD	-	Lean Product Development
MLD	-	Modified Launch Design
NPD	-	New Product Development
PDLM	-	Product Development Launch and Maintenance
PPM	-	Project Portfolio Management
QMS	-	Quality Management System
R&D	-	Research and Development
TDB	-	Test-Design-Build
WIP	-	Work In Progress

1

Introduction

The market for coffee machines has expanded and is predicted to grow for several years ahead, mainly thanks to the convenience, increased interest in specialty coffee, and new technologies emerging (Transparency Market Research, 2018). One example of this is the introduction of the portioned filter provided by the Senseo brand which offers the consumer to brew one cup of filter coffee with significantly lower effort than previously. However, the increase of market value has also resulted in harder competition propelled by the globalization of consumer markets. One player for this market is Philips BU Coffee, a part of Royal Philips and collaborator for this thesis. The battle for market shares is tough and, therefore, Philips BU Coffee is required to continue its innovation to ensure sustainable growth.

Releasing innovative products faster to the market than its competitors is something which puts a strain on the portfolio and strategical management. This has to be done with grace while respecting the organizational constraints and considering the short and long-term trade-offs simultaneously. The use of roadmapping – first introduced by Motorola and today a widespread management tool for innovation (Groenveld, 2007) – is one tool to achieve this. The challenge is not to derive what projects are possible to do but which projects one should do and when they should be done. Projects can no longer be considered as isolated decisions and entities but a more holistic approach to roadmapping that integrates multiple perspectives and departments is required. By emphasizing the when, a firm is able to unlock a potential to not simply match the needs of today but also the anticipations of tomorrow. This thesis was initiated to address this and determine how a firm can work with integrated roadmapping from a holistic standpoint.

1.1 Background

Philips BU Coffee has the ambition to be a world-class innovation organization that can excel in linking technology and product development with market opportunities

and consumer insights. This is today ensured by the usage of a market roadmap as well as a project roadmap. These roadmaps are separate – even though a linkage between them exist – and sorted on market category and product family. Thereby, it is difficult to provide a holistic view of how the strategical decisions facilitate a product and technology advancement moving towards set goals and ambitions as well as gaining an unambiguous overview of the value streams. Further, the revision of the current roadmaps is done periodically at relatively long intervals which results in larger changes with extensive efforts.

There is a need for an investigation of the current roadmapping situation at Philips BU Coffee taking a holistic standpoint. The respective dimensions in consideration are function- and organization. The function-based view aims to look into how the different functions within Philips BU Coffee relate and influence the roadmapping as well as how they are affected by its output. On the other hand, the organization-based review regards the role of roadmapping in the organization and its influences on operational and strategical management, e.g. resource planning. There is an intention to cascade the roadmap to integrate additional aspects such as workforce planning and supplier integration. A future ambition at Philips is to use a common roadmap structure to utilize the synergy potential.

1.2 Aim

The purpose of this thesis is to investigate the current state of roadmapping and innovation process at Philips BU Coffee, both according to the standard work processes and how it is done in practice. Based on the findings and derived root causes, a set of countermeasures will be derived and implemented.

1.3 Research Questions

Beyond the case-specific aim, the findings will be used for answering a set of research questions which are at a more aggregated level and aims to be applicable regardless of industry and sector. The answers will provide new knowledge to the topic of integrated roadmapping and portfolio management.

RQ1: *What effective measures can be done to manage and counteract multi-project setting and resource allocation syndromes?*

This question addresses the challenge of a multi-project setting and resource allocation syndromes commonly present at project-based organizations. The QMS ad-

dresses these risks but in practice may have challenges mitigating them well enough. This investigation aims to see if any additional measures can be taken to mitigate these risks effectively.

RQ2: *How does an integrated roadmap change the perception and interpretation of roadmapping?*

There are multiple ways to design the roadmap where integration is one. The question addresses if this roadmap design results in a difference in how the roadmap is interpreted, utilized for portfolio management, and influences the strategical decision making. Onward, will the introduction of an integrated roadmap invoke a shift in perception of roadmapping?

1.4 Limitations

This thesis does not aim to derive a new roadmap for either markets nor technologies. It will instead take its stand based on current roadmaps and identify means of improvements. Further, the task is to investigate the current state and propose an improvement plan for Philips BU Coffee and not the corporation as a whole nor any partners. However, it is not excluded that the results might be used and incorporated outside the business unit as well as creating a foundation for roadmapping efforts together with partners.

Today, the project portfolio management is done in Planisware, a PPM software, and the prerequisite is that the roadmapping should be constructed or mitigated to this environment. Thereby, the product of the thesis needs to be compatible with the existing functions and limitations that exist in Planisware. Organizational management, group dynamics, and cultural challenges have an impact on roadmapping. Regardless, this will not be addressed apart from a theoretical perspective unless it is crucial for the success of the thesis. Recommendations for implementation of the results with regards to organizational management will be given.

1.5 Deliveries

The project can be divided into a set of deliveries which are crucial for the success of the thesis. The identified deliveries are listed below.

- An analysis of current state including a derivation of root causes
- A countermeasure framework with an implementation plan

- A published thesis report

1.6 Outline of the Report

The continuation of the report is structured as follows.

Chapter 2 To enable the best understanding of the thesis, a theoretical framework is provided. Relevant research and topics are presented based on the literature study.

Chapter 3 The methodology of the thesis is described both from an aggregated level as well as methods and tools used throughout the project. This chapter provides an understanding of how the rest of the report is constructed.

Chapter 4 In accordance with the A3 method, the first step is to identify the current state. This is done by depicting the project context followed by results from the qualitative and quantitative data analysis.

Chapter 5 This chapter builds upon the previous by determining the vision of success and targets for how the current state should be improved.

Chapter 6 Based on the current and desired state, a problem analysis is conducted and presented. This analysis ultimately derives the root causes believed responsible for the gaps.

Chapter 7 The process and result of the countermeasure identification and selection is shared. Taking stand from the problem identification, root cause analysis, and vision of success; the countermeasures space is explored and analyzed.

Chapter 8 Based on the selected countermeasures, individual implementation plans are developed and presented. This includes a detailed description of the action plan.

Chapter 9 To determine if the implemented countermeasures have fulfilled their purpose, the effects are discussed and reflected upon. A new comparison with the vision of success is made.

Chapter 10 The results and process of the thesis are discussed with respect to the learnings made and initial ambitions.

Chapter 11 The thesis is summarized and general conclusions are presented. Lastly, recommendations for future work is shared.

2

Theoretical Framework

A literature study was conducted to identify the state-of-the-art research and provide fundamental knowledge required for the thesis. The theoretical framework provides an introduction to key concepts and topics which will be considered throughout the report. Topics such as roadmap, product development methodology, and project setting are introduced and discussed.

2.1 Roadmap

In general, a roadmap is a collective look at a certain field's development as a function of time using available knowledge and analyses of relevant trends (Galvin, 1998). It joins together two organizational functions in both the short- and long-term perspective (Groenveld, 2007), e.g. product-technology or product-market. The explicit use of time as a function is something which distinguishes the roadmap from most other strategical documents and tools. Though several different types of roadmaps exist, there are two fundamental roadmaps used in corporations today. These are either product-market or product-technology roadmaps derived from a market-pull or technology-push perspective respectively (Vishnevskiy et al., 2016; Lee et al., 2009).

Further, the integrated roadmap is a combination of the product to market and technology to product roadmaps where the roadmap is approached from both the market-pull and the technology-push perspective simultaneously to create a holistic view of the future innovation (Vishnevskiy et al., 2016). It is constructed so that the trajectory from basic R&D to the market application is visible – see figure 2.1 for a schematic model. The use of technology-push provides a picture of which product characteristics and features are possible simultaneously as the market-pull derives the required product specifications needed to meet the current trends and assumptions of the market's future growth. However, it is also possible to solely rely on one perspective and do a cascading which goes through the entire roadmap.

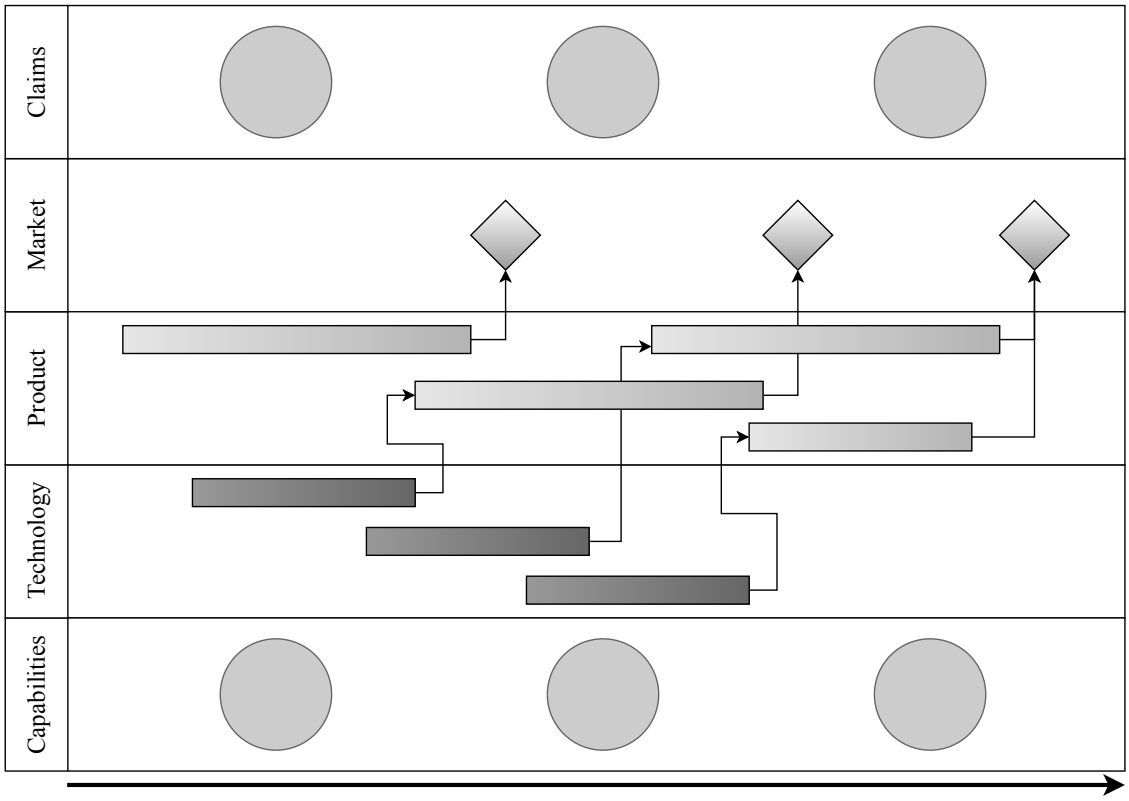

Figure 2.1: Illustration of an Integrated Roadmap

Most common is then to take the market-pull and cascade downwards towards basic R&D. Research also refers to technology roadmaps using the same definition as for integrated roadmaps, e.g Rinne (2004), Lee et al. (2009, 2016), Phaal et al. (2004), and Petrick and Echols (2004). A technology roadmap enables the linkage of multiple perspectives such as market, product, and technology and offers support for the long-term planning (Lee et al., 2016).

Moreover, several benefits with the integrated roadmap or a roadmap, in general, can be identified. The most apparent ones are: enabling more sustainable new product development decisions; reducing the risk associated with uncertainty; ability to identify common needs and opportunities to maximize the synergy potential; a tool for communicating strategical development both internally and externally; achieving consensus regarding the future innovation; a method to stimulate targeted investigation and investment with a focus on prioritized areas; enabling corporate-level technology plans; and effective in connecting business and technology planning (Albright and Kappel, 2003; Petrick and Echols, 2004; Galvin, 1998; Lee et al., 2009, 2012; Phaal et al., 2004). The integrated roadmap has the additional benefits of increased transparency through a single source of truth as well as an increased focus on alignment between stakeholders.

Additionally, one important aspect to consider is that the main determinant for the potential progress potential of a product is the complexity of the underlying knowledge structure (Dong and Sarkar, 2015), addressing the importance of having control over the knowledge development in an organization. An integrated roadmap will aid in this by clearly connecting then knowledge pathways from basic R&D to product launch. The division of a knowledge structure within a product architecture provides the possibility to modularize and address each part individually. This can, in turn, be used for achieving a standardization in the roadmapping format enabling better utilization of synergy potential (Groenveld, 2007). When roadmapping is performed correctly, it manages to align the priorities of marketing and innovation together (Kappel, 2001).

2.2 Roadmapping

The process of creating and maintaining a roadmap is called roadmapping. It can be described as a method for creating a strong awareness of how future market needs can be met with the right product at the right time as well as a measure to improve synergies between functions in product development (Groenveld, 2007). Albright and Kappel (2003, p. 33) states that "one feature that distinguishes roadmaps from other corporate planning documents is the explicit revelation of time". This concludes that a through using a roadmap, an organization is able to address the strategical development with planning as a product of time, e.g. resources and budget. Important factors to consider for a successful introduction and maintenance of the roadmap is to ensure that it is adapted to the organization, to have expertise available for facilitating the process, and obtain acceptance of it within the organization (Phaal et al., 2004; Albright and Kappel, 2003; Lee et al., 2012).

As introduced by Groenveld (2007), one approach to roadmapping is to use scenarios. The author describes the process of first constructing building blocks for the roadmap – i.e. specific projects in R&D of NPD for instance – and then based on these blocks, construct a set of scenarios. Hussain et al. (2017) present a similar approach where different scenarios are constructed and evaluated. This is then used as input for a traditional roadmapping procedure such as the one presented by Phaal et al. (2004). By the utilization of a scenario-driven roadmapping, both developing and emerging technologies can be considered thus aiding the decision-making by providing a tool to balance the external uncertainties and unpredictability of emerging technologies (Hussain et al., 2017). The elaboration of multiple scenarios provides the portraying of possible futures. This aids the process of thinking in different time horizons which are required to suffice all departments within the organization

(Kappel, 2001).

2.3 Portfolio Management

The concept of portfolio management refers to the dynamic decision process where all active projects are updated and revised. It also includes the continuous evaluation, selection, and prioritization of new projects and existing projects (Cooper et al., 2012). The portfolio consists of all running and planned to run projects, for the innovation and development department, this includes product development projects, technologies projects, improvement projects and so forth. The consequences of poor portfolio management according to Cooper et al. (2000) is fourfold. The first typical consequence is a lack of strategic criteria in the selection process which increase the risk of running a project without consistency and direction. Another characteristic is a portfolio with a majority of low cost-low reward projects and a scarcity of breakthrough projects giving the portfolio a short-term skewing. A third outcome is a reluctance to kill project resulting in multiple projects with scare resources and no focus in the portfolio. Finally, the risk of running the wrong projects increase since decisions are usually based on gut feeling and politics rather than objective selection methods. Therefore, good management of the portfolio is vital for success in innovation.

One important remark within portfolio management is that it is not about selecting the best project but rather deciding on the best set of projects which combined achieves the business strategies (Smith and Sonnenblick, 2013). If projects are considered as isolated entities, the selection will be made based on which project stands best alone. However, this might and often is not what is best when looking at the entire business since projects with low risk, low costs, and short-term sales are premiered over high risk, high cost, and long-term business opportunities. By evaluating and selecting project using portfolio-centric measures, a more holistic approach which premieres a well-balanced set of projects is achieved (Smith and Sonnenblick, 2013). In conclusion, never assess a project, assess a portfolio. Cooper et al. (2012) summarize five key characteristics present for a method resulting in good portfolio management, all listed below.

- Explicit and established in the portfolio management
- Has support from management
- Clear rules and procedures
- Treats projects as a portfolio

- Consistently applied across all appropriate projects

2.4 Product Development Methodologies

Multiple methodologies for NPD exist today. Some examples are the product development process by (Wheelwright and Clark, 1992), the Stage-Gate® model by (Cooper et al., 2000), and Lean Product Development as presented by (Kennedy et al., 2008). The Stage-Gate® model and lean product development are the methodologies used at Philips BU Coffee. Cooper et al. (2012) explains the Stage-Gate® model, a today common used methodology, as a process with pre-determined gates that functions as hurdles for the projects. To reach a gate, the project must meet a set of deliveries and then a decision is made if the project is allowed to continue, requires rework, or is killed. Every project needs to pass the same gates and meet the same deliveries.

Further, lean product development introduces a new way of thinking about product development through the introduction and emphasize on value stream. Kennedy et al. (2008) presents a model to visualize the two distinct value streams – see figure 2.2. The product value stream relates to the development of new products and components where each product is a separate flow. The knowledge value stream refers to the obtaining and reuse of knowledge across projects and products. The learnings from a product development projects function as input for the organizational knowledge and thus activates the knowledge value stream. This model helps to visualize that a project has a dual purpose, partly to produce a product of service and partly to increase and mature the knowledge of the organization. It is important for a firm to focus on both to be successful (Kennedy et al., 2008).

2.4.1 Product Development Flow

The concept of product development flow refers to how product development projects are performed and progress in the organization from project initiation to completion. This concept is presented by Reinertsen (2009) and Oosterwal (2010) from two different points of views. Reinertsen (2009) describes it as a part of lean product development and, as with lean production, is an approach to manage the product development projects within an organization. The product development flow can be evaluated with similar parameters as a production flow, e.g. WIP, queues, and takt – or cadence as Oosterwal (2010) refers it to. However, there are some fundamental differences which make the implementation of lean production principles

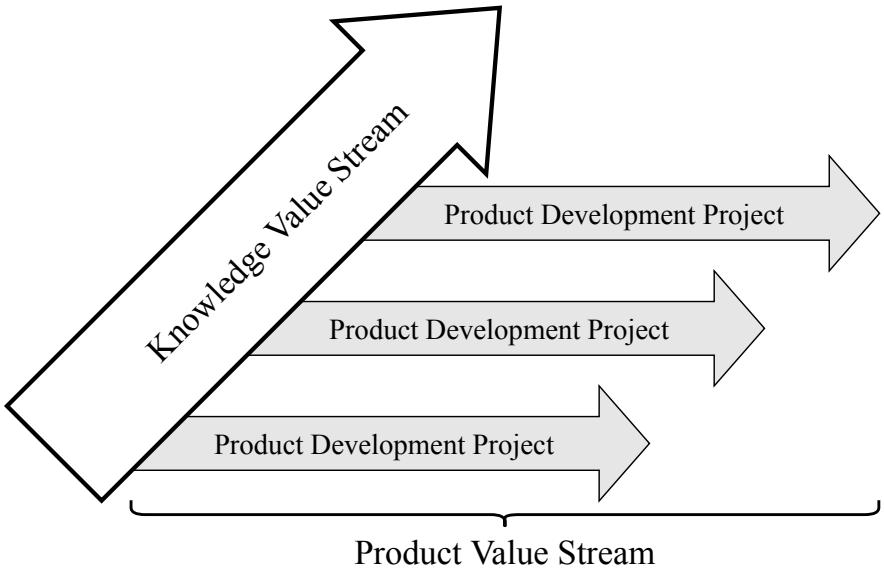

Figure 2.2: Value Streams in Lean Product Development (Kennedy et al., 2008)

on product development flow difficult or contradicting. One major difference is the characteristics of the objects – product or project – flowing. In a production line, all objects are homogeneous while projects in a product development flow are heterogeneous. Additionally, products are mainly real entities while projects are virtual entities. This makes methods such as First-In-First-Out and Six Sigma ineffective since there exist a natural variance among the projects as well as relative priority (Reinertsen, 2009).

Onward, this means that the product development flow must be handled differently from the production flow. Reinertsen (2009) present a management approach for this which is based on the aim to always use one unit for measurement, financial impact. For instance, when decisions are made parameters such as the cost of delay and cost of variance should be considered. In traditional management, putting a project on hold is considered cost-free since there is no direct cost connected to it. However, Reinertsen (2009) argues that this is in fact not true due to alternative cost induced by later launch date, loss in market shares, as well as rework and loss of knowledge. By deriving the cost of delay, prioritizing the projects in the development flow becomes more evident.

Further, one major influence for cost is queueing, projects and activities waiting for a resource to be available. Queues occur naturally due to the natural variance in projects and the development process causing a fluctuation in resource need (Reinertsen, 2009). Figure 2.3 illustrates how the queue size for a resource is dependent

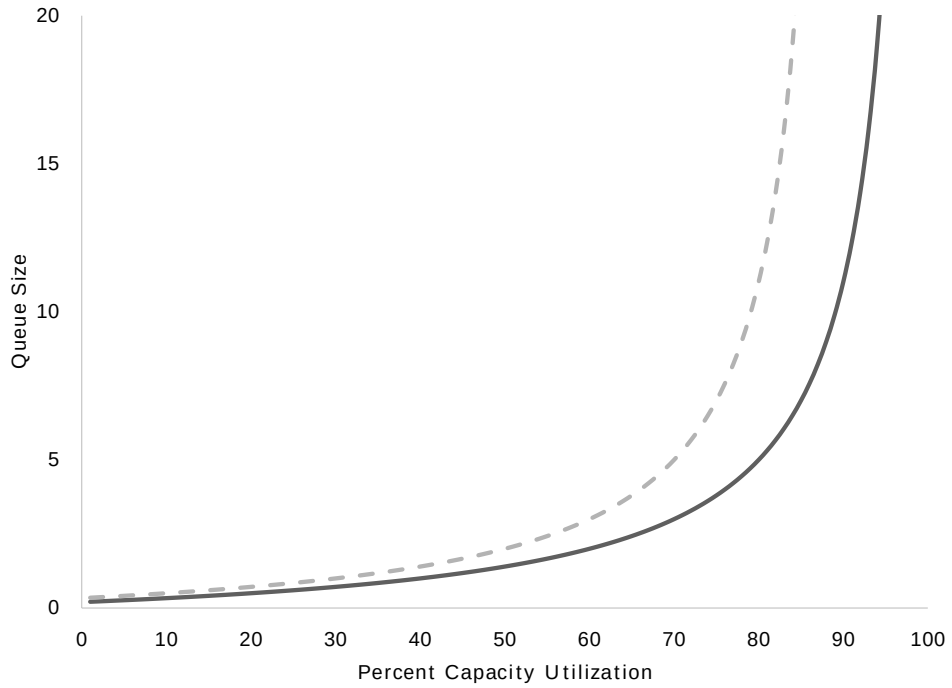

Figure 2.3: Queue Size as Function of Capacity Utilization (Reinertsen, 2009)

on the degree of capacity utilization. It shows that the queue size will drastically increase as the capacity allocation approaches full utilization. The different lines show the effect of variance where the dashed line has a greater variance in the regarded system. Reinertsen (2009) explains this phenomenon by the project fluctuation and compares it to how a traffic jam is created. Oosterwal (2010) refers this to the tipping point. If the tipping point is passed, the resource enters a state of firefighting where the focus is continuously on solving the next critical problem thus leading to new delays and new critical issues. This state is characterized by rapid shifts in focus, changes in resource allocations, and increased costs.

Binning

Oosterwal (2010) develops the work by Reinertsen (2009) further by introducing a new method for project planning, called binning. The concept of binning consists of three parts: cadence, flow, and bins. The first, cadence, is the natural rhythm of which projects are completed and capability to deliver new product to the market. The new product introduction or development throughput (TH) can be calculated

using the following formula:

$$TH = \frac{WIP}{CT}$$

The WIP is the current work in progress in the development portfolio and CT is the time to complete a project or cadence. This equation can be used by management to derive the possible new product introduction or by reversing the formula, derive the needed WIP to maintain a predetermined launch rate. For example, an organization has the capability to run 5 projects simultaneously in a stable state (WIP). These projects take on average 2.5 years to complete equaling the cadence (CT). The result is that the firm can have a development throughput of 2 projects or products per year (TH). See the equation below for example.

$$TH = \frac{WIP}{CT} = \frac{5\ Projects}{2.5\ Years} = 2\ Projects/Year$$

However, projects vary in scope, scale, and complexity which can cause disturbances or inefficiency if not managed correctly. There exist a correlation between the WIP and cadence, an increase in WIP will eventually lead to an increase of cadence due to the increase of queues in product development flow (Oosterwal, 2010; Reinertsen, 2009). Therefore, the cadence and WIP has to be fitted to the organization's capabilities. For the cadence to be effective, it is important that its natural state is derived and that the projects obey and follow it instead of randomly being started and completed. This is where the application of bins comes in.

Oosterwal (2010) explains the introduction of bins in combination with cadence and flow as a method to standardize projects and use designated slots in the project planning. The target is to move away from a chaotic process where projects are started and completed randomly to a standard project designation following the cadence of the organization – see figure 2.4. The figure illustrates, a standard project designation gives control over the project and limit the variation to be contained within scope, schedule, and resources.

The standardization of scope, schedule, and resource is what Oosterwal (2010) refer to as bins. A bin is an element with determined values in these aspects providing the possibility to address the project planning at an aggregated level and a leaner approach. The actual project portfolio management is reduced to filling the empty slots with projects corresponding with the designated bin for each slot. Based on the calculated cadence and requested new product introduction, the number of designated slots for bins can be derived. For instance, one ambition can be to launch one large platform, two derivatives, and six improvements per year. Binning is done by

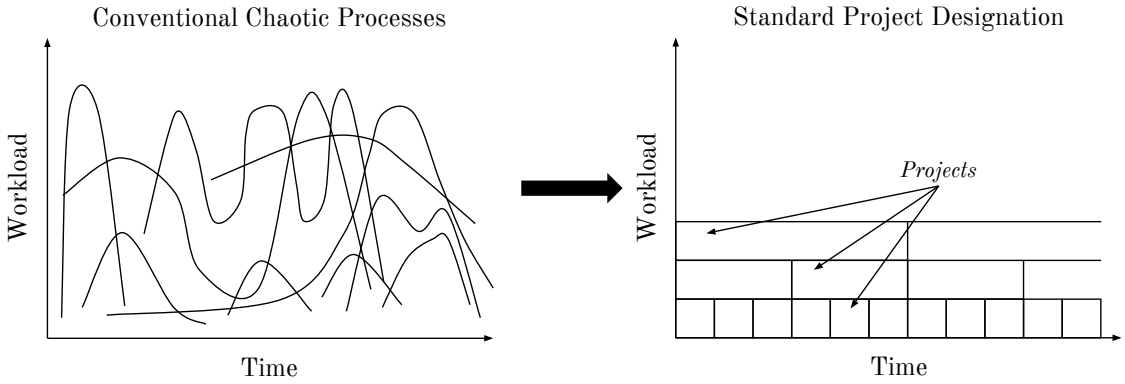

Figure 2.4: From Chaotic to Standard Project Process using Binning (Oosterwal, 2010)

Table 2.1: Example of Bin Designations (Oosterwal, 2010)

	Bin 1	**Bin 2**	**Bin 3**	**Bin 4**	**Bin 5**	**Bin 6**
Scope	Small	Small	Small	Medium	Medium	Large
Believed to fit Process	Yes	Yes	No	Yes	Yes	Yes
Believed to fit Timing	Yes	No	No	Yes	No	Yes

determining the distribution of projects with regards to the organization's natural cadence and capabilities in WIP.

Onward, bins are defined based on the characteristics of previous performed projects to find commonalities in scope and resources – schedule is already determined. Oosterwal (2010) gives an example of six different bins designations in the case of Harley-Davidson based on the scope as well as accordance to process and timing – see table 2.1. The smaller bins responded to small improvement projects with variance in urgency and critical path but all in all small and well-known in scope. Medium sized bins corresponded to derivative projects based on existing platforms and product families. These projects are required to follow determined methodology but can be compressed in time if necessary. Finally, the large-sized bin is for breakthrough and platform projects which are strictly required to adhere to both the methodology and standard cadence and timing. The general rule of thumb is to strive for bin 1, 4, and 6 projects and avoid bin 2, 3, and 5 projects to be in line with the standard work and achieving a streamlined product development process with a set cadence (Oosterwal, 2010). By doing proper project charters and assessment before initiation with emphasize on scope, scale, and complexity; management is able to determine the probability of following process and timing to determine the correct bin designation.

2.5 Project Setting

Project-based organizations are characterized by the majority of their activities are performed as projects and, therefore, experience a certain project setting. The term project setting refers to the perception of the project environment by project members and the organization. If there are several projects assigned to employees simultaneously, regardless of intentions, it is called multi-project setting (Engwall and Jerbrant, 2003). This is typically characterized by tight schedules, multi-tasking, increased efforts for coordination, and significant set-up time for alternating between tasks. The main reasons for a firm to run multiple projects in parallel is efficient use scarce resources, reduce idle time, share expertise and knowledge between projects, and increase the ability to change in a turbulent environment (Zika-Viktorsson et al., 2006; Eskerod, 1996).

Wheelwright and Clark (1992) investigated how the number of assigned projects to a single engineer influence the percentage spent on value-adding activities – see figure 2.5. What is evident from the study is that the highest productivity is achieved at two assigned projects – marked with a dashed circle – and that the time spent on value-adding activities decreases with every additional project beyond this. The initial increase in productivity is often due to an increase in utilization since the engineer can switch to the other project when waiting for an activity to complete from the first. However, if the number of assigned projects expand beyond this, the productivity declines due to a larger time fraction spent on non-value-adding activities such as coordinating, knowledge loss, and obtaining information (Wheelwright and Clark, 1992).

Further, the number of projects and the project setting can influence the perceived work situation. (Zika-Viktorsson et al., 2006, p. 386) defines project overload as "fragmentation, disruption, and inefficiency caused by switching between commitments to simultaneous projects" and its perception on project members. This state is mainly caused by a lack of opportunities for recuperation, inadequate routines, scarce resources, and a large number of simultaneous projects. Moreover, the project overload can be associated with high levels of psychological stress reactions, decreased competence development, and deviations from time schedules (Zika-Viktorsson et al., 2006). Karrbom Gustavsson (2016) develops this further, stating that the project overload gives cause to information overload, feelings of frustration, irritation, and stress that ultimately lead to reduced quality, efficiency, and knowledge creation. In a multi-project setting where a project overload exists, it is difficult to obtain a good overview and holistic approach to project portfolio management (Karrbom Gustavsson, 2016).

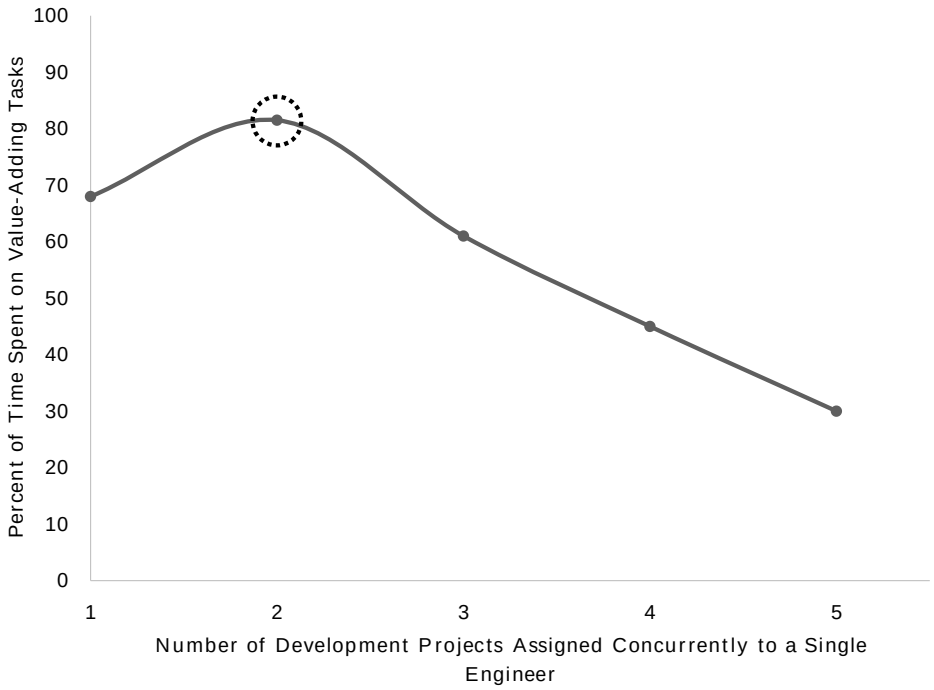

Figure 2.5: Productivity of Development Engineering Time (Wheelwright and Clark, 1992)

Finally, O'Leary et al. (2011) contribute to this topic by proposing a model for describing the relationships between multiple team membership and their effect on productivity and learning at an individual as well team levels – see table 2.2. The overall performance can be derived from the productivity and learning achieved for both the individuals as well as the teams. The parameters which determine the performance from a multiple team membership perspective is the number of teams an employee is a member of and the variety between these.

2.5.1 Resource Allocation Syndrome

A project setting where the demand for resources is higher than the availability causes a state of resource allocation syndrome. This syndrome is defined by Engwall and Jerbrant (2003) as a situation where management is overwhelmed by the challenge of distributing and redistributing resources between project to find slack resources. However, this gives cause to new problems and the project setting reaches a state of firefighting where the focus is continuously short term in solving the most

Table 2.2: Relationships Between Multiple Team Memberships and Productivity and Learning at Individual and Team Levels, based on (O'Leary et al., 2011)

Number of Multiple Team Memberships		**Effect**
Individual Productivity	Focuses attention on efficiency-oriented practices	(+)
	Fragments attention	(-)
Team Productivity	Improves team norms/practices	(+)
	Introduces lags/delays	(-)
Individual Learning	Attention to new information and time to encode knowledge	(-)
Team Learning	Opportunities to integrated across members	(-)
Multiple Team membership Variety		
Individual Productivity	Information load and switching costs	(+)
Team Productivity	Diversity of information and team coordination costs	(+)
Individual Learning	Variety of information	(+)
	Impedes analogical learning	(-)
Team Learning	Information exchange	(+)
	Impedes analogical learning	(-)

urgent fire (Oosterwal, 2010).

Further, Engwall and Jerbrant (2003) derived four possible effects for the resource allocation syndrome. The first effect is the failing of project scheduling. The argument is that most organizations use a centralized resource planning system for allocating resources. Due to fully utilized resources in combination with unplanned project fluctuations and natural variance, any minor changes in the project needs causes a ripple effect and queuing. This, in turn, results in management being forced to re-prioritize ad hoc (Reinertsen, 2009; Engwall and Jerbrant, 2003). In the long term, failing to do proper scheduling results in a decrease in an organization's capabilities to meet project milestones and deadlines. Additionally, the rapid shifts in project assignations cause productivity among employees to decrease which in conjunction leads to a reduction of the ability of an organization to deliver project reliable (Yaghootkar and Gil, 2012). This is also connected to the second effect which is over commitment, namely that the organization starts more projects without significant consideration to the capabilities and constraints (Engwall and Jerbrant, 2003).

The third effect is management accounting systems which are dysfunctional for multi-project management. Engwall and Jerbrant (2003) describe a case where the income of a department is determined by hours spent, giving a financial incentive to keep the hours spent per project as high as possible and not for productivity improvements. Finally, the last believed effect is opportunistic project management behavior. This refers to the game of politics and optimistic portraying of projects in order to gain the most resources. Engwall and Jerbrant (2003) also report cases where project managers push the projects to a critical state to get higher priority.

2.6 A3 Methodology

This tool was first applied by Toyota in an effort to capture the problem-solving process on a single sheet of paper (Shook, 2008). The advantage of the A3 thinking is that it emphasizes solving problems, the actual problems, in an evidence-based manner using a clear and unambiguous approach which is both common and standardized within the organization (Matthews, 2010). Shook (2008) states that "The A3 helps spread a scientific method that forces individuals to observe reality, present data, propose a working countermeasure designed to achieve the stated goal, and follow up with a process of checking and adjusting for actual results." The legend says that the selection of the A3 paper format was due to being the largest easily available size to find, print, and fax.

Further, the usage of A3 incentives the owner to be concise, visual, and straightforward in the problem solving as everything has to fit on a single sheet of paper. The fundamental idea behind an A3 is to communicate a proposed idea of the problem solving on a single sheet of paper (Matthews, 2010). Additional to this, the A3 methodology can be used to teach employees about problem-solving so that it can be done as close to the problem as possible. The majority of the tool is focused on the problem statement and analysis since this is what requires the most time and effort. It is crucial to identify the problem and root causes correctly to apply the best countermeasures. A problem is defined as the difference between the current and standard state (Matthews, 2010).

2.6.1 Root Cause Analysis

For a countermeasure or solution to have a sustaining effect, it must address the root cause of the problem. Otherwise, the problem will most likely reoccur. The root cause analysis is an approach to solving problems and achieving sustainable

results.(Okes, 2009, p. 13) derives it in four generic steps: "(1) identifying a problem, (2) performing a diagnosis, (3) selecting and implementing solutions, and (4) leveraging and sustaining results" where the emphasis is on identifying and diagnosis of the problem. In the context of A3, the term countermeasure is used instead of the solution to emphasize that the action is believed to improve the state but not necessarily solve it completely Shook (2008). In general, root cause analysis uses a logical and deductive approach through critical thinking. The model can be further detailed into ten steps which are listed below (Okes, 2009).

1. Define the problem
2. Understand the process
3. Identify possible causes
4. Collect the data
5. Analyze the data
6. Identify possible solutions
7. Select solution(s) to be implemented
8. Implement solution(s)
9. Evaluate the effect(s)
10. Institutionalize the change

The terms *Find it* and *Fix it* can be used to describe the first and second half of the ten steps. The nature of the process is not linear but takes a more iterative approach (Okes, 2009). Figure 2.6 shows a visual representation of the process where the shape of the elements represents different conditions. Step 1, 4, 5, and 7 is characterized by convergent thinking while step 2, 3, and 6 are of divergent nature. Step 8 is project management, step 9 is a decision, and step 10 is sustaining the improvement and transferring it to organizational learning (Okes, 2009).

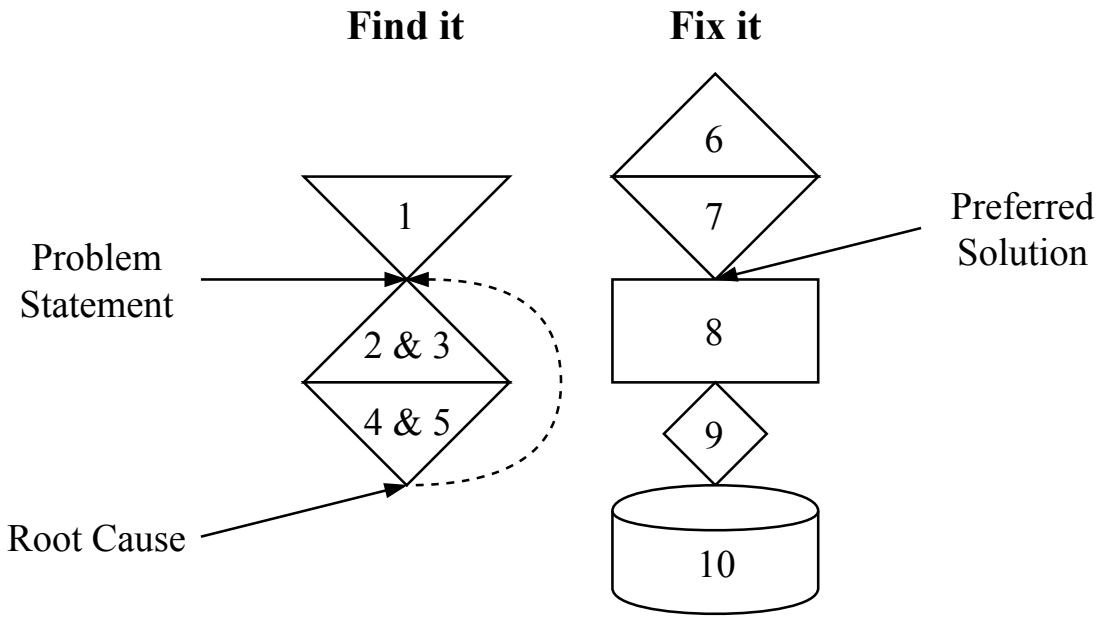

Figure 2.6: Visual Representation of Root Cause Analysis (Okes, 2009)

3

Methodology

The thesis was initiated to address an identified problem space and to perform a corrective analysis. There are multiple approaches to corrective analysis and action-based problem solving depending on what is most suitable with regards to the problem setting and organizational fit (Okes, 2009). The targeted outcome of the thesis is to provide an investigation of the problem space and implement countermeasures to mitigate and improve the situation. This chapter first goes through the research design found suitable to address this context followed by the introduction of valuable tools and methods for the research. Lastly, the general project management approach is discussed and selected.

3.1 Research Design

As stated previously, the A3 method will be used for the problem solving and general management of the thesis. This method was selected due to its versatility, appropriate problem-solving structure, and is the preferred approach for problem-solving at Philips BU Coffee. The A3 consists of several elements which may vary depending on the organization and the intended setting. However, there are some elements which are typically included – see figure 3.1 for a template of an A3. There is also a distinct flow through the elements which follow a logical sequence (Shook, 2008), also illustrated in figure 3.1. The tools used within the A3 allow for an iterative process as learnings may require changes in previously made assumptions, e.g. if a countermeasure proves ineffective it might be due to an error in the root cause analysis. Therefore, the A3 matures with the development of the project and multiple revisions are commonly made (Matthews, 2010).

In the case of this thesis, the intended workflow is in accordance with the template illustrated in figure 3.1 and can be described as follows. First, the background of the problem is to be determined to create a good understanding of why this issue is relevant and how it relates to the organization. This is then followed by

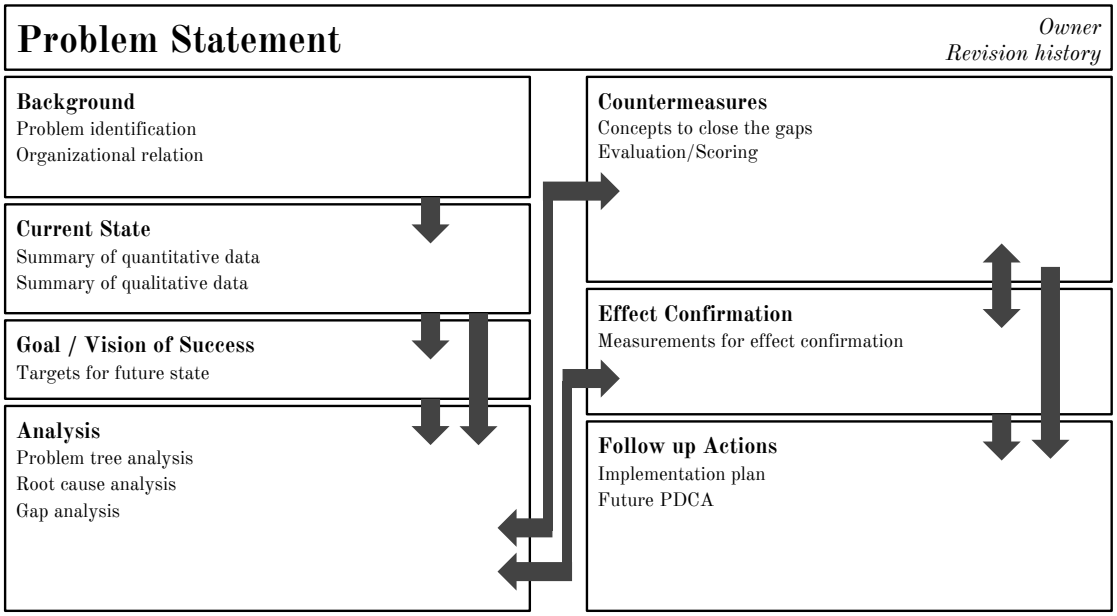

Figure 3.1: Template of A3, based on Shook (2008)

an investigation of the current state using data collection of both quantitative and qualitative character. Both data collection methods are used to obtain an extensive and accurate picture of the case study as possible (Krishnaswami and Satyaprasad, 2010). Based on the background and current state, a vision of success with the corresponding targets can be derived. Further, an analysis will be conducted using the problem tree, root cause, and gap analysis to establish the actual problem and potential gaps between the current state and vision of success.

Afterward, different countermeasures in the context of the problem are identified and evaluated to find the most promising ones. Countermeasures are derived from literature study based on state of the art research in related fields as well as a study of best practice. The countermeasures are required to be constructed so that they fit the organizational context to ensure acceptance and proper impact (Phaal et al., 2004). Adjacent to this, measurements for effect confirmation are developed, derived from previous analysis and the intended effect of countermeasures. Finally, follow up actions are presented to ensure that the effects are lasting. Due to the limitation of the thesis, not all countermeasures can be fully implemented and, therefore, an implementation plan and determination of effect confirmation is provided as a compliment.

3.2 Research Methods

To support the thesis research, a set of tools and methods are used. The methods have been selected based on how well they are believed to assist in the A3 process and provide the best understanding or support for activities.

3.2.1 Problem Tree

An established tool for problem identification, especially when a desire to determine the cause and effect relationships, is the problem tree. This tool aids in the understanding of a context, the core problem, and how it mitigates. For clarity, the problems can be divided into three categories: causes, (core) problems, and symptoms. The core problem refers to the main problem that causes all subsequent problems or symptoms (MIT, 2001). Figure 3.2 illustrates the general schematic of a problem tree.

Based on MIT (2001), the problem tree can be approached using four steps. The first step is to list all the problems which have been identified. Important to note is that these should be observed issues and not possible or potential ones. The second and third step is to identify a core problem and determine which problems are causes and which are symptoms. These steps are iterative and performed until a stable outcome has been reached. The final step is to arrange the causes and symptoms hierarchically according to their respective cause and effect relationships. The end result is a visualization of a problem space with clear dependencies and relationships between causes, core problem, and symptoms.

3.2.2 Root Cause Analysis

To derive possible causes and identify the root causes of a problem, the method of root cause analysis can be used. This tool is a generic approach to deduct and diagnose cause and effect relationships using logical and critical thinking (Okes, 2009). According to Okes (2009), the root cause analysis is the diagnostic phase of corrective analysis where the problem is refined and its corresponding process is reviewed to identify possible causes and ultimately the root causes. The method is useful for analysis of problems within structured processes that are reoccurring or where previous countermeasures have not been effective (Okes, 2009). Therefore, this method was selected as a compliment and internal part of the problem tree.

Further, Okes (2009) describes five steps in the diagnosis of a problem. The first

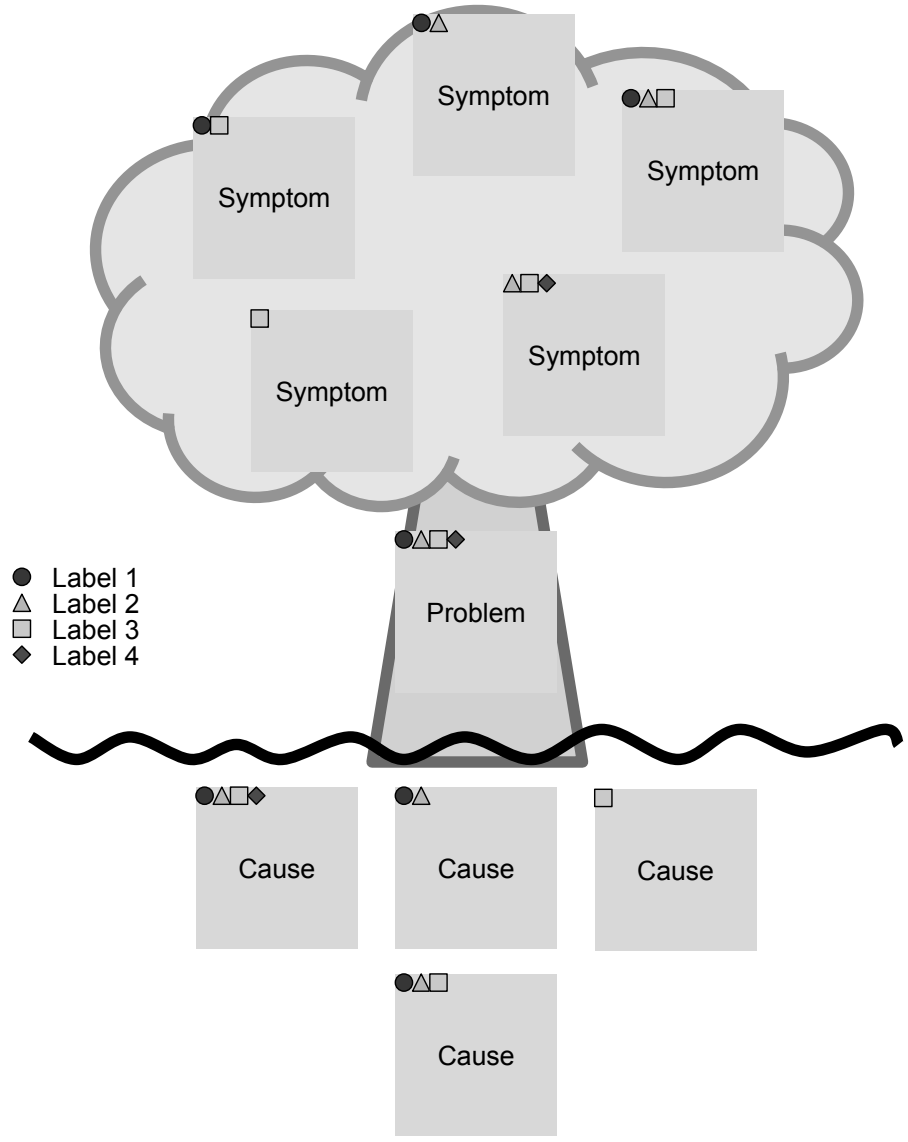

Figure 3.2: An Illustration of the Problem Tree

step is to define the problem and derive a problem statement. The problem needs to be clearly defined to remove any uncertainties and be validated. The second step is to understand the process in enough details to ensure that there is an unambiguous picture of the influencing parts. This is followed by the third step which is to identify possible causes in the process based on the problem statement. The approach of 5-Why is useful for going in further depth in causes. The final two steps are collecting and analyzing the data to validate that the causes and root causes are valid.

3.2.3 Build-Measure-Learn

The planned method for the development and implementation of derived countermeasures is inspired by the build-measure-learn cycle as presented by Ries (2011). The motivation for selecting this method is the ability to have a faster pace in the development and allow for shorter intervals between the iterations and thus reducing the risk of moving in the wrong direction for an uncertain project environment. This translates to that each part can be divided into a set of development cycles where each cycle is an iteration of the previous one.

Build-measure-learn cycles are in accordance with lean thinking and have similarities with TDB approach from LPD. Likewise, as the TDB process focuses on learning and gathering enough knowledge before locking in on a concept (Gustafsson and Raudberget, 2011), the Build-measure-learn cycle emphasizes the trail and learning from building a product. It is not to be interpreted as the DBT where the design is locked in before the knowledge space is completely explored. The build-measure-learn is suitable for projects where the technical feasibility is proven but the concept feasibility and customer requirements are uncertain. The loop is an iterative effort similar to running the TDB while simultaneously building the product. This works best when the product is virtual or a process/method since the cost for development is low and easily adaptable.

The iterative process is illustrated in figure 3.3. The first step of the cycle is to, based on generated ideas, build a product or process. This is then tested based on a set of measurements to collect data which can be analyzed and summarized to a set of learnings. These learnings are then used as input for new ideas of improvements to the following cycle. The internal activities in each step can vary between the cycles depending on the findings made from the previous one, e.g. a new set of measurements might be derived to better reflect the desired result (Ries, 2011).

Further, before initiating the first development cycle an initial investigation needs to be performed to generate a set of ideas. The investigation is the first half of the A3 and it is the proposed countermeasures which act as the initial set of ideas. The

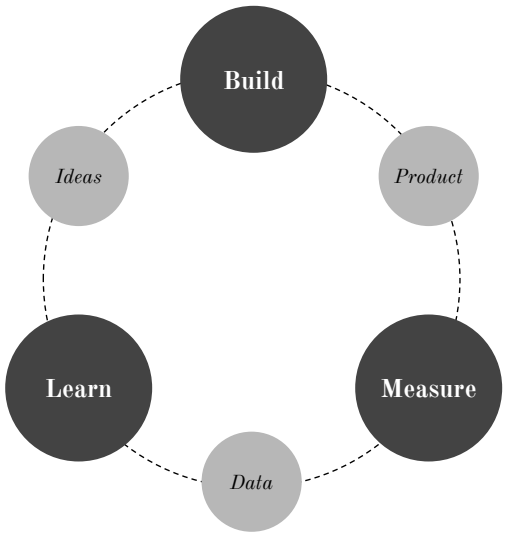

Figure 3.3: The Build-Measure-Learn Cycle (Ries, 2011)

build-measure-learn cycle represents the implementation part of the A3 but it might give cause to revisits and revision of previous phases depending on the findings made throughout the process.

3.3 Project Management

The selection of a project management method can be derived from assessing the environment of the project intended. Chin (2004) argues that for a project with no uncertainties and no requirements for speed, the classic project management process is suitable. Moreover, if the project needs to be fast-paced and is assorted with uncertainties an agile approach is more fitting. The thesis is regarded to have an intermediate level of uncertainties. The process investigated is well documented and is based on the standard work from the quality management system. However, the process addresses a setting involving several functions and interactions between the departments increasing the uncertainties.

Based on these constraints, a hybrid between traditional and agile project management is selected. The traditional project management will mainly be present in the overall planning of the thesis while the methods used for different steps are of a more agile character. A set of iterations in the development phase are planned to create the needed flexibility for managing new discoveries and gathering of knowledge in problem-solving. The overall project planning is based on the A3 approach from a lean methodology which has a clear progress flow but simultaneously allows for iterations and, thereby, works well with the intended project management method.

4

Current State

This chapter presents the results from the current state analysis within roadmapping and project setting at Philips BU Coffee. Both the roadmap and project setting utilize quantitative and qualitative methods for data collection, e.g. interviews, meeting minutes, and statistics. The two areas of investigation are described separately in detail and then summarized in joint. The chapter is introduced by describing the organizational and project context. The employees interviewed span across all departments involved in the roadmapping process.

Addressing the market of the coffee machines at a whole, the current trend and forecast is an increasing growth in the market thanks to the ease of use and consistency in brewing results. The main contributors to the growing market are the expansion of coffee culture, and new types of coffee machines as well as technology development (Transparency Market Research, 2018). International Coffee Organization (2018) report a steady increase in both coffee production and consumption for the years of 2014 to 2017 with the exception of a minor decline in the production in the year 2016. The production for 2017 landed at 164.81 million 60-kg bags and the consumption at 162.23 million bags. Simultaneously, the price for coffee has declined steadily for the past two years, for all main varieties of coffee beans (International Coffee Organization, 2018).

4.1 Organizational and Project Context

Philips was initially founded by Gerard and Frederik Philips in 1891 in the city of Eindhoven, the Netherlands. At that time, they produced cost-effective light bulbs for everyone to use. Today, Philips is a leading health technology company focused on improving people's health and enabling better outcomes across the health continuum – from healthy living and prevention to diagnosis, treatment, and home care. This is also reflected in the mission of Philips.

"Improving people's lives through meaningful innovation."

- Mission

Onward, the Philips Group is today divided into three main businesses revolving around either professional health care or consumer health and well-being. The business area of *Personal Health Business* can be further derived into four business groups where *Domestic Appliances* is the one where the business unit *Coffee* is located. However, regardless of the business unit, group, or area, they all gather around one vision.

"We strive to make the world healthier and more sustainable through innovation. Our goal is to improve the lives of 3 billion people a year by 2025. We will be the best place to work for people who share our passion. Together we will deliver superior value for our customers and shareholders."

- Vision

Philips BU Coffee innovates and manufactures coffee machines within three major areas: espresso, portioned filter, and drip. Some of the products included in this range are Senseo Switch 3in1, Series 5000 (LatteGo), and Cafe Gaia. The coffee machines are sold under the brands of Philips, Saeco, and Senseo. Additionally, they sell consumables and accessories such as descaling equipment. Unique for Philips BU Coffee is their partnership with Jacobe Douwe Egberts, an international coffee producer, through the brand of Senseo. Philips BU Coffee distributes coffee machine across the globe and operates in all major markets.

Moreover, Philips BU Coffee has four main sites: two in the Netherlands, one in Italy, and one in Romania. This project is conducted within the department of *Innovation and Development* but the stakeholders are all departments within Philips BU Coffee with emphasis on *Function Development*, *Innovation and Development*, and *Marketing*. The common grounds for all stakeholders in their contribution is that they each bring department-specific expertise as well as knowledge about the possibilities and constraints within their respective fields. Moreover, each department has a strategy and eventual partnership which are important to take into consideration when roadmapping. All in all, they play a crucial role in setting the direction for future innovation.

Onward, the gain for each stakeholder for an integrated roadmap is first and foremost the alignment and agreement on the strategic development. This allows for a more pro-active long-term planning at the departments. Additionally, the integrated roadmap functions as a single source of truth and ensure that all the information is consolidated in one place. This improves the communication between the stakeholders and toward external parties. The integrated roadmap for an organization is

a strategical document which involves most departments and is used as a means to conceptualize and communicate the business strategy at a more tangible level.

4.2 Roadmap and Roadmapping

Since a roadmap is constantly changing and adapting to its boundaries and influences, the analysis is on the project roadmap currently valid in June 2018. The outcome of the analysis might, therefore, differ from the present day but the conclusions will not be changed significantly. The first evaluation of the roadmap was regarding its feasibility in resource allocation using a bottleneck analysis to see how well it complies to the organizational constraints. This was done by applying demand templates for each project depending on the project types as well as adding the baseline allocation for the continuous programs and resource demand.

The result of the bottleneck analysis is shown in figure 4.1 where the resource demand is displayed for each project type over time. Project type refers to the classification of a project according to its character, e.g. PDLM, AD, and MLD, which could be within NPD, modification, or technology development. Firstly, it is natural that the resource need is front-loaded since the uncertainties are lower in market needs and trends. The chart displays that the roadmap is over-allocated in three of four quarters in 2019 and the whole year of 2020. This is also reflected in the interviews were the unfeasible roadmap was addressed on multiple occasions. It was referred to as a wish list of Philips BU Coffee's ambitions but without a connection to the constraints of the organization. The lack of projects further ahead in the future suggest neglect of thinking in the long-term perspective and spend the majority of the effort in the short term horizon. In observations and interviews, this was identified as a concern of not paying enough attention to long-term projects and having a strategical discussion far too nearsighted.

> *"The wish list [roadmap] is big but there is a lack of making decisions and prioritization."*
>
> *- Employee A*

To get a better understanding of the bottlenecks as well as critical spots, the same analysis was done with the division on function – as shown in figure 4.2. Function refers to the job functions within the department, e.g. functional development, mechanical engineering, or supply-chain engineering. The displayed value is the delta of the resource demand and staffing, i.e. bars below zero indicates that there is an over-allocation while bars above zeros shows that slack resources exist. The bars are stacked and the line shows the sum of all functions to illustrate if the total

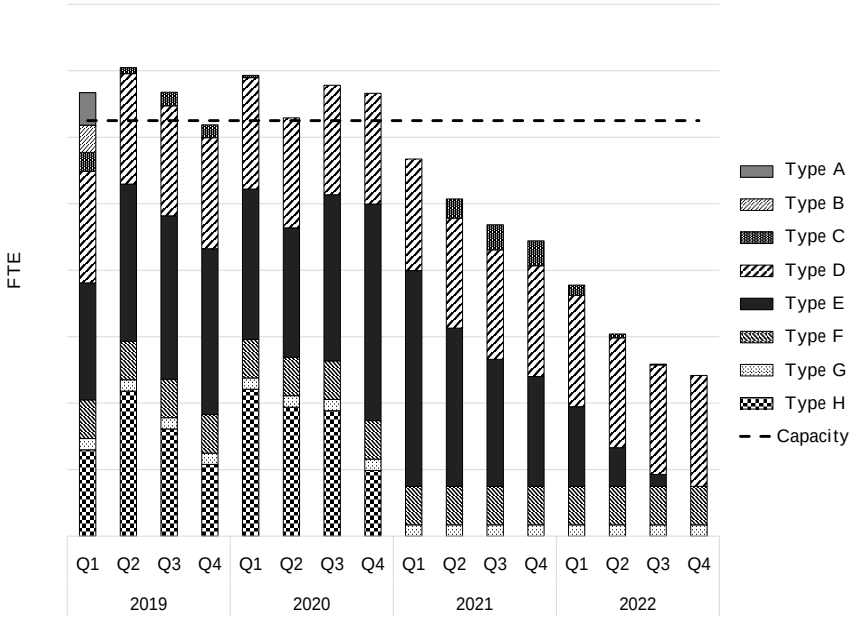

Figure 4.1: Bottleneck Analysis on Project Type

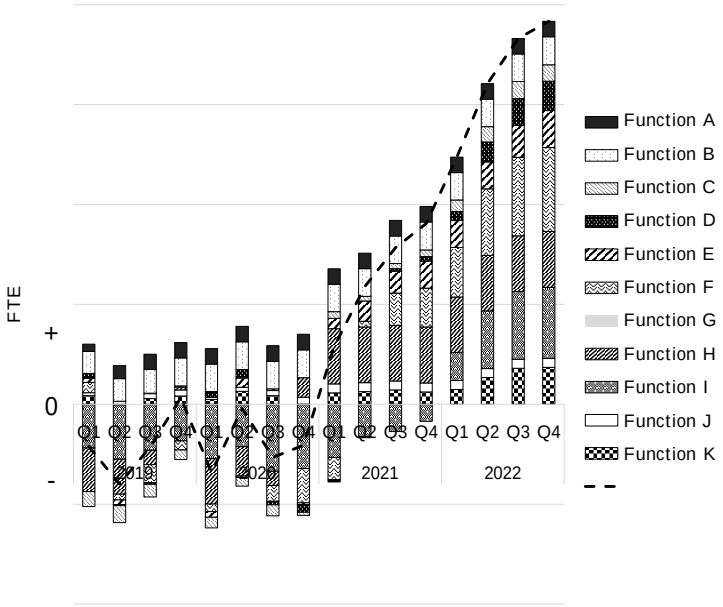

Figure 4.2: Bottleneck Analysis on Function

demand is compared to the total available staffing. This illustrates that the main bottlenecks are within three functions where one – Function I – is in shortage for the entirety of 2019, 2020, and 2021. Noteworthy, the outcome is strongly depending on the types of projects, for instance, technical function categories mainly influenced by the number of technology development projects. The financial aspects of projects are regularly discussed and serve as an important metric. However, the possibility of executing a project is also dependent on the resources which is a topic currently absent in the decision making.

"We want a lot but we can't afford it!"

- Employee B

In addition, the roadmapping process was portrayed as functioning at a structural level by the interviewees. It was believed that the current process of roadmapping is comprehensive enough to cover all necessary perspectives and coupe with inherent risks. A comparison between the standard work and QMS of Philips BU Coffee with observations were made where these statements were affirmed. The roadmapping process is a comprehensive process which involves multiple departments and functions and, therefore, can be considered a sufficient process to manage roadmapping. However, the process did not shine through properly and was visible in the actual work.

"Roadmapping is a joint exercise."

- Employee B

A strong request and desire were to obtain a method to maintain the roadmap between its reviews to ensure that it is always up to date. The quicker the changes in internal and external influences, the more often the roadmap needs to be updated. The case of coffee machines is a fast-moving environment and the roadmap is therefore also frequently changed. According to the QMS, continuous maintenance of the roadmap is included in the programming. However, it is not as obvious when observing the practical implementation.

"We make a roadmap and two weeks later it is invalid."

- Employee C

Further, there are no explicit boundaries on the number of projects which can be conducted simultaneously for each type which in combination with minor reflection in resource allocation consequences causes unrealistic roadmaps. An overall target for lowering the number of projects to a certain number exists, but it has so far never been reached. The lack of prioritization in the roadmapping causes an over-allocated roadmap which in turn contributes to the work overload. There is a discrepancy between the roadmap and what can realistically be delivered.

"Roadmapping needs to become more realistic about what actually can be delivered."

- Employee A

This becomes evident when viewing the roadmap and the current project portfolio in comparison. According to the roadmap, 2019 will consist of several projects in all major types while at a programming level, a different future is portrayed. Therefore, there is a discrepancy between the roadmap and the programming with regards to project timing and multitude. This causes confusion and uncertainties in what is actually expected and planned. The roadmap in itself does not visualize what is planned and agreed on projects and what are project ideas.

Moreover, the project roadmap was compared to the market roadmap to distinguish any discrepancies. This resulted in the identification of three cases where the launch date is before the planned product launch according to the Stage-Gate® project planning. It was also found that five different cases exist within the project roadmap where the predecessor will not finish before its successor start. Finally, when comparing the execution time of planned projects to previous delivery performance in those project types, two cases were identified where the execution time is optimistic.

"The roadmap says one thing and the programming says another."

- Employee D

Further, one recent change in the programming was to create LCM programs with separate budgets and resources. The ambition was to reduce the clutter caused by the small projects and govern these in a program form. This has improved the situation and given better clarity in the overall programming as well as a greater overview in differentiation between improvement and development projects. This is also reflected in the roadmap.

4.3 Project Setting

The majority of the data collection was done through quantitative methods by extracting information from PPM and governance software present at Philips BU Coffee. This was done to get an objective assessment of the project setting with the lowest possible human influence. The first analysis was to see how the project setting has changed throughout 2018. This was done via the extraction of data from the project review meetings' minutes. Figure 4.3 illustrates the changes in project status and quantities for the year 2018. Evident from this is that the number of running projects is significantly higher than any of the other categories. It also shows that the number of started and closed projects – depicted as implemented

and stopped – is about the same. The average delta between input and output for the project portfolio is shyly positive which according to the continuity equation results in an increasing project portfolio. The target for the organization overall is to lower the number of projects, i.e. the opposite.

The running projects can be further derived into types of projects – as seen in figure 4.4. One first remark is that the majority of all running projects are belonging to one category and project class. Together these projects stand for more than three-quarters of all running projects. These projects have a short time horizon and are in general smaller projects, in contrast to the minority of the projects which have a long time horizon and are generally more complex and larger in size. Therefore, the majority of the running projects are low risk-low reward resulting in incremental improvements or changes while the minority is high risk-high reward giving the significant changes to the business.

Moreover, the WIP for 2018 so far has a high average where the majority, as previously stated, is smaller projects. However, the WIP does not consider the variety and number of employees in each project. Therefore, the number of projects assignments were explored to determine the number of concurrent projects assigned to each individual. By collecting data about the project staffing for 2017, a frequency distribution could be calculated – depicted in figure 4.5. The figure shows at an aggregated level that only 26% of the personnel has two projects or less assigned and 44% has three or less. The total average in the number of project assign to a single employee is 4.26 projects. The fluctuations over the quarters are minor apart from a small peak in the fourth quarter.

To see how the project assignation behaves at a job functional level, figure 4.6 was constructed. Illustrated in the figure is the number of projects assigned on average to an individual separated by job function as well as the overall average of project assignments per person. The calculation used a Boolean criterion and, therefore, not taken the degree of involvement of the project assignment, e.g. being assigned for 5% or 95% of the available time to a single project is counted equal. This is due to the fact that the number of projects mainly influence the productivity of individual projects. From the chart, the number of projects per person varies vastly depending on the function but within each function, the number of project assignments is rather stable over time.

In regards to the findings presented in section 2.5, the current project setting can be determined as a multi-project setting with an existing project overload. This is something which was confirmed in interviews and observations. From interviews with different stakeholders in the roadmapping and PPM process, it is clear that

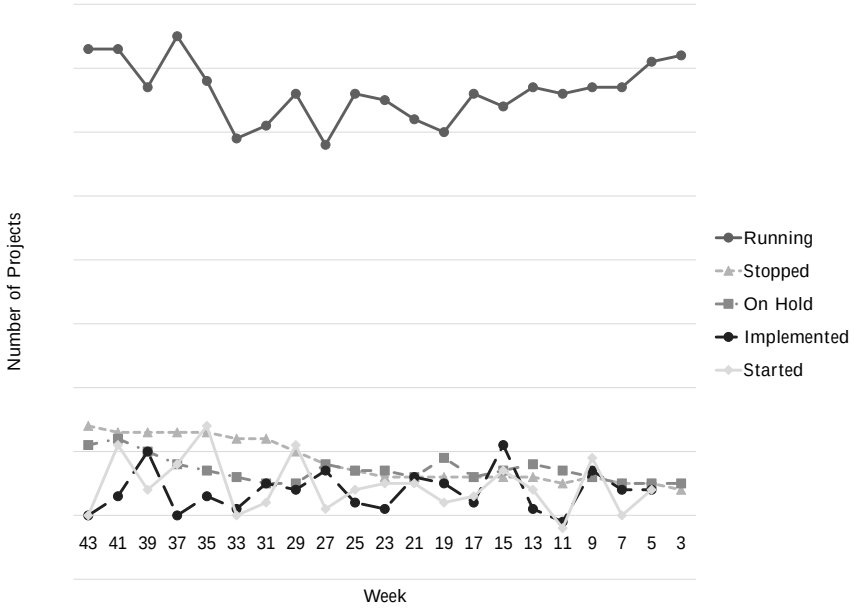

Figure 4.3: Development of Project Setting for 2018

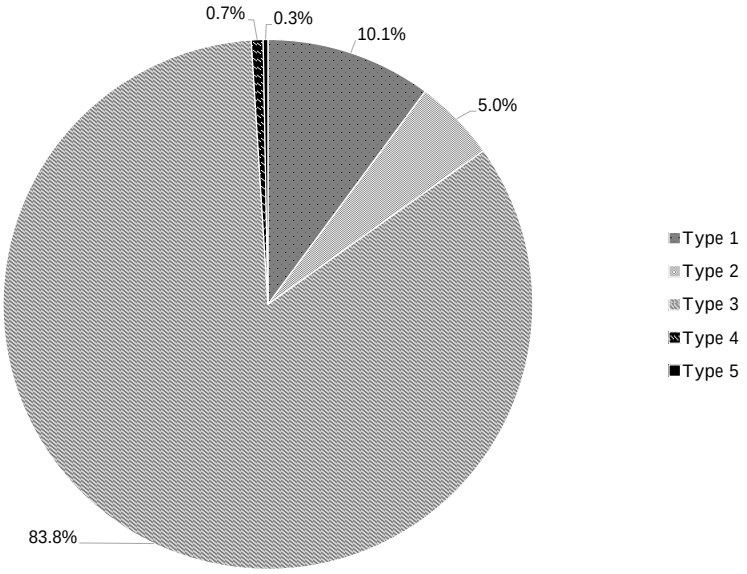

Figure 4.4: Distribution of Running Project Types for 2018

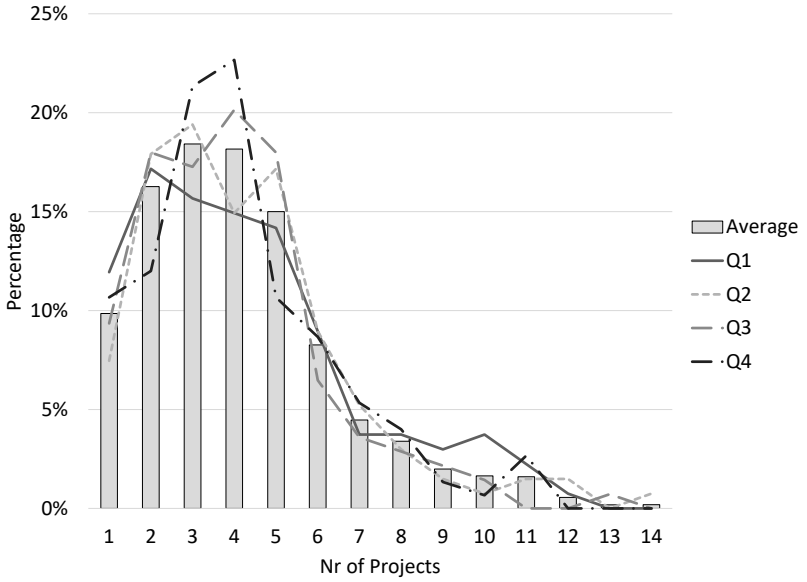

Figure 4.5: Number of Projects Assigned to an Individual Employee

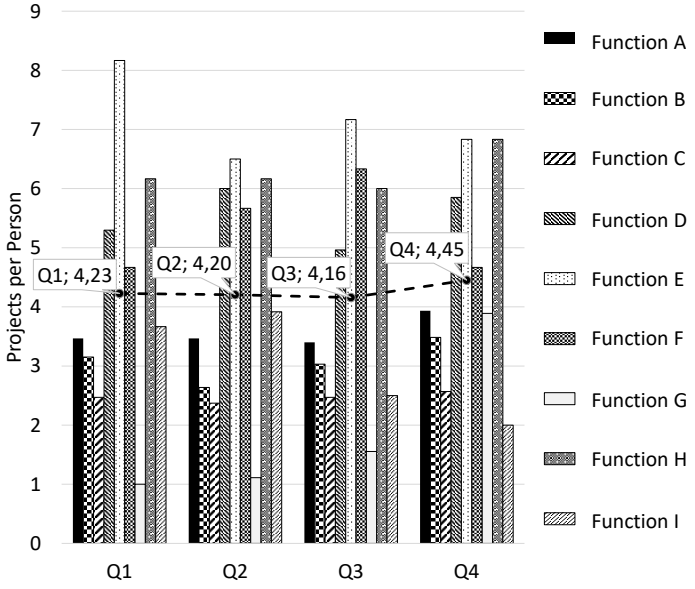

Figure 4.6: Project Assigned divided by Function

there are more projects running which together with the administrative and daily chores creates a work overload.

"Everyone is overloaded in work."

- Employee E

Further, it was also reported that natural fluctuations occur which makes it difficult to plan the projects to a sufficient extent. Changes in requirements and constraints make it difficult to predict the resource allocations required to run a project smoothly all the way through. This in turn influence surrounding projects creating a ripple effect in resource needs and project intensity. It was shared that projects were started with knowledge gaps and uncertainties making the made assumptions questionable.

"There is an issue with the project timing and resource allocation."

- Employee D

The cause of the multi-project setting was assumed by the organization to be the eagerness of starting new projects before the existing ones are finished. This appears to be especially true for smaller projects and initiatives. Since no true restrictions on how many projects that can run and minor support for prioritization, projects can be initiated with minor hurdles while costing major efforts to complete causing the quick start but slow finish. There are targets for WIP existing, but these are often not followed or achieved.

"Projects are easy to start but slow to finish."

- Employee A & D

4.4 Executive Summary

Based on the findings, two main conclusions can be drawn. The first is that the current existing roadmap is over-allocated and not feasible in implementation. It is impossible to implement the roadmap with the boundaries in staffing and budget. The lack of prioritization causes decisions to be inconsistent and made ad-hoc as well as a discrepancy between the roadmaps and actual programming. The second conclusion is that Philips BU Coffee suffers from a project overload. The high WIP and proportion of assigned projects to each employee make it difficult for the organization to be flexible and adaptive to the environment. This puts them in a firefighting mode where resources are shifted between projects causing missed opportunities in optimization and productivity potential. Onward, the project portfolio distribution is weighted toward smaller low risk-low reward projects in quantity but toward larger projects in resource allocation.

5

Vision of Success

As the current state was defined and analyzed, the desired state can be determined. The vision of success entails the desired state where the organization wishes to be. Taking the findings and issues identified in the previous chapter and using the theoretical framework, a set of targets were determined. The following targets have been identified:

- Have a resource demand in the overall portfolio equal to about 80% of available staffing.
- Have an average number of projects per person of 2.
- Transparent and unambiguous roadmapping.
- Transparent decision making and prioritization based on objective analysis.

The derivation of these targets will be presented one at a time. The first target is based on the product development flow theory presented by Reinertsen (2009) and Oosterwal (2010) – see section 2.4.1. With a resource utilization of 80%, the queues can be kept at a sustainable level and capable of handling the natural fluctuation and variance in work. This also aids in moving away from the tipping point where the project setting goes out of control and turns into a mode of constant firefighting. Rising issues can then be managed by the resource slack so that the problem is constrained and does not spread nor create ripple effects. Moreover, the resource slack can be used for explorative development and improvements which otherwise is neglected. This increases the innovation potential and possibilities for disruptive or breakthrough innovation. Since the backlog will be reduced, it also allows for quicker feedback loops and overall lower lead times.

The second target is inspired by Wheelwright and Clark which shows that the most optimal number of projects assigned to an employee is 2 – see section 2.5 for more details. The reduction in the number of projects will not influence the organizational productivity negatively since the projects will be able to run smoother and faster than before, lowering the time and cost for projects. The overall effect is the same output annually but with lower WIP. Reduced project time is beneficial since it will

allow for a faster reaction to market trends and implementation of novel technologies in product developments. Any key decision can also be made closer to the launch date which enables more knowledge to be gathered and, thereby, provide better decision support. A lower number of assigned projects will help in achieving a better work environment with less occupational stress and psychological strain.

Further, the third target is a state where all stakeholders in the roadmapping share a unison understanding of its purpose, constraints, and standard work. The purpose of the roadmap, how it should be interpreted and communicated is unambiguous for all parties involved in the roadmapping process as well as receivers of the roadmap. The latest valid roadmap is easily obtainable and can be used for improving the strategic and operational planning of all departments. One of the core purposes of a roadmap is to get a unison understanding for the future development within the organization and, therefore, it is important that both the process and the roadmap itself are transparent and a trustworthy source. The roadmap should be in accordance with the programming and these two entities should reflect one another for the roadmap to function as a single source of truth as it is intended to do.

Finally, the last target refers to an ideal state where every project portfolio decision can be traced back to a transparent and unambiguous decision based on objective information and evidence. This simplifies the decision-making process and improves the communication thereof. The ultimate environment is where all decisions are made based on evidence and trade-offs and, thereby, enable the mandate to be pushed further down in the organization and be made more confidently and quickly. Another important perspective within portfolio management is to glance at best practice and identified success factors in that area. One key success factor is to never assess projects but portfolios and scenarios. This ensures a holistic view and a well-balanced portfolio. Table 5.1 lists best practice for a successful PPM – for a complete list, see appendix C. One key aspect is to strive for the best practice and develop the processes accordingly.

Table 5.1: Best Practice in PPM (Menke, 2013)

Portfolio management results in an allocation of resources to projects and programs.
Pursue three overarching objectives in the PPM process: strategic alignment, strategic balance, and return maximization.
All stakeholders are disciplined and reliable in following the agreed PPM processes.
Management decision making is knowledge-based, transparent, and consistent.
Make decisions, set priorities, and allocate resources using PPM process.
Once portfolio decisions are made, they are supported by all involved parties.
Measure the strategic and financial value of portfolio decisions using a business case.
Use PPM as a key decision-making process so that PPM drives the allocation of resources.
Use clear, user-friendly reports that meet the needs of decision makers.
Require a comprehensive business case early in the process and update it at each decision gate.
Evaluate projects in a standardized way that combines quantitative and qualitative measures.

6

Analysis

This chapter describes the analysis part of the A3 including the root-causes creating the gap between the current and desired state. A problem tree is used as a framework and means of visualization for the analysis in combination with a root cause analysis. The result from the workshops can be found in appendix B.

Throughout the investigation of the current state, a total of 24 issues were identified. These issues were input for a workshop where a first problem tree was constructed. This workshop also utilized a list of common issues found in similar settings based on the literature study. This was done to connect identified issues and fill in the blanks. The results showed that there are mainly two flows of problems, one related to the roadmap and one regarding the project setting. There are dependencies between these areas and, therefore, the connections go beyond strictly vertical. Different colors of the post-it notes were used to indicate the type of identified issue. The findings discovered in the workshop were tested and analyzed further to increase the knowledge and enable a better clustering at the following workshop.

Sequentially to this, a second workshop was conducted where the problem tree was matured further. The same notes were used as input for this workshop but they were arranged differently to create a more unison view of the problem and form only one tree and stem. New findings and feedback were translated into modifications made on the problem tree. This was then digitized which resulted in a third version of the problem tree due to some minor adjustments made ad-hoc during the digitization. As the digital visualization was developed, additional labels were added to describe the support and sources for each issue. This problem tree was then sent out for feedback with stakeholders and interviewees in two iterations creating a second and third, final version.

As figure 6.1 illustrates, there are two different problem stems that have been identified in the final version. The reason for dividing the problem tree again was to improve the readability and emphasize on the flows. The first tree revolves around the multi-project setting and the second regards the discrepancy between roadmap

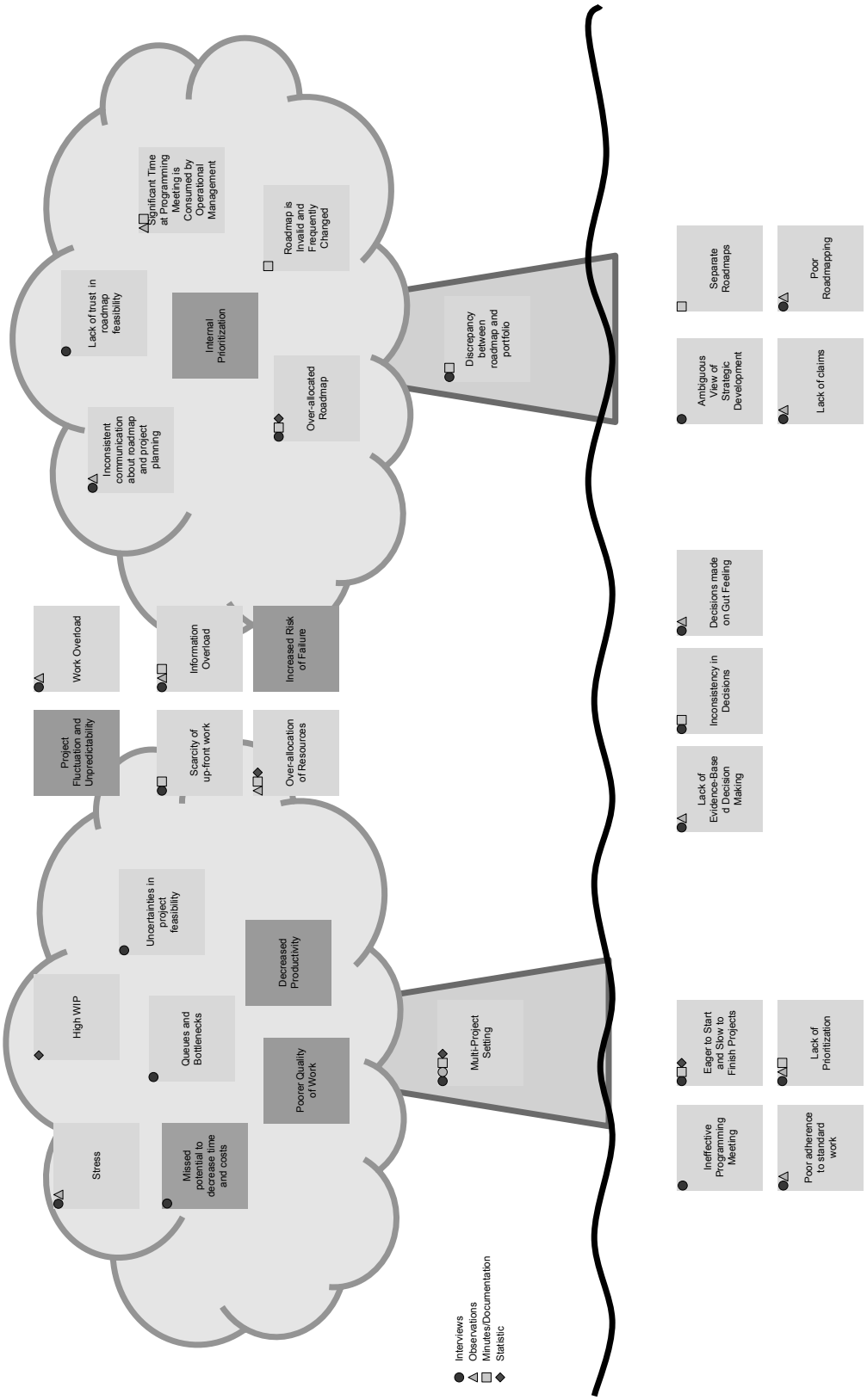

Figure 6.1: Final Version of Problem Tree

and portfolio. There is also a middle stream which represents those subjects and issues which influence both trees. With regards to quantity, both trees are relatively equal in symptoms and causes. The darker notes are issues based on the literature study which should be present in the organization but not proven. The bright notes are proven issues identified from the current state. The labels in the top left corner of the notes symbolize on which grounds these statements are made. The support could come from interviews, observations, minutes/documentation, or statistics. It is possible to use several sources as support for one statement. The labels are separated by color and symbol.

The first tree with the core problem *Multi-Project Setting* addresses the situation when the number of projects is beyond manageable and creates an unsustainable setting for the organization and its employees. The majority of the symptoms are connected to the topic of resource allocation syndrome – see section 2.5.1 – which manifests with high WIP, stress, queues etc. The second tree revolves around the core problem of *Discrepancy Between Roadmap and Portfolio*. This describes the issue when the roadmap and project portfolio are not in-line and unambiguous as well as the roadmaps internally. the result of this is displayed via the symptoms of an over-allocated roadmap which is frequently changed or deemed invalid. Further, it creates uncertainties within the roadmap of what can be delivered upon and what is actually going to happen.

Onward, these two problem trees have been derived into four root causes where the two first are related to the problem tree of *Multi-Project Setting* and the last two are regarding *Discrepancy between Roadmap and Programming*. The first root cause, *Poor Adherence to Process*, is based on an examination of the currently existing QMS and standard work. During this investigation, it was found that the QMS and standard work should be able to mitigate the found problems and symptoms but it appears that the process does not shine through in the daily management completely. The second root cause, *Lack of Prioritization*, is linked to both the objective and cultural aspect that no true prioritization is made. The prioritization is done more ad hoc than up-front. One key component of this is the treatment of the portfolio as isolated projects instead of looking at the portfolio as an entity. There is a need to go away from assessing projects to assessing portfolios to ensure that the right set of projects is selected to provide both short and long-term benefits.

For the second problem tree, the first root cause of *Lack of Claims* relates to the fact that the general claims of which direction Philips BU Coffee is heading are not clearly visible and used in the roadmapping. From a business strategy point of view, it is not possible to say which direction Philips BU Coffee is heading and on which grounds they separate themselves from the competition. A set of claims has the

purpose of making sure that all stakeholders and projects are moving in the same direction. The final root cause, *Poor Roadmapping*, is related to the fact the found discrepancies should have been considered already when the roadmap was created and that the changes in the roadmap today are done as a consequence of project and portfolio decisions rather than being done in unison. The potential of using the function of time which is one of the fundamental characteristics of roadmapping is not being used to its fullest potential. Further, the roadmap is not being done with the organizational constraints into consideration.

In conclusion, there are two problem trees related to the project setting or portfolio management and roadmapping. These give cause to a set of symptoms and can be derived, ultimately, from four different root causes. These causes can be summarized in the lack of asking and answering the following questions: *Can we do it?*, *Should we do it?*, and *When should we do it?*. The conclusions were presented with the stakeholders and interviewees once more to certify their correctness.

7

Countermeasures

The following chapter covers the generation and development of countermeasures – corresponding to the A3 flow. The phase aims at identifying the most suitable countermeasures with respect to the current state and derived root causes. Therefore, the chapter is structured so that the general process is first depicted followed by the proposed countermeasures. Lastly, the final selection is discussed.

7.1 The Derivation Process

The derivation of countermeasures was made in four steps: exploration, elimination, evaluation, and grouping. These parts worked as a method to identify and rule out possible countermeasures until only a selective few remained. Continuously through the process, the identified problems and root causes were used as a support and inspiration for finding and eliminating concepts. The overall process and development of the countermeasures are illustrated by figure 7.1.

The first part is the exploration of possible countermeasures. The main part of possible countermeasures was gathered from a literature study based on identified problems and proposed solutions in articles, proceedings, etc. A minority of countermeasures were generated through brainstorming and later supported by research. A total of 68 concepts were generated using these two approaches. The next step was the elimination of proposals which did not meet the requirements of fitting the scope and addressing the root causes in an unambiguous manner. This reduced the

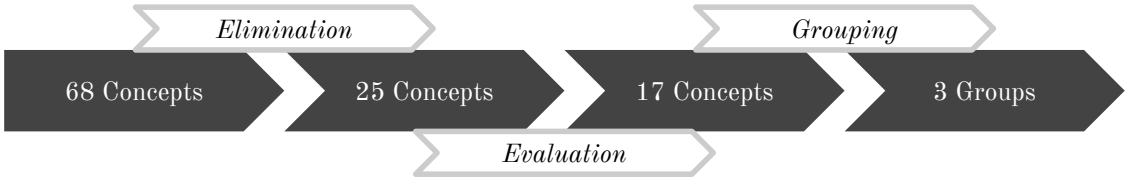

Figure 7.1: The Process for Countermeasure Selection

Table 7.1: The Proposed Countermeasure Options

Option	Problem Solved	Effort	Effect
Integrated Roadmap	Remove over-allocation Avoid missing synergies Remove discrepancy Avoid missing actions needed	M/H	H
Adherence to Process	Achieve consistency in decisions Transparent and objective decisions Increase meeting effectiveness Remove clutter between meetings Achieve better portfolio management	L	M
Reduce WIP and Introduce Binning	Remove over-allocation Reduce amount of parallel projects Obtain flexible scenario building Increase productivity	H	H

number of concepts to 25.

Afterward, an evaluation phase was conducted to determine how each concept maps in relevance to the root causes and their believed effect in solving the issues. A threshold of medium or high relevance and effect was decided to ensure appropriate significance and sustainability. The result was 17 concepts still remaining. Since several of the concepts were similar or adjacent within the solution space, a grouping was done to identify the main themes. Three main themes in countermeasures were derived and, thereby, formed three groups for proposed countermeasures.

7.2 Proposed Countermeasures

Based on the results from the derivation process, the countermeasures were harmonized further. The outcome of this was a refined short-list of three countermeasure options: integrated roadmap; adherence to process; reduce WIP and introduce binning. These suggestions are mapped with identified problems to see how they as an entirety address the problem space – see table 7.1. There exist some overlapping between the countermeasures with respect to solved problems and methods used. Therefore, it is believed that the implementation of these countermeasures will furthermore result in synergy effects.

Further, the time restrictions and resource limitations require a prioritization in

the implementation of the countermeasures. This prioritization was based on the required effort and estimated effect for a successful implementation. The options with the lowest effort in combination with the highest effect are striven for and, therefore, the *Adherence to process* was considered a first priority. This is motivated by the low effort but still a medium effect. *Integrated roadmap* was the second priority since it has about the same effort and effect as *Reduce WIP and introduce binning* but it also has synergy effect with the other option since they both utilize Planisware as a tool for the implementation.

Finally, the proposed countermeasures are suggestions on how to solve the problem at a conceptual level. At this stage, each countermeasure is only presented at an aggregated level with the aim to provide evidence on how each countermeasure addresses the problem, what the believed benefits are, and the constraints present in each case.

7.2.1 Create an Integrated Roadmap

Today, there are mainly two different roadmaps – market roadmap and project roadmap. The distinctions between projects are based on their corresponding program and product family. In contrast, an integrated roadmap is divided according to category – market, product, technology, R&D etc. Which and how many levels an integrated roadmap include varies and is dependent on the organization. The linkage between the projects is depicted through connectors drawn between corresponding projects. Thereby, this style of roadmap visualizes two different flows and value streams as compared to the product roadmap which only has one. The first flow is within a level where it shows how the knowledge of that area progresses over time, e.g. how new technologies are matured. The second flow is between the levels and this visualization illustrates how the product value streams go through all levels and how the different project at different levels are connected, this is the same as the product roadmap. In other words, the integrated roadmap shows a visualization of the two value streams present in lean product development. Figure 7.2 shows the current project roadmap where each shade represents a specific development project type.

Moreover, the integrated roadmap can be further developed to include cascading between additional levels. This is done through the expansion of the integrated roadmap with new levels, e.g. claims and capabilities. Additional to this, other aspects can be added such as supplier/procurement strategy by using a new dimension in labeling or through adding a new level to the roadmap itself, either as a new one or as part of an existing level, e.g. by dividing technology development into

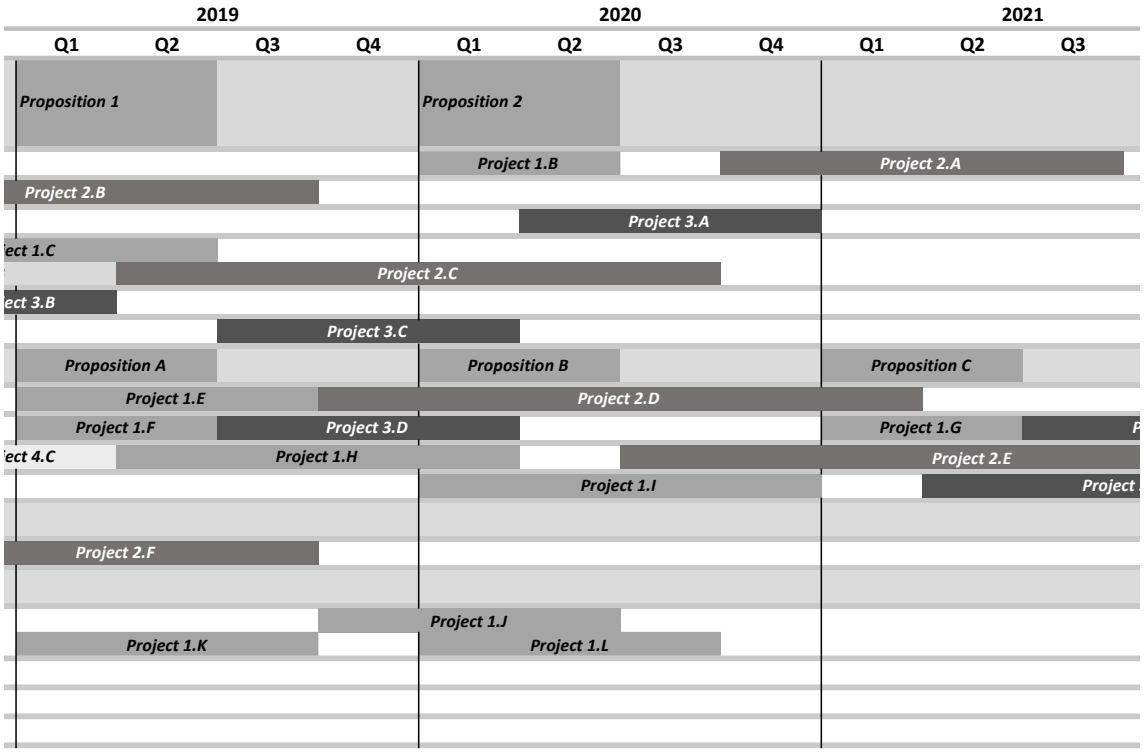

Figure 7.2: Example Extract from the Current Roadmap

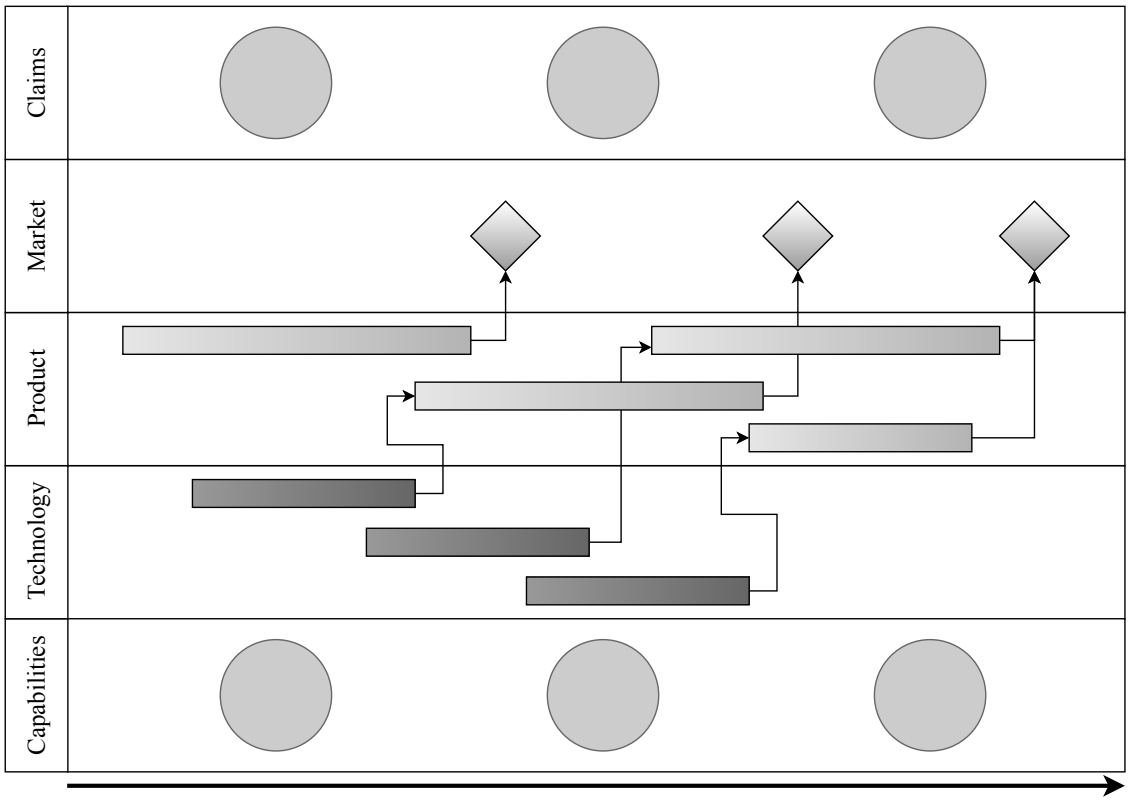

Figure 7.3: Schematic of an Integrated Roadmap

in-house and outsourced. The integrated roadmap is constructed as object-oriented meaning that all projects are stand-alone elements or objects with determined attributes. This can be project class, level correspondence, development sourcing type etc. The advantage of this approach is that it enables addition or subtraction of new perspectives to be made without significant effort and influence on previous work. Figure 7.3 illustrates how an expanded integrated roadmap is schematically constructed.

It is believed that this integration has two main advantages compared to the traditional, separated roadmaps. The first is that it provided a quick and easy overview of how the project distribution with regards to volume and sequence. For instance, it allows the viewer to easily obtain a picture of progress in projects that are running at a specific point in time – something which is useful in combination with the next proposed countermeasure. Overall, this aids in avoiding the over-allocation of the roadmap. The second advantage is that an integrated roadmap adds a new perspective in visualization which simplifies the possibility to identify critical paths and needed projects or actions to fulfill targets, i.e. additional transparency to the roadmapping process. It also enables synergies to more easily be detected. Further, an integrated roadmap also enables a cascading of the roadmap since it provides a core structure which is modular. New levels can be removed or added as requested without disrupting or influencing the other levels due to the object-oriented structure.

7.2.2 Adherence to the Process

The investigation of the current state revealed that the existing structure and process according to the standard work and QMS are sufficient to manage the identified issues. Therefore, the main proposal is to better adhere to the process. One example is to better distinguish the program review meeting and programming meeting and their respective purpose. For instance, is LCM projects discussed in both meetings while the standard meeting guidelines of the programming meeting only state that key projects and programs should be regarded. It is also this part which consumes the majority of the meeting time, leaving less time to the strategic discussions. Since the LCM programs have dedicated funding, resources, and governance separate from the programming, they can be managed separately and only be discussed at an aggregated level in the programming meeting. This would improve transparency and remove clutter between project review meetings and programming meetings. This also opens up for more time in discussion and maintenance of the roadmap which is suggested to be handled at the programming meetings.

Further, there has not been any evidence, apart from those depicted in the project charters and assessment, of the existence of any criteria or guidelines on how the projects within the portfolio should be prioritized. Without any guidelines or tools for decision making, the decisions made are largely based on an ad-hoc and current perception of the situation increases the risk of project overload and inconsistency in decisions. Moreover, current effort in reaching the aimed target of lowering the WIP is not sufficient, as is proven by the difference between initiated and closed projects. It is desirable to have a limit in WIP to avoid multi-project setting and ensure high productivity with needed flexibility for unseen issues. Lowering the WIP can actually increase the output performance of projects since it will enable projects to run faster and with less fluctuation. By the use of binning, the WIP can be kept within sustainable limits effectively. The WIP for LCM and the innovation funnel is excluded since they are managed within their respective program.

Based on this, the following set of recommendations are made:

- Present the LCM projects only at an aggregated level in the programming meetings
- Have prioritization guidelines and claims for decision making
- Reduce the review portion of the meeting to increase the strategic portion
- Use the programming meeting as a place for maintenance of the roadmap
- Continue and develop the use of Planisware as a decision tool

The believed benefit from this countermeasure is first and foremost to achieve transparency and consistency in decision making. If programming decisions are made with support from objective and unambiguous decision tools, the roadmap and programs will gain higher transparency and credibility. Additionally, the reduction of clutter between project review meetings and programming meetings will improve this further as well as increase the meeting productivity. Less time will be spent discussing the same issue giving more room for a strategic discussion to take place. More continuous maintenance of the roadmap ensures its validity and reduces the amount of work necessary for updating overall.

Planisware as Decision Tool

This countermeasure exists, as with binning, to be an aid to the current programming process by providing guidance and support for the decision making and prioritization. Since Planisware is used for the PPM and is already used to some degree for support in decisions, it is suitable for further expansion and integration. Some of

the tools within Planisware that could be useful are scoring, business case tracking, scenarios, and bottleneck analysis. This aids in the organizational integration of the roadmap, i.e. that the roadmap is sustainable as well as reflecting the organizational constraints and ambitions. The recommendation is, therefore, to continue utilizing Planisware for the programming and as a tool for decision making as well as introducing the scenario and resource modules to the roadmapping and PPM to include the additional perspectives and assist in adhering to the process. The advantage of using Planisware for the evaluation and prioritization is that it is easier to track the decisions made as well as following up their progress and development. Planisware would then also act as a single source of truth, increasing the transparency further.

Two modules to develop in Planisware for better decision making is scenario building and resource analysis. The first module enables the user to experiment with different scenarios to find a suitable option. The scenarios can be differentiated with project timing, selection of projects and/or programs etc. Multiple scenarios can be created and evaluated simultaneously to serve as support for strategic decision making. The scenario module provides great potential in moving away from assessing isolated projects toward considering the entire portfolio when making decisions. The second module, resource analysis, is incorporated into the scenario module by adding a new dimension. This module maps the resource demand from the current portfolio or selected scenario with the available staffing to find potential bottlenecks and over-allocation. This enables real-time simulation of how different proposals in projects, programs, and portfolio will influence the resource allocation and determine what is actually possible. Further, it ensures that a project overload does not occur. Additionally, this enables the resource demand to be sustainable giving the employees a manageable workload as well as capable of balancing fluctuations and unforeseen issues.

7.2.3 Reduce WIP and Introduce Binning

As previously stated, the current WIP and project assignment to employees are higher than research recommends and argues for. Therefore, there exists a target of lowering the WIP to achieve better balance. However, it has proven difficult to reach this target and, therefore, a need for a new approach exist. The suggested approach is to quantify the goal WIP by investigating previous output and performance followed by setting up a binning structure to ensure that the WIP is kept within its limits. Binning is done by determining the distribution of projects with regards to the organization's natural cadence in project completion and WIP. Bins are defined with fixed lengths of time and workload which reduces the risk of work

overload. Since there is always a set distribution of available bins of different sizes, the roadmap becomes a prioritization process when filling the bins. Depending on the project's size and complexity, it is put in a suitable bin.

Compared to the current setting, the introduction of binning is an effective way to constrain the WIP and ensure that enough capabilities and resources are available to deliver projects in time and with demanded quality. The structure makes it impossible to start a project above the set WIP without deliberately making that decision. Further, this approach views the project based on content and uncertainty which gives better predictions than decisions based on project type. It allows the portfolio management to be done in a more structured manner and have a longer outlook without increasing the effort significantly.

7.3 Final Considerations

All three countermeasures are believed to have a good impact on the current state toward the vision of success. However, resource restrictions require prioritization of the countermeasures. It is not possible to conduct two implementations which require high effort and, therefore, the *Reduce WIP and introduce binning* will not be considered further, apart from general recommendations for how this countermeasure could be addressed in the future. This field is also currently worked with and there has been good progress made already, e.g. through the bucketing of LCM programs. The ambition to lower the WIP will continue regardless of this project and, thereby, it is better to focus the resource elsewhere.

Further, it was considered possible to implement *Adherence to process* and *Create integrated roadmap* concurrently since they are adjacent in scope but can be worked with as two entities in parallel. There exists a synergy potential in running both implementations which increase the attractiveness of this option. The synergy comes from the utilization of Planisware as support and means of implementation for both countermeasures.

In conclusion, options *Create integrated roadmap* and *Adherence to process* are considered for implementation while *Reduce WIP and introduce binning* is neglected for future work.

8

Implementation Plan

Given the gap between the current state and the desired state in roadmapping, an implementation plan was constructed to aid in the roll-out of countermeasures. The plan is based on the two selected countermeasures and describes in detail the intended work to achieve the vision of success.

8.1 Integrated Roadmap

The first countermeasure to be implemented was the integrated roadmap. As compared to traditional roadmaps, an integrated roadmap manages to visualize all perspectives and value streams within one roadmap creating a better overview and enables potential and trajectories to be better elaborated with. The implementation is divided into two parts where the first one is the development of a core structure to best fit the organizational needs and constraints, and the second part which is the mitigation of the roadmap onto Planisware as well as developing the connection to currently existing programming done in the software.

8.1.1 Development of Core Structure

As stated by Phaal et al. (2004), it is crucial that the roadmap fits the organization for it to be successful. Therefore, the development of the integrated roadmap structure has been done in development cycles where the proposals have been discussed with stakeholders at the end of each cycle to achieve a structure which suits, is accepted by, and is beneficial for all stakeholders. The fundamental structure of the roadmap is based on research literature using the general layers of claims, market, product, technology, and capabilities. Additional layers can be included later thanks to the modularity of an integrated roadmap. The suggested structure of the integrated roadmap for Philips BU Coffee is shown in figure 8.1.

Further, the visual representation has taken respect to the different objects within

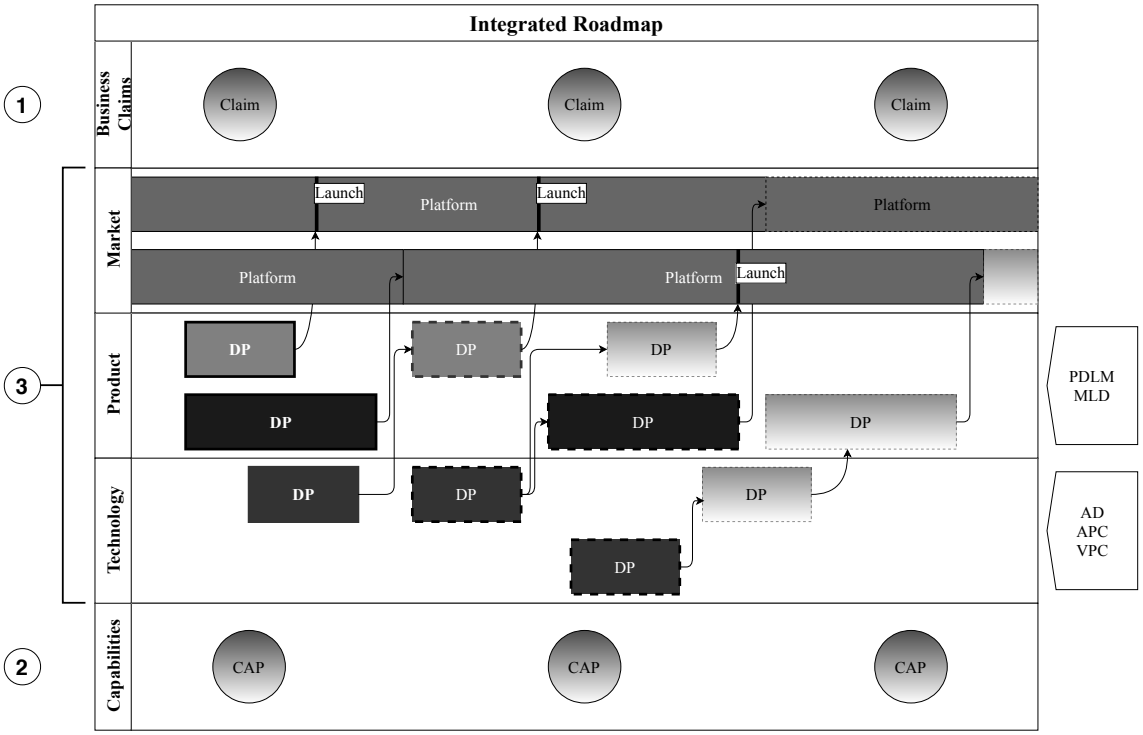

Figure 8.1: Core Structure of the Integrated Roadmap

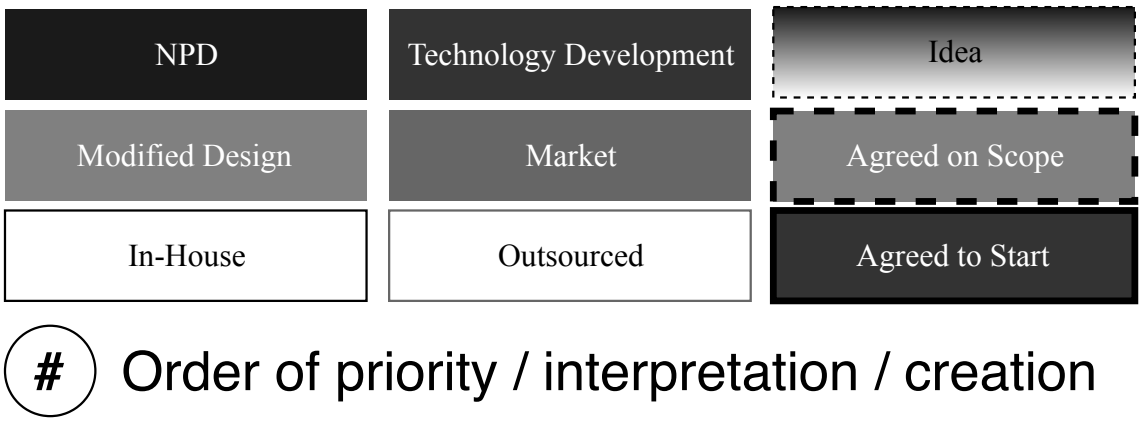

Figure 8.2: Legend for Core Structure of the Integrated Roadmap

the roadmap which are presented differently depending on their characteristics. Figure 8.2 illustrates how visual representation is interpreted. For instance, will a development project (DP), e.g. PDLM, AD, or MLD, change from a gradient to a solid color as it shifts from being a proposal to a committed project with a determined scope. The color will change depending on the project class and the border changes with respect to the development sourcing type. Noteworthy is that this is an example and the final product differs in its visual representation depending on the available functionality of Planisware.

Finally, an object-oriented approach was used in the development of the structure to easier enable the mitigation and creation of linkage with programs and projects in Planisware. Therefore, each element in the roadmap is treated as an object with attributes. Depending on the value of these attributes, Planisware automatically creates the correct visual representation. The development projects are linked to their corresponding project file in the project module so that any change in the project management automatically translates to the roadmap. This ensures the roadmap to always be valid and in accordance with the current status of each individual project. Elements can also be created where no current corresponding project exist for illustration of future ideas and then replaced when a project has been formalized.

8.1.2 Mitigation to Planisware

As the core structure of the integrated roadmap was matured to a sustainable degree, the mitigation process to Planisware could start. This was done in four different steps. The first step was to create a template consisting of all styles and characteristics defined in the structure. This enables a reduction in effort when creating new roadmaps as well as ensuring consistency through all roadmap generations. Further, it will also allow other branches of Philips to use the same roadmap structure if wished.

This was followed by the mitigation of the current roadmaps – market and project – to Planisware as well as integrating them. The mitigation was done in collaboration and communication with involved stakeholders to ensure that the right data was mitigated and properly set-up. The synchronization linkages with the existing project were also made simultaneously. This allowed for the roadmap to easily be updated and in coherence with the programming, reducing the need for hands-on maintenance. The process was well documented to be able to later trace back and follow-up on decisions made during the mitigation process as well as moving the knowledge to an organizational level.

Subsequently, as the mitigation was completed, it was stress-tested. This is nec-

essary to identify any errors or flaws in the structure. Any issues discovered was documented and resolved. The stress-test ensured that the structure and roadmap are sustainable and will be useful in the programming and roadmapping as well as possible as a mean of communication. An evaluation of the mitigation provides feedback and opportunities to further improve the roadmapping.

Finally, user manuals and required documentation were made to make sure that the roadmap is continued to be managed correctly and that the learnings are translated to an organizational level. Since the roadmap is aimed to be in use for a period longer than this project, it is important that clear manuals exist for maintenance and creation of potential future roadmaps.

8.2 Adherence to Process

The second countermeasure consists of a set of actions for improvement in adhering to the QMS as well as achieving consistency in decision making. In total, there are five areas identified where room for improvement exist and these are to some degree also connected to each other. The ways of improvements proposed are based on identified best practice within Philips or the industry as well as proposals made by research. Additionally, the focus is aimed towards developing tools and support which the management can use to better adhere to the process.

8.2.1 Present LCM at Program Level

Previously, LCM projects were handled in the same manner as other projects which caused significant clutter and challenges in project management. Recently, the LCM projects were bucketed into standalone programs with dedicated budget and resources. This has done significant changes in managing projects reducing the clutter and keeping the LCM projects constrained to a reasonable portion of the overall development and review attention.

However, it was identified that they still counted for a significant proportion of time during the programming meetings even though they are managed at a separate meeting. Based on this, the recommendation was to reduce the time spent in programming meeting focusing on LCM by only discussing them at an aggregated program level. This has during the course of the project already been implemented and the recommendation is, therefore, to continue with this. It is proposed to follow-up after some time to see if the time spent discussion LCM actually has been reduced.

8.2.2 Prioritization Guidelines and Claims

One cause for inconsistency in decisions is an ambiguous view of strategic development. If the long-term targets and claims are not clearly stated, there is no obvious direction of where the decisions should group towards. This also makes it harder to make a good prioritization and objective evaluation of projects beyond the metrics of pure economical estimates. Decisions based on economics is good but to solely consider the financial aspects can cause inconsistency, dilution, and imbalances in the portfolio. The first action is, therefore, to emphasize the claims which can be added to the roadmap. This will make it easier to see trajectories and make the right decisions to reach those claims. It will create a unison understanding among all stakeholders on where the development is going and the actions needed to reach there. Claims enable long-term planning to be conscious and guide departments, programs, and projects in their decision making. Onward, claims is something which today is present at other BU:s within Philips, e.g. Floor Care, with success.

However, claims are only part of the action. The other part is to determine prioritization guidelines to reduce the amount of ad-hoc and gut feel decisions made. A set of guidelines will ensure that all decisions are managed in the same manner. Guidelines create an incentive to consider all relevant aspects and consider the entire project space. Further, it provides a common language to communicate an argument for the conclusions made as well as evoke a consistency. The prioritization guidelines aids in moving from assessing projects as isolated entities to looking at the entire portfolio performance.

In summary, two actions are proposed. The first is to derive claims for the roadmap and, secondly, to construct prioritization guidelines.

8.2.3 Reduce the Review Part of the Programming Meeting

Similar to the action regarding LCM, this proposal aimed to ultimately free up more time in the programming meeting in consideration for more strategic discussions. Partly it also addressed the clutter which exists between the project review meeting and the programming meeting. Today, topics are discussed at both meetings with similar attendees which leads to ineffective use of time. It is, therefore, recommended to keep these two meetings as distinct and divided as possible. The amount of information regarding review should be minimized at the programming meeting. One method of doing this is to change the agenda to have one slide summarizing all information in short bullet points. This forces the review to be packaged and compressed and signals that this is an information and not discussion topic.

8.2.4 Develop a Structure for Roadmap Maintenance

Today, the roadmap is not reflecting the actual innovation program and, thereby, its validity is low and rapidly decreases with time. This called for a better structure of maintaining the roadmap so that it is up to date and valid with respect to the programming. There is room for improvements regarding the relationship between the roadmap and the programming as well as how the roadmap is maintained. The other countermeasure for implementation, create an integrated roadmap, provided a core structure for which this action was built upon. A first step was to have a dedicated place for updating the roadmap which with the current process is within the programming meetings and performance reviews. The integrated roadmap done in Planisware allows for automatic updates of the roadmap since the elements will be synchronized with the actual programs and projects managed. If the roadmap is kept outside Planisware, this had to be done manually.

Further, a good routine recommended was to have a checklist which is looked at every programming meeting. This checklist contains statements and/or an action tree to determine if the roadmap is in need of adjustment, update, or review. This approach of assessing the roadmap continuously is supported by research as a critical aspect for ensuring a credible and valid roadmap. To allow for a more ad hoc roadmap review without increasing the effort, event triggers can be developed to systematically evaluate the validity of the roadmap when an unexpected event occurs. An example set of questions for the checklist is as follows, if all answers are "yes" then the roadmap is still valid.

- Are the projects progressing according to schedule?
- For each stakeholder, are the conditions determined previously unchanged and valid?
- Are the portfolio still matching the strategy?
- Is the strategy unchanged?

In conclusion, the roadmap should be updated in the programming meetings directly as well as a checklist and event trigger can be developed to assess the roadmap's validity at a high frequency with low efforts.

8.2.5 Develop the Usability of Planisware as a Decision Tool

The final aspect was more of a complement to the others or an enabler thereof. As Planisware is becoming incorporated in the daily management of projects as well as tracking and planning, it has opportunities to serve as a platform for decision

support in both programming and project review. Since Planisware would serve as a single source of truth, it can also be used for ad-hoc decisions and discussions which cannot wait until the next official review or programming meeting.

Two modules developed and implemented in the programming process were scenario building and resource analysis. These modules support the decision making by objectively provide analysis of how different scenarios would play out and affect the organization using the latest information available with regards to cost and resources. The results are also objective and quantifiable which provides better argumentation for making a certain decision. Additionally, several dashboards were created to give users a quicker and simpler overview of different aspects of the same view. This is especially beneficial if Planisware is to be used by users which are not as educated in the software.

8.3 Executive Summary

The two options *Integrated Roadmap* and *Adherence to Process* which have been selected for implementation can be broken down into steps and action points. Some of the actions are proposals for ways of improvement while others are the introduction of new structures complementary to the existing process. When relevant, the actions points were implemented through the use of Planisware. Below are all actions points for implementation summarized in topics and how they address the problem space.

Integrated Roadmap	Set the common ground and ensures that everyone is aligned. Removes the discrepancy and provides a single source of truth. The timing of projects become evident and any potential miss-interpretations are removed. All stakeholders use the same source for communication.
Claims	Addresses the ambiguous strategic view and gives support in the decision process. It aids in keeping a unison direction as well as having a customer-centric approach in decision making at all levels.
Priority Guidelines	Ensures a consistent and objective prioritization for the project portfolio. It removes the over-allocation and has the potential to reduce the WIP. Further, it allows for unambiguous transparency of decision making.

Scenario and Resource Dashboards	Provides support in the decision making and allows the portfolio to be evaluated instead of projects. It depicts the constraints and functions as a single source of truth for making evidence-based decisions.
Event Triggers	Addresses the roadmapping and provides a framework for maintaining the roadmap continuously instead of periodically valid. The case list enables the assessment to be done ad-hoc and directly as unintended changes occur.

9

Effect Confirmation

The results from the implementation need to be compared to the vision of success and problem analysis to determine if the intended efforts have given the right effects and moved the current state in the right direction. However, the nature of roadmapping and PPM are both long-term and, thereby, immediate effects are hard to distinguish. Any significant effects on the setting will likely not be detectable until some time after implementation. Therefore, the effect confirmation has been conducted by determining the acceptance and perception of the countermeasures by the organization and stakeholders. Additionally, the effects of the thesis on sustainability are discussed using the Sustainable Development Goals as a framework.

A general conclusion from the discussion with the stakeholders is that they are positive to the proposed countermeasures and implementation strategy. As they were presented with the findings, the supporting evidence for each conclusion made, and the proposed countermeasures; they all shared enthusiasm and belief that the situation would improve after implementing the results. Since the stakeholders have different relationships with the roadmapping and their unique perspective, parts of the results spoke differently to different stakeholders. However, at an aggregated level, they all shared the view that the countermeasures would bring improvements to the roadmapping process at Philips BU Coffee.

Moreover, some minor comments on the implementation were given by a few interviewees. These were related to the general visual representation of the roadmap and dashboards and did not influence the core structure itself but had the character of final touches and "nice to have" rather than "need to have". This was the sole solid feedback given from all interviewees and, therefore, the assumption is made that the stakeholders are satisfied with the countermeasures and their implementation. Most of these comments have been addressed and changes have been made to the implementation.

Further, the discussion of how the countermeasures are to be transferred and incorporated in the organization was raised. The generally positive attitude to the

solution was mostly connected to a concern for how the organization would manage to actually follow through and use the tools developed. The stakeholders portrayed an understanding of how and where the tools fit in the organization but expressed worries about how well the ownership and responsibility would be maintained after the thesis has ended. To mitigate this, e-learning material has been developed as well as a live demonstration of how to use the tools.

Additionally, this correlates to the general concern of organizational culture and how it affects the roadmapping. Most stakeholders expressed an understanding for a cultural change required alongside the implementation of the countermeasures for it to take significant and sustainable effect. Otherwise, they feared that the setting would be redundant and diminish the potential provided by the new functionality. The cultural aspect is something which is strongly depending on leadership. If the proposed countermeasures will assist in the cultural change of if a cultural change is required to happen in parallel is challenging to determine. Regardless, the leadership needs to focus on creating an environment where long-term and a holistic view is encouraged and incentivized to increase the performance of strategical work.

In conclusion, there is a general and enthusiastic perception of the proposed countermeasures and how they manage to mitigate the risk and fall pits of the roadmapping today. However, this is in combination with a concern that the culture within the organization will not change in accordance with the findings and a lack of ownership and responsibility causing the proposals and improvements to have diminishing effects. The implementation is valued as suitable and beneficial for Philips BU Coffee even though some minor feedback and additional wishes exist. It is believed that the implemented countermeasures can have a significant and sustainable effect on the roadmapping in raising the discussion to a holistic level and better long-term planning through utilization of timing and active PPM.

9.1 Sustainability Impact

It is important to reflect on and discuss how work will influence the sustainability of its contexts and environment. To assess how the proposed countermeasures will influence sustainability, directly or indirectly, the Sustainable Development Goals from the UN was used as a framework. The results and outcome from the thesis have been checked against each goal and corresponding targets to identify correlations. Figure 9.1 highlights which goals are influenced by the thesis. The main influence of the thesis comes from indirect possibilities to improve the sustainability impact by making the right decisions. The result in itself has minor influences on

Figure 9.1: Applicable Sustainable Development Goals

the environment since it is a process mainly and, therefore, does not produce any tangible effects. In total, seven goals have been connected to the thesis.

The thesis relates to the Sustainable Development Goals in the sense that it creates a foundation for making decisions which in turn work toward sustainability. In the same manner, as the roadmapping is a method for conceptualizing and making the strategy tangible, the roadmap can also transform the ambitions within sustainability to actual projects and actions. By including a green initiative, something already present at Philips, the portfolio assessment can more clearly use this aspect as a parameter for decision making. Having a single source of truth enables a consistency that includes sustainability along with other perspectives. The development of the scenario dashboard visualizes the performance of the portfolio where the sustainability aspect easily can be included to further broaden the holistic view. Hopefully, the transparency and instant feedback provided through the implementation of the countermeasures will result in a more sustainable approach to roadmapping and PPM. Below are all the influenced goals listed.

Goal 3 Ensure healthy lives and promote well-being for all at all ages

Goal 6 Ensure availability and sustainable management of water and sanitation for all

Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 17 Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Goal 12 Ensure sustainable consumption and production patterns

In summary, the thesis can be used as a tool for sustainability effort and ensure that related strategies become tangible and transformed into actual results. A good integrated roadmap and PPM enables Philips BU Coffee to focus the decision making on fitting the business strategy, including the sustainability aspects. The thesis has created aid in transforming abstract sustainability visions and goals into tangible programs and projects.

10

Discussion

The topic of roadmapping is a multi-faceted and broad area where the challenges have more than one possible countermeasure. The project setting has a wide set of stakeholders and dependencies internally. Therefore, there exist several important points of reflection. The discussions are categorized on process, results, and implications. Lastly, the research questions, asked in the beginning, are revisited and elaborated on.

Regarding the process of the thesis, there are some remarks and points which needs to be addressed. First, the scoping played a significant role in the feasibility and quality of the project. Roadmapping is a central part of strategical planning and involves multiple stakeholders. This, in turn, leads to a complex setting where the number of perspectives and approaches are almost endless. This thesis took the standpoint from the I&D and, thereby, was influenced correspondingly in terms of scope. However, a holistic approach was striven for and is perceived to have been fulfilled despite this. The limitations were set early on and quite narrow to the core statement to avoid an unmanageable cascading of work. The limits are deemed well defined in the trade-off between scope and resources.

As mentioned, this thesis was a collaboration between Chalmers University of Technology in Sweden and Philips BU Coffee in the Netherlands. The work culture differs between these countries, even though they are to a large extent similar. There is also a difference between the cultural traits within academia and industry. This can give cause to misconceptions and neglecting of valuable observations. It is believed that the effects of this are not significant. Partly since this has been an aspect considered already at the project's initiation and also since the work was mainly conducted on-site at Philips BU Coffee.

Further, the lead times for scheduling of the meetings, obtaining the data, and receiving replies on e-mail were all bottlenecks in the progress. This goes in line with the multi-project setting which was identified and is common in project-based organizations. An effort to counteract and mitigate this was done by working pro-

actively but it still had a significant effect on the progress speed. Despite this, the project managed to run according to schedule and provide the desired results, mainly due to parallel programming of activities and awareness of potential lead times.

One aspect which could have aided in the progress and quality of the results is a more extensive benchmarking. A large emphasis on benchmarking could have given new insights and possibilities which are proven to work, reducing the effort and uncertainty of introduction. On the other hand, each BU in Philips is unique and has distinct challenges and potential. It is, thereby, not certain that all findings from a benchmarking are applicable nor transferable. One clear example of this is the financial strength differing between BUs. The main part of the benchmarking was done with BU Floor Care which is similar to BU Coffee in several ways and, thereby, allows for a high knowledge transfer. A benchmarking with the industry would have provided good potential for finding best practice and valuable tools. Unfortunately, due to the sensitivity and confidentiality related to roadmapping, it is impossible to obtain this with the exception of previous work published in academia. An effort to identify and extract best practice based on research provided some insights.

The research design of this thesis was based on the A3 methodology as presented by Shook (2008) among others. In retrospect, it was a good approach for this case type in the sense that it is a methodology already established at Philips BU Coffee and it emphasizes on action-based problem solving as well as communication of findings. It has provided support and effective documentation of the progress as well as ensuring the work to stay on track and in the right direction. The method has worked as a facilitator for continuously summarizing and keeping the progress closely linked to the core of the thesis.

Noteworthy is that the effect confirmation of the A3 was not possible to perform in its traditional manner due to the time restrictions. The effects from the implementations of the countermeasures will take time to surface. In similarity, Smith and Sonnenblick (2013) report a PPM approach which took six years to be fully transformed. The focus has, thereby, been on acceptance and perception of the proposed countermeasures to provide some indication of plausible effects. The nature of roadmapping and PPM are long-term and, therefore, any improvements effort can take years before significant effects are visible. However, it is believed that the implemented countermeasures creates the potential for improvement and sets the direction of effective and efficient roadmapping.

Moreover, the results of the problem analysis are interesting but not unique in the sense that, at an aggregated level, these issues are reported and identified in previous literature. Analogies can be drawn between the current state and the *Innovator's*

Dilemma as introduced by Christensen (2000). The requirements on market growth and an increase in revenues stress the organization to select a project with low risk, low cost, and low reward. This might not cause any issues in itself but if it causes the project portfolio to be skewed toward the short-term and low degree of innovation. This can harm the business in the long-term perspective and give room for emerging competitors to steal market shares. It is important to consider the entire portfolio and perform assessment and decision making based on portfolio performance rather than isolated project performance.

Further, one key aspect which was identified with the proposed countermeasures was the enabling of synergy potential. This is achieved by both lifting the decision making to the portfolio level and through the integration of the roadmap. The portfolio perspective gives room for synergies between projects and programs while the integrated roadmap emphasizes synergies between functions and using the timing as a parameter for knowledge development which can be utilized in multiple projects. In a context where the resources and funding are scarce, it is important to maximize the synergies which is something that both implemented countermeasures enables.

The scope of the thesis excluded the consideration of partnerships, something which has a strong influence on the planning for Philips BU Coffee. This was considered to be out of scope due to its large complexity and, thereby, the resources and time demand exceeded the availability. Regardless, the partnerships play an important role and future effort should consider this to make sure that the strategical alignment is not only present within the BU but also with important partners. A sharing of roadmaps and making claims as a joint venture are two examples of how to ensure an alignment not just internally in an organization but also externally with its core partners.

Regarding the implications of the thesis, one of the fundamental gains from the integrated roadmap, something also provided with the improvements in PPM, is the alignment between stakeholders. The implementation via Planisware emphasizes this even further. By incorporating the integrated roadmap and dashboards in Planisware, a single source of truth and common platform for discussion and decision making has been achieved. The utilization of one, common platform for every stakeholder creates transparency and an unambiguous communication which is always accessible for all. Any proposals or changes can be instantly evaluated with objective information to ensure evidence-based decision making. The usage of the resource module provides direct feedback on proposals feasibility to make sure that the selected roadmap reflects the organizational constraints and capabilities.

Onward, the intention of the countermeasures is to provide a needed breathing space

for the product development that allows the organization to retain a focus. One of the key remarks of a multi-project setting is the overload of concurrent projects and dilution of focus. By sequencing and reducing the number of parallel projects, the organization can obtain a deeper focus on each project to deliver higher quality and achieve greater productivity. The selection process is crucial for this and is the reason for the development of PPM dashboards. It is believed that Philips BU Coffee can excel in innovation by putting more emphasis on what can be done, what should be done, and when it should be done. Moving the assessments from projects to portfolio ensures a needed holistic view needed for achieving a sustainable NPD. This also helps in reducing occupational stress and create a better work environment.

Throughout the thesis, the cultural aspects and their role in the roadmapping have been reoccurring topics for almost all interviews and discussions. It is needless to say that culture has a strong influence on the PPM and roadmapping. The prior research also recognizes this and the political environment typically present in PPM and roadmapping. Therefore, it is important for an organization to acknowledge this and invest efforts in mitigating these risks. The culture has a strong influence on the outcome of a process and its impact cannot be neglected. The results are believed to provide a framework where a healthy and sustainable culture can blossom through providing a transparent, evidence-based, and unambiguous approach to decision making. This follows the belief that the best processes are those where decisions become self-explanatory.

Considering the research questions, the thesis has provides some new findings. Firstly, it gives insights into how the multi-project setting can be shown in a case as well as how the integrated roadmap can be implemented to mitigate this by using PPM software. The project has shown how specific tools can assist in creating a cultural change needed to move away from the challenges to a more holistic and sustainable NPD environment. Below are each research questions discussed individually.

RQ1: *What effective measures can be done to manage and counteract multi-project setting and resource allocation syndromes?*

In the project, it was identified that several countermeasures exist which can be deployed to mitigate the multi-project setting. Out of these countermeasures, the integrated roadmap and shift from project assessment to portfolio assessment are believed to be the most effective approaches. One of the causes for reaching multi-project setting is the lack of seeing how projects influence each other by treating them as isolated entities. The integrated roadmap and portfolio focused assessments counteract this. Moreover, one of the most common limitation metrics for projects is

funding, but the resource limitations are rarely considered initially. To get a better project setting, both need to be considered early on and the discussion has to be to whether a project is suitable rather than possible. The created dashboards in Planisware helps bring this to life and show, black on white, what the organization is capable of handling and what it cannot. The integrated roadmap visualizes the project setting and incentives the users to utilize the potential of timing to obtain a more steady product development flow.

RQ2: *How does an integrated roadmap change the perception and interpretation of roadmapping?*

There are some important remarks to be made on how the integrated roadmap change the standpoint of roadmapping. Firstly, the integrated roadmap breaks the barrier between functions and emphasize that roadmapping is a collaborative and collective effort which cannot be done effectively in silos. Further, the visualization clearly depicts the importance of time by showing the trajectories from development to market launch. By cascading downward or upward, one can determine the required start of projects or anticipate a reasonable launch date. By adding the claims, a customer focus and solid direction can be better established, both at portfolio and project level. Additionally, the inclusion of capabilities helps accentuate the knowledge value stream and how the development of knowledge can create synergies and harmony in the roadmap. Finally, the integrated roadmap creates a single source of truth which all stakeholders can fall back and agree upon.

11

Conclusion

The art of efficient roadmapping falls down on answering three questions consciously and consistently: *What can we do?*; *What should we do?*; and *When should we do it?*. By answering these three questions, the organization ensures an alignment among stakeholders, feasibility in the proposals, and optimization of timing potential. The thesis found that a multi-project setting exists at Philips BU Coffee, caused by a lack of prioritization and challenges in adhering to the QMS. Further, the current roadmaps where not in sync internally and with the actual programming and organizational constraints causing discrepancies. This was linked to the absence of business claims as well as a roadmapping process which did not use the time potential present in roadmapping nor considered the feasibility in its execution, i.e. poor execution of roadmapping.

The derived countermeasures of introducing an integrated roadmap in combination with tools to support the prioritization and adherence to the process were developed and implemented. In combination, they achieved to create a framework where the discussion is transformed from isolated projects to scenarios and portfolios which enables a more holistic approach to programming. Moreover, they enable the discussion to be evidence-based and objective instead of having a more political nature. Lastly, the single source of truth creates a foundation for alignment between stakeholders and transparency in decision making.

Further, a few key findings were made throughout the project. The first one was that it is possible for Philips BU Coffee to get more things done by doing less. This is due to a potential for productivity increase through sequencing project to a greater extent. The second finding, adjacent to the previous, is the importance of time. By emphasizing on when the organization can do more long-term planning to give space for valuable up front-work which in turn reduces the uncertainties before agreeing and starting a costly project. Lastly, good roadmapping and PPM is never about finding and selecting the right project, it is about selecting the right scenario and portfolio. Success lies not in doing the right decision about one project, it lies in making the right call for the portfolio.

In summary, this thesis has through the usage of A3 been able to depict the existing challenges in roadmapping at Philips BU Coffee and mitigate these through the introduction of integrated roadmapping. The identified multi-project setting and discrepancies in roadmapping are the core problems which could be derived from a small set of root causes. Countermeasures were implemented to achieve a more holistic approach to roadmapping and a PPM which facilitates this. It was found that it is possible to get more things done by doing less through sequencing. However, in the end it all falls down to three three questions of *Can*, *Should*, and *When*. By answering these questions consciously and consistently, Philips BU Coffee can ensure that their passion for coffee continues to re-innovate the market today, tomorrow, and for decades to come.

11.1 Future Work

Roadmapping is a process which is characterized by long-term perspectives and planning horizons. Any change management will, therefore, take time to gain momentum and achieve a substantial effect. The thesis has introduced some countermeasures to improve the situation but these need to be further developed as the organization matures. Additionally, the introduction of lean thinking in PPM is still an unused potential which can have a major impact and influence on how it performs in the future. Since this will fundamentally change the approach for roadmapping and PPM, it requires time and effort to be properly incorporated. However, if introduced correctly, it has the potential to transform Philips BU Coffee to the next generation and world-class innovation firm that it desires to be.

Further, the roadmap works within a constantly changing environment and, therefore, it is important to assess its validity continuously. The event triggers are a start for this but they need to be developed further to gain proper momentum and be truly useful. Another aspect important for roadmapping is its surrounding culture. Philips BU Coffee need to invest energy in creating a healthy culture around roadmapping and PPM also including their partnerships. The multi-disciplinary nature of roadmapping has to be reflected in the culture.

In conclusion, the following activities are proposed for future work:

- Develop a continuous roadmap assessment through event triggers.
- Investigate possibilities and implement binning along with lean thinking for PPM.
- Work towards a healthy culture and away from politics within roadmapping.

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A

Thesis A3

Integrated Roadmapping (An Holistic Approach)

Owner: Carl Toller
Issue date: 10/03/2018 (update 12/14/2018)
Reviewed by: Suzanne van Egmond

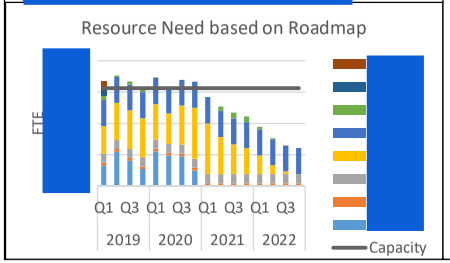
Background

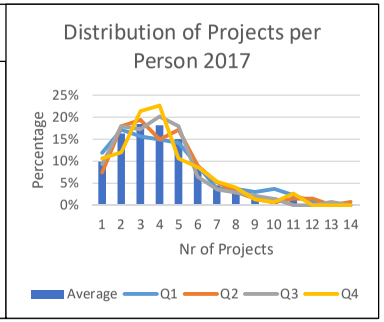
Philips BU Coffee has roadmaps, processes, and structures for follow-up. However, it is not evident how these are followed and if they actually fulfill their purpose to their fullest extent. The holistic view of the roadmap with regards to function and constraints are lacking. The multi-project setting reduces the overall productivity and hinders organizational learnings.

The increased competitive situation and budget constraints requires BU Coffee to be better at prioritizing and making the "right" decisions in the short- and long-term portfolio management and communicating its current trajectory to stakeholders.

Current State

Average WIP





Goal / Vision of Success

- Have a resource demand in the overall portfolio equal to 80% of available staffing. (Reinertsen, 2011)
- Have an average number of projects per person of 2. (Wheelwright & Clark, 1992)
- Transparent decision making and prioritization based on objective analysis.
- Transparent and unambiguous roadmapping.

Root Cause Analysis

15 Symptoms

- Resource allocation syndrome
- Work and information overload
- High WIP
- Low roadmap validity

2 Problems

- (1) Discrepancy between roadmap and portfolio
- (2) Multiple project setting

14 Causes

- (1a) Poor roadmapping
- (1b) Lack of claims
- (2a) Poor adherence to standard work
- (2b) Lack of prioritization

Countermeasures

Option	Problem Solved	Effort	Effect	Prio
Integrated Roadmap - Cascading - Insight in feasability - Connections - Integration to Planisware	- Remove over-allocation - Avoid missing synergies - Avoid missing projects/actions needed	M (excl. Planisware) H (incl. Planisware)	H	2
Reduce WIP and Introduce Binning - Define bins (length and/or resource need) - Set WIP target/Bin limits - Evaluate scenarios in Planisware	- Remove over-allocation - Reduce amount of parallel projects - Obtain flexible scenario building - Increase throughput - Lower project duration and cost	H	H	3
Adherence to process - Prioritization guidelines - Use programming meeting for roadmap update - Present LCM programs at an aggregated level - Reduce review portion in programming meeting - Use Planisware as decision tool	- Achieve consistency in decision making - Transparency and objective decision support - Increase meeting effectiveness - Remove clutter between PRM and programming meeting - Reduce time talking about the same problem	L + Monitoring	M	1

Option *Integrated Roadmap* and *Adherence to Process* selected for implementation.

Effect Confirmation

The stakeholders perceived the countermeasures positively in general. Some minor suggestions for improvements were made and have been accounted for. For determining the long term effect of the countermeasures, the following metrics can be used:

- Number of projects running concurrently (from PRM).
- Annual calculation of project assignments per employee (from Clarity).
- Comparison between determined "dream" portfolio and current from scenario dashboard.
- Qualitative follow-up on the roadmapping and PPM after one, two, and four years.

Follow up Actions (Specify any parent/child A3)

- Continue to develop the modules in Planisware to mature and adopt with the organization.
- Develop a continuous roadmap assessment through event triggers.
- Investigate possibilities and implement binning along with lean thinking for PPM.
- Work towards a healthy culture and away for politics within roadmapping.

85.1.09B Problem Solving A3 (PowerPoint version)
Date: 2015-03-20

Improved by: Suzanne van Egmond
Version: 1.0 [based on v1.5 of docx version]

PHILIPS

B

Problem Trees

Figure B.1: Results from First Problem Tree Workshop

Figure B.2: Results from Second Problem Tree Workshop

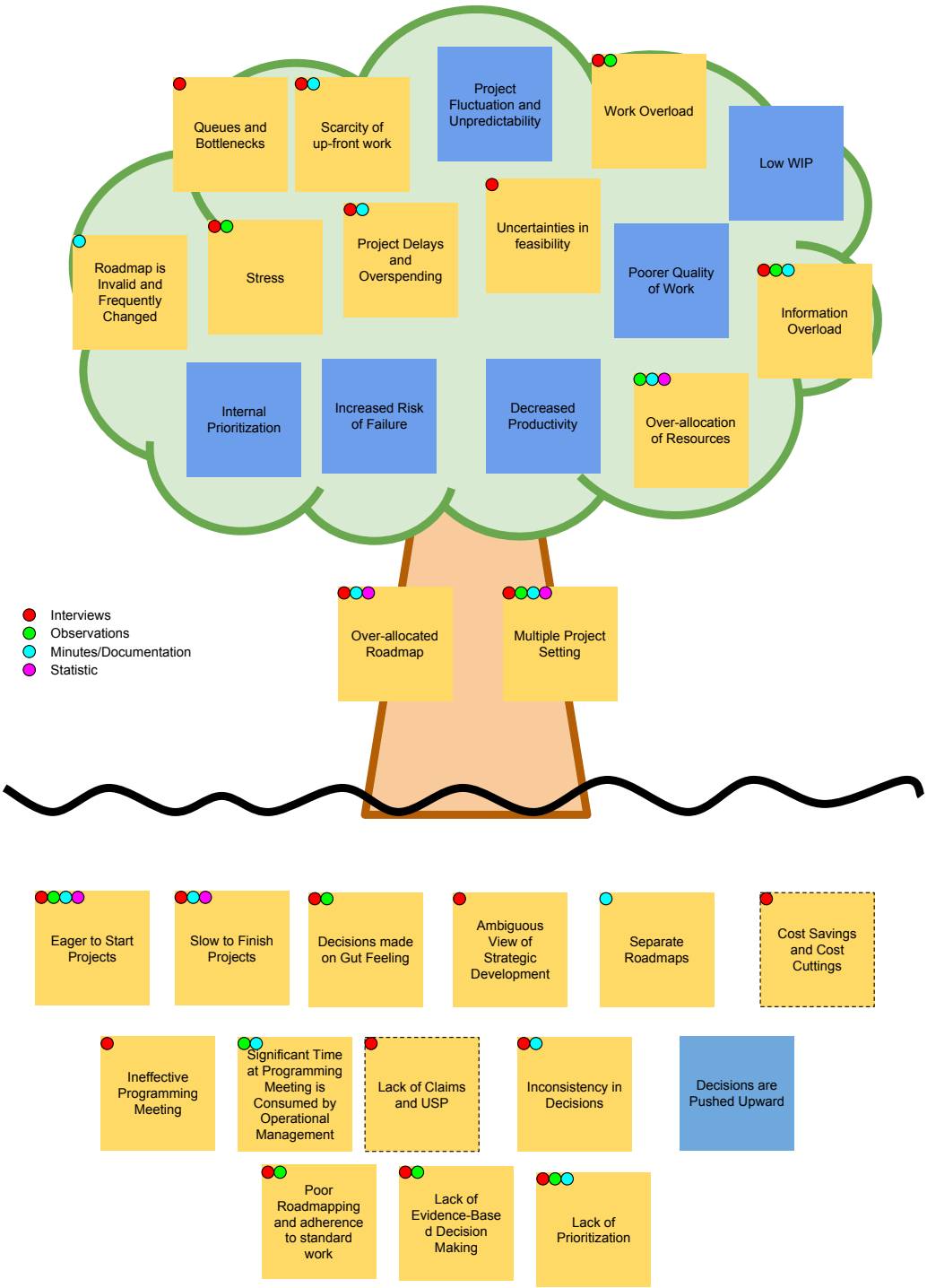


Figure B.3: Problem Tree - Version 1

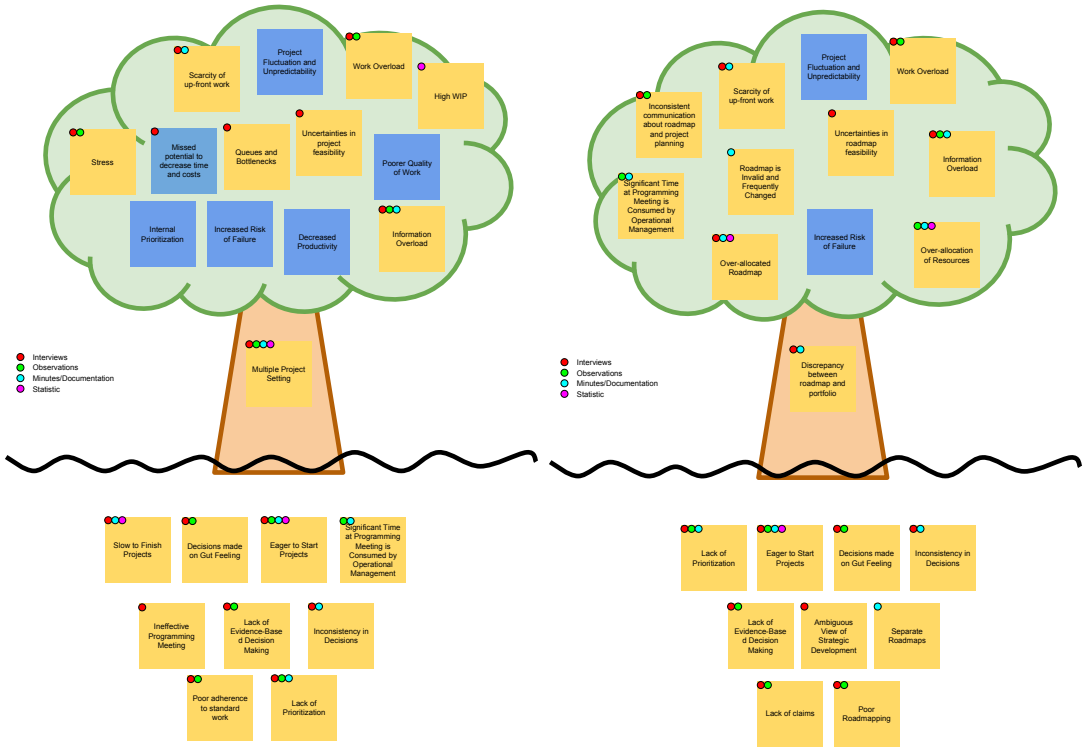


Figure B.4: Problem Tree - Version 2

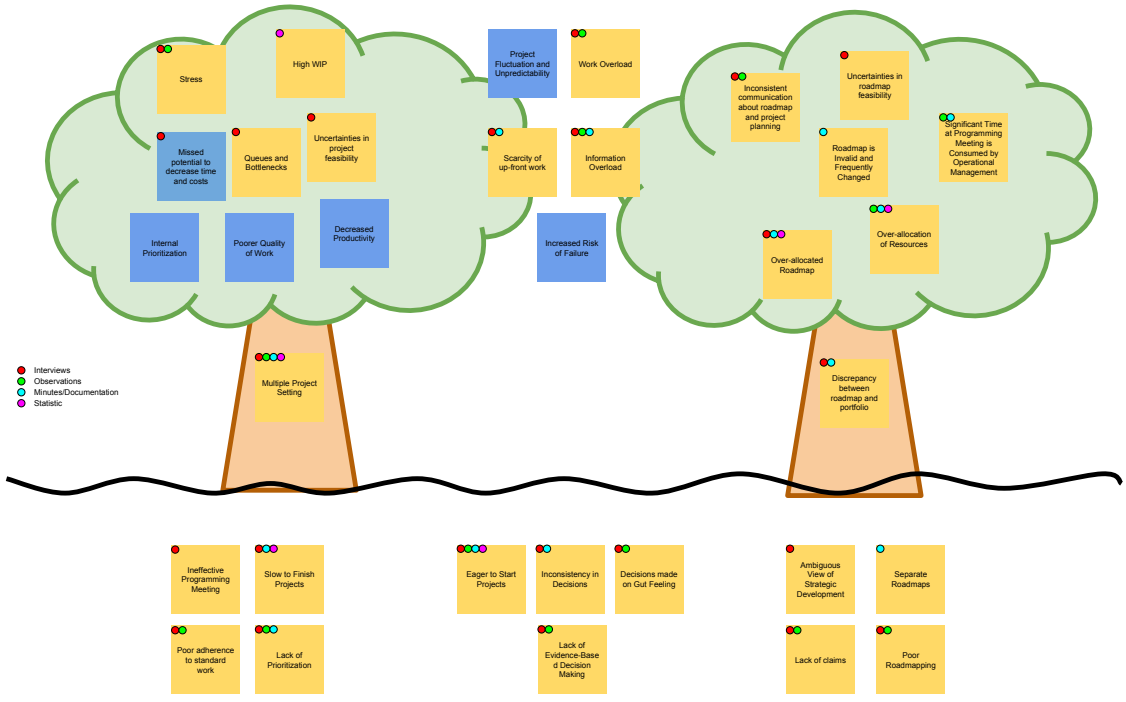


Figure B.5: Problem Tree - Version 3

C

Best Practice in PPM

Table C.1: Best Practice by Category (Menke, 2013)

A. Added Value and Value Creation	
A1	Pursue three overarching objectives in PPM process: strategic alignment, strategic balance, and return maximization.
A2	Use KPIs (i.e., strategic contribution, improved efficiency, balanced risk, higher ROI) to measure the effectiveness of PPM.
A3	Use a value/return measure that is aligned with shareholder value (e.g., eNPV).
A4	Take explicit steps to maximize portfolio return (e.g., "Efficient Frontier" approach).
A5	Communicate the added value of PPM to the organization frequently and explicitly.
B. Analytics, Reporting, and Risk Assessment	
B1	Use clear, user-friendly reports that meet the needs of decision makers.
B2	Use effective visual displays (e.g., risk-return grid) to convey portfolio information.
B3	Align portfolio analytics and reporting across tiers to improve comparability.
B4	Use an appropriate mix of methods to improve decision quality (sensitivity analysis/risk analysis/decision analysis).
B5	Show impact of project risk on future project and portfolio value.
B6	Measure, understand, and manage portfolio risk from global variables that impact many projects, such as oil price.
B7	Identify the key bottleneck time clearly and transparently.
B8	Identify the key bottleneck money clearly and transparently.
B9	Identify the key bottleneck people clearly and transparently.
B10	Identify the key bottleneck material clearly and transparently.

Table C.1: *Continued*

C. Management Decision Behavior	
C1	All stakeholders are disciplined and reliable in following the agreed PPM processes.
C2	Management decision making is knowledge-based, transparent, and consistent.
C3	Portfolio management results in an allocation of resources to projects and programs.
C4	Once portfolio decisions are made, they are supported by all involved parties.
C5	Projects are prioritized according to a clear set of rules.
D. Financial Information and Analysis	
D1	Monitor a mix of financial information (NPV/eNPV/etc).
D2	Align PPM with regular planning and control processes, such as the capital budget process.
D3	Measure the strategic and financial value of portfolio decisions using a business case.
D4	Reassess the business case throughout the project life cycle.
D5	Benefit management is leveraged well (robust realizable benefits, capture all forms of benefits created, etc.).
D6	Where possible, "book" benefits early by cutting budgets, limiting headcount, and including these changes in performance targets.
E. Resource Information and Management	
E1	Identify and monitor resource bottlenecks.
E2	Manage the balance between resource demand and resource supply.
E3	Do not overload the project pipeline or the people; resource projects adequately.
E4	Examine alternative strategies and resource levels to achieve project objectives.
E5	Clearly articulate the relationship between resources, timelines, and risk resolution.
F. Strategic Information and Alignment	
F1	Have a well-defined business strategy and communicate it to all employees clearly and often.
F2	Create an awareness of the strategic impact of the project portfolio,
F3	Translate strategic goals and gaps into necessary projects; build in strategic alignment.

Table C.1: *Continued*

F4	Confirm that the projects in the portfolio are sufficient for the strategy to succeed.
F5	Use strategic buckets to avoid conflicts between projects from different buckets.
G. Portfolio Governance and Organization	
G1	Ensure that portfolio governance is clearly defined and understood
G2	Have a clear division of responsibilities (i.e., between divisional and central PMO).
G3	Have a well-documented and implemented set of decision criteria, business rules, and internal controls regarding PPM.
G4	Use PPM as a key decision-making process so that PPM drives the allocation of resources.
G5	Use cross-functional teams to ensure high quality and broad acceptance of decisions.
G6	Integrate PPM with other key business processes, such as strategy development and project management.
G7	Provide specific training to ensure those involved in PPM acquire the necessary skills.
H. PPM Process	
H1	Use a consistent PPM process, language, and tools across all levels and functions.
H2	Evaluate projects in a standardized way that combines quantitative and qualitative measures.
H3	Use an idea-to-launch process with decision gates.
H4	Require a comprehensive business case early in the process and update it at each decision gate.
H5	Make decisions, set priorities, and allocate resources using PPM process.
H6	Measure and monitor anticipated benefits as an integral part of the PPM process.
H7	Have a framework for learning; audit the PPM process regularly and improve as needed.