Design of a Planning Tool for effective management of software development projects

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Abstract

Sigmax Public Transport (SPT) is a relative young business unit, part of overarching organization Sigmax Group. SPT is still in its initial phase and therefore does not have a solid body of structure and formalization concerning their product portfolio and related (project) management processes. This absence of structure results in somewhat uncoordinated processes of product- and project management. In addition, SPT lacks decision-making based on rational thinking and hard metrics, in terms of project selection, prioritization and/or termination. Furthermore, a long-term focus has been driven out by short-term projects and for the most part, long-term thinking and planning are not even present within SPT. Absence of the aforementioned, reduces continuity within the SPT department and does not contribute to the overall work progress.

The goal of this research is therefore threefold and includes development of a practical Planning Tool supporting SPT in:

1a. Formulation of the SPT business and definition of the competitive position within the business environment.
1b. Development and communication of a business strategy and long-term organizational planning.
2. Decision-making related to selection, prioritization and/or termination of projects, before, during and after project implementation.
3. The application of guidelines for process-based and organized management of projects.

Based on these research goals, a research question is formulated:

' In what way can SPT be supported in the development of a long-term vision,
decision-making related to software projects
and
in the implementation of structure within project management processes? '

To answer the research question, an academic method of problem solving is performed. The problem solving cycle (Van Aken, Berends, & Van der Bij, 2009) has a design-oriented focus and is used to design a practical solution for the business problem. Based on the problem context and the literature findings, a set of 3 design propositions is developed to guide the design process of the Planning Tool. Qualitative research methods are performed to allow for multiple iterations and interim moments of reflection. Various individual interviews and a focus group are part of this qualitative research.

Three prototypes are developed prior to development of the final design of the Planning Tool. This Tool is developed by means of the Business Process Model Notation technique and includes new activities, documents, organizational roles, periodic meetings, decisions and responsibilities. The Tool, consisting of a resp. a Strategic-, Tactical- and Operational level, will support SPT in the implementation of structure within management processes by the implementation of an hybrid management approach and application of important areas of project management (phasing and specializations). In addition, application of different portfolio management tools and the use of the developed Project Assessment Criteria Checklist, will support SPT in decision-making related to project selection, prioritization and/or termination. To conclude, SPT will be enabled to anticipate to the future business environment by implementation of the Scenario-based Roadmapping Tool and performance of differently themed organizational analyses. A User Manual and Document Templates are developed to provide SPT with additional detailed information. Furthermore, an

Implementation plan is developed, supporting SPT in the implementation process of the Planning Tool.

Implementation of the Planning Tool does involve application of entirely new business processes. A one-year pilot is suggested to embed these new processes into the SPT business culture and assess whether, or not, the Planning Tool functions properly. Execution of áll Planning Tool elements is a necessary precondition for this, e.g. the implementation of new activities, documents, organizational team roles and periodic meetings. To guide this implementation process, it is advised to assign an organizational member responsible. Preferably, someone of the SPT management team.

To conclude, different areas for future research are defined. Different elements of the Tool are eligible for implementation within the ERP system of SPT. Exploration of these possibilities is recommended. Furthermore, additional research in the Strategy as Practice (SAP) domain is suggested. Exploration of the possibilities of SAP, in relation to the practical implementation of the applied strategic tools and techniques, is therefore suggested.

Table of Content

Introduction

Humans, as well as all organisms, go through several development phases in life. This biological maturity process is not static, it is characterized by change and uncertainty. From birth to death, several interdependent phases can be categorized, all individually contributing to the growth and development of organisms. Equal to the maturity phases in biology, organizations experience a similar process of growth and development. Decades ago, organizational researchers discovered this similarity, its relevance highly emphasized in nowadays organizational management literature. This maturity process consists of sequential stages characterized by firm growth and development, more commonly referred to as the Organizational Life Cycle (Quinn & Cameron, 1983). This life cycle describes the predictable sequential phases an organization goes through, from inception to execution. The establishment of a company is referred to as the entrepreneurial stage, followed by the collectivity stage and formalization and control stage. Decline of a company, referred to as the elaboration of structure stage, completes the life cycle.

Sigmax Public Transport (SPT), part of Sigmax Group, is a relative young business unit and formerly part of business unit Sigmax Law Enforcement (SLE). Due to the increasing demand for public transport related products and internal organizational growth, a separate business unit was a logical consequence. STP as an isolated new business unit is still in its initial phase. They however operate in the public transport industry for many years. Currently, SPT is situated in the aforementioned collectivity stage in which informal communication and structure, as well as little planning is performed (Quinn & Cameron, 1983; Greiner, 1989). Nevertheless, formalization is required. SPT is in need for organizational stability, efficiency of work and formalization of rules and procedures (Katz & Kahn, 1978; Scott, 1971; Quinn & Cameron, 1983). Therefore, this study focusses on finding a solution that supports SPT in the application of structure within their management processes, in order to effectively manage software development projects. Furthermore, the solution has to allow SPT to anticipate to the future business environment accompanied by new innovations and technological trends.

To answer the research question of this study, an academic method of problem solving will be performed. The reflective redesign will be used to develop a solution for the business problem. This redesign will serve as a guidance throughout the whole problem solving process and is based on the business problem solving cycle as described by van Aken et al. (2009). By implementation of this method, a systematic way of coping with the business problem is ensured. The step-by-step approach will support in the design of a tailor-made solution for the defined SPT business problem.

This study is structured into different sections. Firstly, an introduction to Sigmax Group and the business unit Sigmax Public Transport is given. Context of the study will be provided, as well as the applied methodology. Hereafter, identification and validation of the business problem is presented. The next section provides Design Requirements for the Planning Tool, followed by the Literature section providing insight into prior research and literature. A synthesis of the different literature models and techniques is presented, supported by Design Propositions. Thereafter, Prototype 1 and Prototype 2 are presented, including feedback sessions. To conclude, the Final design of the Planning Tool is shown, including a User Manual, Document Templates and an Implementation Plan. In the concluding section, the answer to the research question is provided and a reflection is presented. In addition, recommendations, limitations and managerial implications are given. Furthermore, areas for further research are presented.

The problem context

Description Sigmax Group and Sigmax Public Transport

The company under investigation, Sigmax Group, prioritizes in the development of software and ICT solutions in order to empower professionals everywhere. In 1998, Sigmax has been established as a system management partner for medium-sized organizations. In 2002, they started to develop innovative software for handhelds, tablets and smartphones for business clients. With this development, Sigmax tapped into a new market segment and expanded beyond national borders. Anno 2019, Sigmax still concentrates on the above mentioned, by focusing on the design and management of ICT infrastructures and delivery of effective and efficient software solutions for organizations.

Sigmax' strategy comprises the development of best-in-class ICT and software solutions with tangible value for organizations that want to realize their ambitions and goals. By well-maintained customer relationships and enabling talented and passionate people to develop high-end software solutions, they can continuously improve on customers' expectations and increase their competitive advantage. This enables Sigmax to become market leader and rises possibilities for further expansion into Europe.

The headquarter of Sigmax is located in Enschede, The Netherlands. The company has almost 500 clients worldwide and operates in four countries. Sigmax has over 250 employees, ranging from software developer to ICT specialist, divided into 6 business units (Figure 1). These business units each have their own field of expertise, all within the ICT and software domain. Focus within this study will be on the business unit concerning Public Transport. Sigmax Public Transport makes enforcement and supervision in public transport more effective and efficient by development of smart and innovative software. By implementation of this software, enforcers of multiple public transport operators are equipped with the right tools and procedures, supporting them in their daily working routines. The product portfolio of SPT includes OV pocket, OV Smart Ticketing and OV IoT Monitoring Solutions. Appendix 1 provides a detailed elaboration of all business units and the SPT product portfolio.

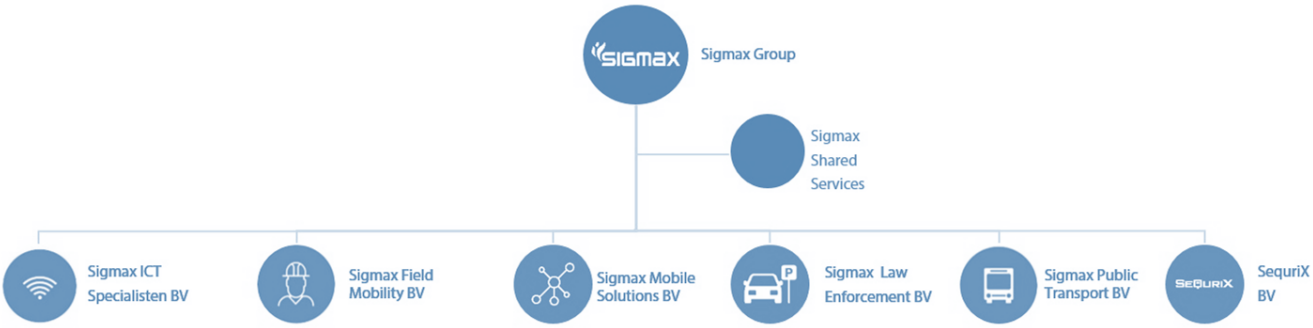


Figure 1 Organizational chart Sigmax

Methodology

To answer the research question of this study, an academic method of problem solving will be performed. The reflective redesign will be used to develop a solution for the business problem and allows for interim moments of reflection in order to learn. This redesign will serve as a guidance throughout the whole problem solving process and is based on the business problem solving cycle as depicted in Figure 2, van Aken et al. (2009). By implementation of this method, a systematic way of coping with the business problem is ensured and a tailor-made solution for the defined SPT business problem is guaranteed.

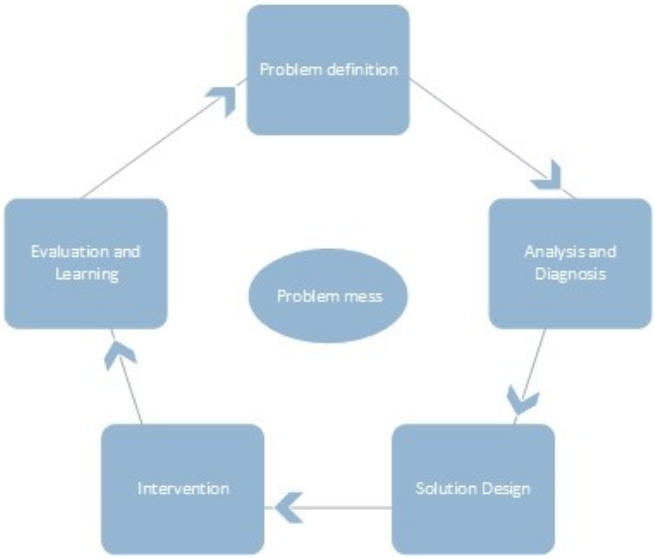


Figure 2 Problem Solving Cycle

Problem solving cycle

The problem solving cycle consists of 6 interdependent steps. In order to come up with a well-defined business problem, the problem mess consisting of multiple underlying sub problems needs to be structured. By structuring this mess, a clear and comprehensive problem definition can be formulated. Multiple perspectives towards the SPT business problem will be gathered, this to view the problem from different angles. Initial informal interviews with several internal stakeholders will be held to formulate the actual business problem and possible sub problems. When the business problem is clearly defined and validated and major causes of the problem are diagnosed and analyzed, a theoretical framework will be developed based on a systematic literature review. Review of existing scholarly and management literature will provide deeper knowledge on relevant theoretical concepts, enabling exploration of potential solutions. Through creative use of the existing literature and a solid qualitative research methods, a pragmatic solution can be designed. An implementation plan will be developed in order to implement the designed solution and to allow for organizational support within SPT.

The problem solving methodology as described by van Aken et al. (2009) is theory- informed and design oriented. Theory-informed (evidence-based) refers to the use of scholarly and management literature, supporting in the business problem solving process. By using the literature, a large amount of data can be gathered, useful as inspiration for the solution design. Design-oriented refers to the ability of creating and designing a solution for this particular business problem. Theory will not

be tested nor be developed. A best fitting tailor made solution will be designed. Furthermore, an implementation plan will be developed facilitating SPT in the implementation process of the solution design.

Theoretical framework

Since this study has a design-oriented focus, a design-oriented qualitative integration method will be performed. This method emphasizes on the development of design propositions by integrating outcomes of relevant literature (van Aken et al., 2009). The CIMO-logic[1] will be applied since already a desirable outcome is identified (Denyer, Tranfield & van Aken, 2008). This upfront focus allows for selection and integration of literature that is relevant in designing the desired outcome for the particular business problem within SPT. A systematic literature review will be performed, serving as a basis for the exploration of potential solutions. The literature will be searched for different interventions that may produce the desired outcome. Design propositions will be developed to relate the literature and the content of the solution design and to guide the process of solution development (Denyer et al., 2008).

Qualitative research method

In order to shape the solution design, qualitative research will be conducted. This empirical research method is a follow-up of the aforementioned qualitative integration technique. By gathering personal views and opinions of different SPT employees and internal stakeholders, multiple perspectives towards the SPT business problem will be uncovered. In this way, the problem is viewed from different angles allowing for a more saturated solution design. Furthermore, qualitative research allows for in-depth conversations and leaves room for questioning beyond the standard predefined subjects. Moreover, less well-spoken and introvert interviewees will not be overruled by more extravert ones. In order to design a solution in line with the requirements and needs of SPT stakeholders, input obtained via personal conversations is desired. For the abovementioned reasons, qualitative research is selected as data collection method in this study.

Data collection

Multiple iterations are part of the design process, resulting in multiple interim moments of feedback. Interim feedback will be collect by means of three sequential stages in the design process. Table 2 presents an overview of the different types of data collection that will be applied. Differently employed internal stakeholders will be questioned during these meetings (Table 1). All involved SPT managers will be asked for feedback, as well as a Sigmax Process Manager and Sales Consultant. The individual feedback meetings (session 1 and 2) will be performed by means of a semi-structured interview approach. Specific content-oriented questions will be developed to guide the interview and structure the session. However, room for additional information will be present in order to benefit from the expertise and creativity of the interviewees (van Aken et al., 2009). In order to achieve non-biased opinions regarding the first two designs, these moments of feedback are individual scheduled meetings. The final feedback will be collected by means of a focus group. Commonly shared opinions will be gathered by performance of this method. Moreover, comments of other participants stimulate explanation and clarification of one's own statements, allowing for more aligned solution design (van Aken et al., 2009).

[1] Context, Intervention, Mechanisms, Outcomes

Name	Function
Evert Veldhuizen	Business Unit Manager/Sales Manager
Sjoerd Luttikholt	Project Manager
Ewald Annink	Operational Manager
Anne-Gert Bultena	Technical Manager (Software Architect)
Marjolijn Stenneke	Process Manager Sigmax
Stefan Kuiper	Sales Consultant Sigmax

Table 1 Participants feedback sessions

Feedback session	Type of data collection
Feedback session 1	Individual feedback meetings *4 managers + Sales Consultant Sigmax*
Feedback session 2	Individual feedback meeting *Process Manager Sigmax*
Feedback session 3	Focus group *4 managers*

Table 2 Types data collection

Data analysis

After collecting the data via different feedback meetings, the data will be analyzed. In the data collection part, the feedback will be structured by the use of the three planning levels, e.g. strategic, tactical and operational level. The discussed deficiencies and redundancies in the prototypes are listed per planning level. New input and suggestions for subsequent prototypes are summarized as well. Hereafter, this data will be divided into positive feedback and constructive criticism. Furthermore, overall feedback and additional remarks will be questioned. This data will be structured in a similar way as the aforementioned feedback. Results of these open questions will be categorized into resp. the strategic, tactical or operational level, hereafter divided into positive feedback or constructive criticism.

Not all collected feedback will be implemented in subsequent prototypes, there will be distinguished between usable and non-usable feedback. The categorization of feedback into usable or non-usable, depends on 2 different factors. The first factor is democratic decision-making. If specific feedback or input is given by the majority of the interviewees, this feedback will categorized into usable feedback. As the majority of the interviewees vote for this adjustment in the prototype, it is reasonable to assume the interviewees require this adjustment in terms of practicability and feasibility of the prototype. Consequently, this feedback will be implemented in subsequent prototypes. The second factor involves discretion of the researcher. In consultation with the SPT supervisor and at the discretion of the researcher, feedback will be assessed. They will discuss if specific feedback will be applied to subsequent prototypes. Their shared opinion towards the given feedback is leading in whether, or not, to implement the feedback. Redundancies will be excluded of the prototypes and new input and deficiencies will be categorized into new elements for subsequent prototypes.

Identification Business Problem

To identify the actual business problem within SPT and possible underlying problems, initial informal interviews are conducted. Several stakeholders are interviewed, all differently employed within SPT. The stakeholders are questioned by means of a semi-structured interview approach. A set of specific content-oriented questions is developed to guide the interview (van Aken et al., 2009). This interview guide can be found in Appendix 2. By conducting these informal interviews, different perspectives towards the business problem are gathered. Furthermore, this approach allows for validation of the business problem later on. Table 3 presents an overview of the interviewees.

Name	Function
Evert Veldhuizen	Business Unit Manager/Sales Manager
Sjoerd Luttikholt	Project Manager
Ewald Annink	Operational Manager
Anne-Gert Bultena	Technical Manager (Software Architect)
Rob Nijhuis	Software Designer

Table 3 Participants initial interviews

Results initial interviews

By conducting the small informal interviews, different perspectives towards the business problem were gathered. An overview of the most frequently mentioned problems and deficiencies is presented below. The interview guide, format and interviews transcripts can be found in Appendix 2 and 3.

Insufficient resources

An insufficient amount of resources is available during execution of projects, e.g. insufficient personnel (competencies), financials and time. This results in shifting of deadlines and delay in projects. Nevertheless if sufficient resources are available, they are not always appropriately allocated among projects.

Absence long-term focus

SPT is overly focused on short-term goals and objectives and primarily concentrates on issues of the day. Furthermore, a long-term vision, strategy and planning are absent. Moreover, the ability to focus on long-term organizational goals and objectives is driven out by small intervening projects.

Degree of innovation

SPT develops a variety of products, all requiring a different application of operating systems, software and hardware. Some projects require implementation of an operating system or hardware solution of the outdated type, if those are explicit customer requirements. Application of these somewhat outdated resources blocks being at the forefront of competition. Furthermore, decrease in innovativeness can be a result of the aforementioned.

Selection, prioritization and evaluation projects

SPT misses guidelines for the selection of suitable SPT projects in line with their business strategy and core values. In addition, interim evaluation of projects is missing, what can result in not entirely fitting software solutions and delay in project lead-times. Moreover, interviewees mentioned the absence of a clear and transparent project ranking in terms of priority. This results in scattered and reduced project focus.

Insufficient identification of customer demands

Requirements and needs of customers are not always fully understood, what can result in not entirely fitting software solutions. Adjustments and development of a redesigning takes time, resulting in project delays. A clear and straight formulation of product requirements and functionalities is therefore desired. Particularity at project initiation, requirements and whishes have to be clear and transparent.

Insufficient definition of project scope

A well-defined scope at start of a project is missing within the current business processes of SPT. Furthermore, SPT employees emphasize the absence of well-defined clear project boundaries. Both the aforementioned create difficulties in later stages of the projects, as responsibilities are not clear and project boundaries can be crossed.

Validation Business Problem

Current situation SPT

Sigmax Public Transport is a relative young business unit, formerly part of business unit Sigmax Law Enforcement. Due to the increasing demand for public transport related products and internal growth, a separate business unit was a logical consequence. SPT is still in its initial phase and therefore does not have a solid body of structure and formalization concerning their product portfolio and related management processes. This absence of structure and formalization results in somewhat uncoordinated processes of product- and project development. Requirements and needs of clients are not always fully understood, what can result in not entirely fitting software solutions. A clear scope at the start of a project is missing, as well as a clear project definition including its boundaries. This results in shifting of deadlines and delay in projects. SPT lacks decision-making based on rational and hard metrics, in terms of project selection, prioritization and/or termination. Furthermore, interim moments of project evaluation are missing. A long-term focus has been driven out by short-term projects and for the most part, a long-term planning and vision is not even present within SPT. Absence of the aforementioned, reduces continuity within the SPT department and does not contribute to the overall work progress. Furthermore, SPT is not able to anticipate to the future environment accompanied by new innovations and technological trends. They lack the right tools and techniques to support them in the process of long-term thinking and innovative product development.

Desired situation SPT

In order to operate in a more process-based and structured way and be able to appropriately manage the product portfolio, effective and efficient methods and tools are desired for the solution design. Practicality and simplicity are of key importance in this design, for management as well as SPT employees. The solution design has to offer management the right tools and guidelines for process-based and organized management of software projects and has to support in evaluation and decision-making in terms of software projects. This, in order to support decision making processes related to new product innovations. The solution design has to clarify the process of product development projects and has to enable management to draw new projects based upon solid and valid argumentation. Requirements and wishes of clients are well determined, as well as the project scope including project boundaries, reducing the shift of deadlines and delay in projects. Furthermore, the solution model has to offer SPT the right tools and techniques to develop a long-term vision and focus. Exploration of the business environment is a precondition for this. To conclude, the solution design has to support SPT to anticipate to the future business environment accompanied by new innovations and technological trends. A long-term focus is desired.

Research Goals

Based on the results of the initial interviews and the desired shape and content of the Planning Tool, a research goal for this study is formulated. This research goal is threefold and will support in the in the development process of the Planning Tool.

The goal of this research is development of a practical Planning Tool supporting SPT in:

1a. Formulation of the SPT business and definition of the competitive position within the business environment.

1b. Development and communication of a business strategy and long-term organizational planning.

2. Decision-making related to selection, prioritization and/or termination of projects, before, during and after project implementation.

3. The application of guidelines for process-based and organized management of projects.

Research Question

‘ In what way can SPT be supported in the development of a long-term vision,

decision-making related to software projects

and

in the implementation of structure within project management processes? ‘

Initial Solution Design

After development of a theoretical framework and associated design propositions, a variety of possible solutions can be developed. The design that best represents the requirements and needs of SPT and is most applicable within the SPT business culture, is selected. By using the relevant literature in a critical and creative way, a tailor made solution can be designed that provides SPT the guidance and support they need. The solution design is categorized into 3 planning levels. Technology Roadmapping, Portfolio Management and Project Management are selected as focus areas for resp. the strategic-, tactical- and operational level. Figure 3 presents an overview of the Planning Tool and the different interrelated levels.

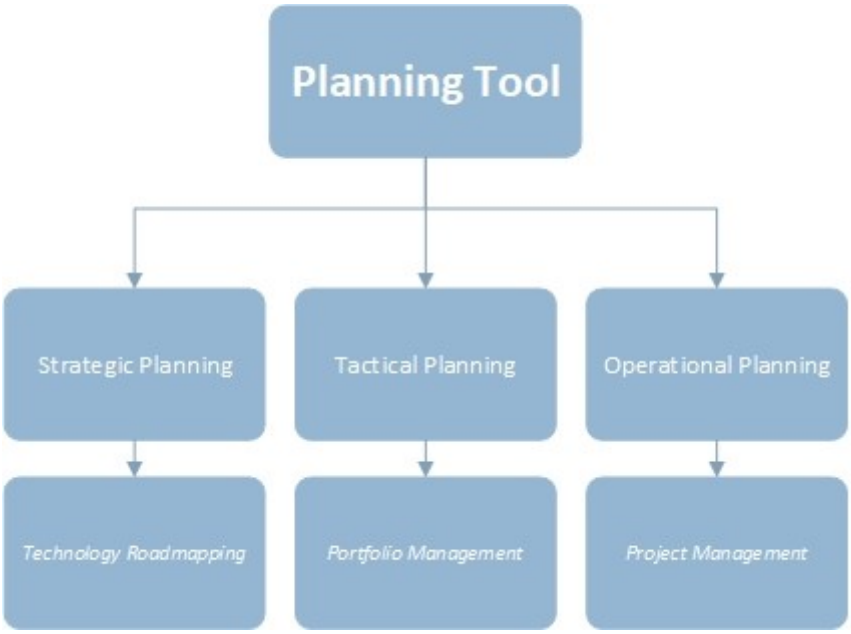


Figure 3 Initial Solution design Planning Tool

Implementation Plan

The implementation plan describes how implementation of the Planning Tool will be realized in practice (van Aken et al., 2009). This plan will support SPT in the implementation of new organizational processes, roles and routines. New tools, techniques and methods will assist SPT in effectively creating structure within management processes related to project- and product developments. Furthermore, this plan will support SPT in anticipating to the business environment in which they are operating.

Requirements Planning Tool

Based on the wishes and requirements obtained via the initial interviews with different SPT employees, a set of design requirements is developed. This concerns requirements in terms of planning tool functionalities and the design of the planning tool. The design of the tool requires a simple and transparent visual lay-out, introducing a step-by-step model of business processes. In this section, different design requirements will be presented in order to guide the development process of the planning tool. Below an overview of the subjects that will be addressed in this chapter.

- Functional requirements Planning Tool
    - 3 planning levels
    - Coherence planning levels
- Design requirements Planning Tool
    - Process modeling techniques
    - Variables

Functional requirements

Each planning level has its specific goals and objectives. In order to achieve these goals, different planning tool functionalities are defined. These functionalities differ in content for resp. the strategic-, tactical- and operational level. In the next section, the goals and associated functionalities are clarified.

Strategic planning

Which strategic direction do we take and what are the motives?

The strategic planning has to clarify the SPT business and its business model. Long term organizational goals and objectives are visualized, accompanied with the markets, products and technologies that will be utilized to achieve the objectives. This level has to support planning of projects over the long term and requires matching of long-term goals to short-term actions. In addition, it has to prepare SPT to multiple possible futures. Future technological trends, environmental changes and uncertainty will be addressed. Furthermore, this planning level will function as a communication tool to internal and external stakeholders, providing graphical insights into the long-term organizational planning of SPT.

Tactical planning

Which projects do we select and accept and how do we make these choices?

The tactical planning has to support in decision-making related to selection, prioritization and termination of projects. It has to be directive in making go/kill decisions and support in resource allocation and risk spreading. Furthermore, it requires contribution to predefined strategic organizational goals and objectives. In addition, the planning level has to align the SPT strategy with the right choices of projects eligible for the portfolio. Better project focus is a result of the aforementioned. To conclude, progress of projects is continuously monitored and periodic project review sessions will be part of the tactical planning.

Operational planning
How do we effectively and efficiently manage the selected projects?

The operational planning has to facilitate in relevant aspects associated with the management of projects. It has to offer management the tools and techniques to support in the implementation of appropriate project management to successfully complete projects. Different perspectives towards the business problem were collected during the initial interviews with internal stakeholders. As a result of these interviews, there is decided not to focus on all elements of project management within the operational planning, but rather on the for SPT key importance areas. A set of 5 key project management elements is therefore selected. Definition of ***scope- and requirements*** will be addressed, as well as time management and associated project ***planning*** and ***monitoring***. To conclude, management of project ***costs*** and ***quality*** are taken into account in the operational part of the planning tool. Other elements of project management are excluded from this study.

Coherence planning levels
As already mentioned in the previous section, all three planning levels have their own purpose and individually contribute to the achievement of structure and organized (management) processes. To develop an organized and logic planning tool, coherence between all three levels is desired. By means of this interrelation between levels, a logical flow of information, requirements and decisions is created. Figure 4 indicates the coherence between planning levels.

Figure 4 Coherence Planning levels

Design requirements

Process modeling techniques

In order to design a transparent and easy-to-use planning tool, different process modeling techniques and tools can be applied. Broadly defined, all modeling techniques have a common purpose; the visualization of a business process or flow of work. By mapping the processes and interrelations between different variables, the business workflow can be displayed. Different process mapping techniques are presented within the literature. Some well-known visualization techniques are mentioned below. At a later stage, the most suitable process modelling technique will be selected.

- Flowchart technique
- Business Process Modeling Notation (BPMN)
- Unified Modeling Language diagram (UML)
- Data flow diagram
- Gannt chart

Variables

Differently themed variables will be part of the planning tool. By clearly defining variables as actors, activities, requirements, decisions, milestones and flows of information etc., the right activities and requirements can be assigned to appropriate actors. The application of these variables will enhance transparency of business process and ease communication between relevant stakeholders. Organizational roles and activities will be clearly defined, as well as required documentation and decisions.

Theory section

To comply with the predefined Planning Tool requirements, a systematic literature research is conducted. By means of this literature, Design Propositions can be formulated to meet the requirements and guide the development process of the Planning Tool.

Strategic planning

Definition business model and competitive position

Which techniques and analyses can be practiced to define and formulate the business model of organizations, as well as the competitive position?

Strategy

Strategy can be defined as the competence of organizations to achieve long term business goals and objectives in order to reach customer satisfaction and competitive advantage. Porter (2008) defines strategy as a way to convey the companies unique selling point and emphasizes on a combination of skills, competencies and resources in order to create competitive advantage. Multiple strategic management methods, tools and techniques are presented within the literature, supporting companies in formulation and implementation of their business strategy (Vuorinen, Hakala, Kohtamäki & Uusitalo, 2018). These strategy tools support in definition of the current position of the organization, its competitive position and helps to identify weaknesses and threats.

Organizational analyses - Intern and extern

Similar to the aforementioned strategy tools, organizational analyses are an appropriate tool to get an understanding of how organizations are positioned and what the characteristics are of the environment they operate in. The analyses serve as guidance throughout the exploration the business environment. Literature differentiates between internal and external organizational analyses, both emphasizing important aspects of the organizational business environment. Table 4 presents different organizational analyses and strategic management tools. These tools and analyses support organizations to gain an better understanding of the business environment and assist in the development process of business strategies.

Management tools and analyses	Explanation
Balanced Scorecard (Kaplan & Norton, 1992)	A performance metric using organizational objectives, measures and initiatives to achieve strategic goals. Internal elements of the organization are highlighted and areas of improvements are identified.
SWOT analysis	This analyses takes into account the internal factors (Strengths and Weaknesses), as well as the external factors (Opportunities and Threats). Areas of improvement can be identified, as well as companies' strong suits.
Porters Five Forces analysis (Porter, 2008)	This analysis supports in the identification of competitiveness of the organization. The tools addresses threats of new entrants and new substitutes, the bargaining power of both customers and suppliers and the industry rivalry in order to develop an overview of the specific industry.

VRIO framework	This framework contributes more to the vision and mission formulation, instead of strategy formulation. By addressing the Value, Rarity, Imitability and Organization of the company, both aforementioned concepts can be defined.
Market analysis	This analysis supports in gaining a better understanding of the market in which the business is operating, The aim of this analysis, is clarification of the requirements and needs of consumers, identification and definition of market segments and formulation of how consumers can be approached.
PESTEL/DESTEP analysis	This analysis supports in mapping the external business environment of the organization. Political, Economic, Sociocultural, Technological, Environmental and Legal factors are identified.
Value Chain analysis	This analysis addresses all elements or activities within the value chain, which add value to the final product or service. The elements are analyzed in order to decrease costs and/or include new product developments to increase value.

Table 4 Management tools and analyses

Mission, vision and core values

A mission, vision and organizational core values serve as guidance for an organization and support in achievement of long-term organizational goals and objectives. The correct formulation on aforementioned concepts allows organizations to clearly define their current position within the business environment and their core activities. Mission and vision are used interchangeably in the business environment and often confused by organizations. However, they significantly differ and formulation of both concepts is therefore highly valued. The next section presents the aforementioned concepts.

A ***vision*** describes the desired future of the company, it entails how the organization ideally would look like in for example 10 years. A vision should function as a source of inspiration for all employees, motivating them in actively achieving organizational goals and objectives. Furthermore, a vision should be short, clear and inspiring.

A ***mission*** elaborates on the organizational goals and objectives to achieve the stated vision. It describes how the organization creates, delivers and captures values for their customers. Moreover, it appoints how the company will achieve competitive advantage and how it distinguishes itself of others within the business environment.

Organizational core values are the most important values of an organization. These values embody the incentives and motives the organization represents. Furthermore, they describe how the organization positions themselves within the business environment. Moreover, core values clarify the business culture of the organization. It is recommended to use a set of three unto six core values for definition of the organization.

Business Model Canvas

A business model canvas (BMC) can be defined as “the rationale of how an organization creates, delivers and captures value” (Osterwalder & Pigneur, 2010). It supports organizations in expressing their business model in a visual and graphical way and can be defined as the blueprint of an

organization. The BMC is composed out of nine building blocks, addressing all relevant areas involved in 'doing-business', e.g. value proposition, key activities, key resources, key partners, customer segments, customer relationship, channels, costs and revenues etc. The model captivates all key components important for creation of value (value proposition) and customer satisfaction (Chesbrough, 2010). Furthermore, interrelations between the components are emphasized in this visual representation of a business model.

Methods and tools to develop strategy

Which methods and tools can be practiced to develop and visualize business strategies and a long-term organizational planning?

Definition Technology roadmapping

A roadmap is a graphical representation of organizational developments over time and supports in matching short-term actions with long-term goals. It comprehensively presents possible markets to tap into, products and services to offer and technologies required for the development of these products (Phaal, Farrukh & Probert, 2004; Phaal & Muller, 2009; Groenveld, 2007). By combining these aspects, definition and formulation of a business strategy is supported. In its turn, this strategy will guide the organization in planning their products and projects over the long term, whilst matching short-term actions with long-term goals, utilizing innovative technology. Proper implementation a roadmap will ensure good communication to both internal and external stakeholders.

Definition Scenario planning

Scenario planning is a foresight method, supporting organizations in preparing for different potential futures and situations (Siebelink, Halman and Hofman, 2016; Hussain, Tapinos and Knight, 2017; Amer, Daim & Jetter, 2013). This method supports organizations in acting more flexible and innovative, by addressing (technological) trends, environmental developments and policies. This strategic planning method supports in development of a business plan to cope with the rapidly evolving business environment and associated uncertainty. Moreover, it allows organizations to make decisions based on rationality. In order to generate the most valid scenarios, implementation of the most crucial environmental drives is required (Amer, Daim & Jetter, 2013). Furthermore, development of a set of 3 till 5 scenarios will most likely be successful, as stated in the scenario planning methodology.

Synthesis road mapping and scenario planning

To guide the activities that are part of the aforementioned techniques, several convenient checklists and practical guidelines are presented within the literature. Predefined roles and procedures and actions to take are mentioned by several scholars (Gerdsri, Assakul & Vatananan, 2010; Yu & Daim, 2017). Moreover, several scholars developed step-by-step approaches and processes, enabling organizations to cope with future technological changes accompanied with uncertainty. Scenario-based -or driven- road mapping (SBRM) is a frequently elaborated method, allowing for strategic organizational planning and matching short-term actions with long-term goals. SBRM addresses both the macro and micro level by combining scenario planning, as well as road mapping in one comprehensive approach. Cheng, Wong, Heung and Leung (2016) developed a systematic scenario-based road mapping approach consisting of five phases; a preparation phase, team formation phase, scenario building, assessing and selection phases and a concluding road mapping construction

phase. A comparable approach is taken by Siebelink, Halman and Hofman (2016), who explore organizational opportunities by the implementation of differently themed workshops within their method. Hussain, Tapinos and Knight (2017) developed a roadmap consisting of multiple phases, using both scenario planning and technology road mapping as variables for the SBRM construction. In addition, they highlight 'flex points' (critical developments) to link scenarios and roadmaps, contributing to strategic organizational planning. Based on the aforementioned methods and techniques, the below mentioned elements can broadly be defined within the roadmap process.

1 Preparation
2 Design
3 Implementation

Variety Roadmap purposes
Different roadmap purposes are classified within the literature. An overview of these possibilities is displayed in Table 5.

Roadmap purpose	Description
a. Product planning	The product planning prioritizes in defining linkages between optional technologies, possible markets and product developments.
b. Service/capability planning	The service/capability planning is closely linked to the product planning roadmap. However, it prioritizes in the domain of services and associated organizational capabilities instead of products.
c. Strategic planning	The strategic planning prioritizes in the support of a long-term vision and planning and involves a highly strategic component. The current firm situation is compared with the desired situation, paths and gaps will be filled in order to create strategic possibilities.
d. Long-range planning	The long-range planning prioritizes in establishing a planning that supports organizational development over the long-term. Compared to the aforementioned strategic planning, a lower level of strategy is involved.
e. Knowledge asset planning	The knowledge asset planning visualizes the alignment of assets of knowledge and management of knowledge. Via knowledge assets up to business objectives, several criteria will be linked in order to respond prospective market demands.
f. Programme planning	Programme planning prioritizes in defining linkages between several stages of project planning and the strategy of the company. Decision making, milestones and technology and business strategy are visualized in this planning.
g. Process planning	Process planning addresses knowledge flows in order to visualize a specific process area (for example, new product development).
h. Integration planning	Integration planning prioritizes in defining linkages between technologies, systems and products. This in order to integrate technology or develop new technologies. Time is of marginal importance in this planning type.

Table 5 Roadmap description and purposes

Connecting Strategy, BMC, Road mapping and Scenario planning
A relative new movement within road mapping literature combines aspects of the roadmapping technique and the business model (BMC) of the organization (Schaller, Vatananan-Thesenvitz & Stefania, 2018; Toro-Jarrín, Ponce-Jaramillo & Güemes-Castorena, 2016). Toro-Jarrín et al. (2016) proposed a methodology for a ***Building Process Integration*** by the use of linking grids. Through performance of differently themed internal and external organizational analyses (acting as the

linking grids), building blocks of the BMC can be filled out. Synthesis of both analyses and the BMC result in a roadmap, visualizing the long-term strategy of an organization. In addition, they add the roadmap time perspective to the BMC, allowing for the best of both worlds in terms of these management tools.

Tactical planning

To support in decision-making related to project selection, prioritization and termination, different portfolio management techniques are associated concepts are studied. Since decades, the portfolio management literature evolves mainly around three core concepts; strategic fit, portfolio balance and value maximization. Therefore, tools and methods are primarily concentrated on these concepts (Cooper, Edgett & Kleinschmidt, 1999; Cooper, Edgett & Kleinschmidt, 2001). Currently, a shift has taken place within the literature. Existing portfolio management tools and techniques are not considered as dominant as before. A shift towards evaluation of the entire portfolio management process is taking place. This process includes the aforementioned tools and techniques, however, the alignment of projects with organizational business strategies and periodic review- and monitoring sessions are addressed as well. When considered as one integrated process, portfolio management can be better understood and contribute to successful application of portfolio management.

Alignment portfolio strategy and business strategy

By means of which technique(s) can the portfolio strategy be aligned with the business strategy?

In order to align business strategies with organizational projects, several scholars addressed this relation. For example, Ansari, Shakeri & Raddadi (2014) developed a framework of five key processes which supports in the implementation of business strategies through project execution (formulation and implementation of strategy, PPM, PM and alignment of organization strategies and PM). In addition, different alignment evaluation criteria and elements are developed. This method supports in the assessment of strategic fit of projects, allowing for organizational decision-making more in line with business strategies. Similar to the aforementioned framework, Kaiser, El Arbi and Ahlemann (2015) developed an information processing model in which the emphasize on structural alignment. They highlight strategic information requirements in order to develop a link between portfolio management and the business strategy. Through centralize strategy development and project evaluation criteria derived from strategic goals and objectives, successes in strategy implementation can be achieved. Meskendahl (2010) explores the linkage between implementation of business strategy and business success, via strategic orientation and project portfolio management (strategic fit, portfolio balance, formalization etc.). By performance of a solid strategic orientation and portfolio structuring, implementation of business strategies can be accomplished. Santiago and Soares (2018) explore a more in-depth and product-oriented approach by developing a framework that utilizes strategic buckets to align the portfolio with a business strategy. Furthermore, resource allocation and project selection are supported by performance of this approach.

Project evaluation methods & review criteria

Which methods and review criteria can be practiced to evaluate and revise projects?

A wide variety of evaluation methods and review criteria are addressed within the literature. These methods support in decision-making related to prioritization, continuation and termination of projects. Several scholars applied traditional project evaluation tools and techniques in their studies (Lerch & Spieth, 2013; Jugend & da Silva, 2014; Oh, Yang & Lee, 2012; Cooper, Edgett & Kleinschmidt, 1999; Cooper, Edgett & Kleinschmidt, 2001; Killen, Hunt & Kleinschmidt, 2008). The addressed portfolio management methods offer support in decision-making related to resources (allocation), financials and risk spreading. Moreover, these methods contribute to the expression of

the organizational long-term vision and strategy. Cooper, Edgett, and Kleinschmidt (1999;2001) present several practical portfolio methods that support organizations in decision-making related to projects. An overview of these portfolio methods and tools is presented in Table 6.

Portfolio management method	Description
Financial method	Financial calculations used to rank and rate projects. Profitability and return metrics such as the Productivity Index, ECV, NPV and ROI are popular tools for evaluation.
Options pricing theory	This method handles each stage of a new project in the same way as if an option for new investments would be obtained.
Business strategy - Strategic buckets approach	The organizational business strategy functions as a basis for assigning resources to certain projects and products. Highest ranked are those best aligned with the strategy of the company. An example of this method is the Strategic Bucket approach.
Behavioral approach	This method supports managers in finding an agreement in project selection and prioritization, particularly in the initial stages.
Bubble diagram or portfolio map	Projects are visualized as bubbles of different sizes and categorized into an x-y plot. Based on predefined characteristics (plotted on the x and y as), decisions can be made.
Scoring model	This method ranks projects based on the outcome of specific questions, criteria or scales. A weighted fashion is applied in order to indicate differences in importance.
Checklist	This method evaluates projects based on the answers to yes/no questions. If all, or enough, questions are answered with yes, the project receives a Go. Otherwise, the project will be killed or deprioritized.
Hybrid approach	This method indicates a combination of several of the above mentioned methods. By application of a hybrid approach, best results can be achieved.

Table 6 Portfolio management methods

Monitoring portfolio

How does monitoring support the tactical planning?

Frequently reviewing the business portfolio is highlighted by several scholars (Urhahn & Spieth, 2014; Jugend & da Silva, 2014). By time to time evaluation of the portfolio, current projects can be re-evaluated and possible new go/kill decisions can be made, positively contributing to successful implementation of the business strategy. Tolonen, Harkonen, Verkasalo and Haapasalo (2015) address monitoring of the portfolio slightly different. To support the implementation of their developed portfolio process, a new business hierarchy consisting of three (review) teams is proposed for periodic execution and monitoring of the portfolio.

Operational planning

To apply structure within project management processes, application of a suitable project management approach and related elements is required. This Operational Planning translates strategic organizational goals and objectives into day-to-day processes, supporting in management of projects in order to successfully complete projects. The profession of project management is performed within different industries and business sectors worldwide. This results in multiple organizations concerning themselves with best practices within the field of project management. Numerous methods, approaches and templates are addressed as antecedents of successful project management. With regards to the (problem) context of SPT and need for a structured and systematic approach in project management, focus will be on approaches and methods embodying this. Work of top project management organizations is reviewed; different hand/tool books, sourcebooks, methods and approaches are explored. An overview of the consulted organizations is presented in Table 7.

Project Management Organizations
Project Management Institute (PMI)
Association for Project management (APM)
International Project Management Association (IPMA)
AXELOS

Table 7 Project Management Organizations

Definition Project Management
Project management is defined as 'a temporary endeavor undertaken to create a unique product, service or result' (PMI, 2013). Management of a project includes requirements such as knowledge, competences, tools and techniques for successful project completion. Multiple specialization areas and disciplines are addressed within the literature, all individually contributing to successful completion of projects (PMI, 2013; APM, 2012; IPMA 2015; 2016). Furthermore, different phases and stages within project management are emphasized within the literature (PMI, 2013; IPMA, 2015). In the following sections a comprehensive overview of the different management specializations and phases are explained.

Project management phasing and specializations

Which project management phasing and specialization areas are addressed within the literature, supporting in process-based and organized management of projects?

The Project Management Body of Knowledge (PMBOK) is a worldwide accepted standard in the field of project management. It functions as a guidance throughout the entire project management process and focusses on several Process Groups and Knowledge Areas (PMI, 2013). Projects are divided into several sequent or concurrent phases and three types of project life cycles can be distinguished; predictive, iterative and incremental, and adaptive. Different areas of specialization (i.e. Knowledge Areas) within project management are described by PMI (2013), supporting in the successful management of projects and underpin execution of the life cycle processes.

The APM Body of Knowledge (APM) concentrates on context, people, delivery and interfaces as framework for the explanation of project management and antecedents of successful project management (APM, 2012). Similar to the PMBOK principles (PMI, 2013), APM describes several managerial delivery areas, supporting in successful management of projects. In addition, APM introduces the FIVE Dimension of Professionalism to the field of project management. This framework, consisting of the dimensions breadth, depth, achievement, commitment and

accountability, enhances personal project management competencies and skills and supports in the knowledge needed for successful execution of project management (APM, 2012).

PRINCE2 is a process-based project management method and divides projects into several different stages in order to effectively manage and control projects (AXELOS, 2017). Whereas the aforementioned Body of Knowledge frameworks (PMI, 2013; APM, 2012) both approach project management specializations in a quite similar manner (e.g. Knowledge Areas and Delivery Areas), the PRINCE2 method addresses 7 principles, 7 themes and 7 processes to perform their method. All components consist of interrelated activities and support in guidance of project processes related to successful management of projects.

The International Project Management Association emphasizes on competences required for individuals and organizations, working in the field of project management (IPMA, 2015; IPMA, 2016). Several competence are addressed, split up into three areas: perspective, people and practice. Different methods, tools and techniques are described. In addition, several management elements and generic- and key competence indicators are addressed in order to support and indicate successful project management.

In contrast to the abovementioned methods and approaches, the ITIL approach is part of IT service management (ITSM) and is based on the phasing of the service lifecycle (AXELOS, 2011). By offering a best practice format with key activities, principles, organizational roles and routines, proper guidance in the development process can be assured, resulting in successful management of projects.

Table 8 on the next page presents an comprehensive overview of the different project management methods and tools as described above. Furthermore, the project management phases and specializations are presented.

Definition project management specializations

Different project management specializations are presented within the project management literature. Based on the predefined design requirements of the Planning Tool, solely on the for SPT key important specialization areas will be focused. Therefore, definition of ***scope- and requirements*** will be addressed, as well as time management and associated project ***planning*** and ***monitoring***. To conclude, ***costs*** and ***quality*** of projects are taken into account. The table below presents descriptions of the selected project management specializations.

Project management Specializations	
Planning and scheduling	Comprises management of time within the entire process of a project. Planning and scheduling of project activities, personnel, budget, resources etc. is part of this.
Scope and requirements	Comprises definition and formulation of the project scope and requirements of external, as well as internal stakeholders.
Quality	Comprises managing and controlling the quality of the whole project, as well as the deliverables of the project.
Costs	Comprises all tasks related to finance; managing project budget, projects costs, investments, financial resources etc.
Monitoring and evaluation	Comprises controlling and directing of the entire process of the project. Evaluation refers to the collection of feedback and points of improvement for future projects or a redesign.

Table 8 PM

Method	Phases	Specializations
PMBOK Guide	Process Groups (stages)	Knowledge Areas
• PM life cycle	Initiating processes	Project integration management
	Planning processes	Project scope management
	Executing processes	Project time management
	Monitoring and controlling processes	Project quality management
	Closing processes	
APM Body of Knowledge		Delivery Areas
		Scope management • Requirements management
		Schedule management
		Financial management
		Quality management
PRINCE2	Processes	Themes
• PM life cycle	Starting up a project	Business Case
	Initiating a project	Organization
	Directing a project	Quality
	Controlling a Stage	Plans
	Managing Product Delivery	Risk
	Managing a Stage Boundary	Change
	Closing a Project	Progress
ITIL	Phases	
• Service life cycle	Service Strategy	
	Service Design	
	Service Transition	
	Service Operation	
	Continual Service Improvements	
Competence Baseline Series		Competence elements
		Project design
		Requirements, objectives and benefits
		Scope
		Time
		Quality
		Finance
		Plan and control

Synthesis of literature models, tools and techniques

The literature study has resulted in a variety of tools and methods applicable for the planning tool. To receive an visual overview of this researched literature and categorize the different models, tools and techniques, all relevant parts are attached to the wall (Figure 5). This in order to define and select the relevant pieces of literature and support myself in the creativity and design process. Not all of the visualized methods and tools will be applied, a selection of the most appropriate ones is made in this section. A synthesis of the researched literature will result in design propositions. These design propositions are developed to find coherence between the literature and the design of the planning tool and are guided by the research goal of this study. The propositions will guide the development process of the planning tool. Below an overview of the selected tools and methods including motives and the developed design propositions.

Figure 5 Overview literature

Strategic Planning

Research goal: Formulation of the SPT business and definition of the competitive position within the business environment.

Which tools and methods are selected and why?

In order to formulate the SPT's business, the concepts of ***mission, vision and core values*** are selected. Identification of the aforementioned concepts supports SPT in development of a strategy and directs in the achievement of long-term organizational goals and objectives. The ***Business Model Canvas*** is selected as this tool supports in expressing the SPT business in a visual an graphical way. Correct formulation of both the aforementioned enables SPT to clearly define their business, core activities and the way in which the create, deliver and capture value.

Differently themed ***organizational analyses*** are performed to explore the internal- and external business environment of SPT, e.g. public transport industry. Both the ***SWOT*** and ***Porters Five***

Forces analyses are selected as they support in strategy development, identification of organizational strengths and weaknesses and analysis of the competitive environment. Exploration of the internal business environment will be on the basis of ***organization-, marketing-, and portfolio analyses***. In order to explore the external business environment of SPT, performance of ***market-, product- and technology analyses*** are selected. These 3 overarching areas assure an overall assessment of resp. the internal and external environment. Moreover, the analyses selected for the latter are related to elements of the BMC as well as the roadmap (mentioned later). Via the Building Process Integration technique, coherence between these three tools is realized in the Strategic Planning.

Design Proposition

Definition of the ***SPT business***, application of the ***Business Model Canvas*** and performance of differently themed ***organizational analyses***, will support SPT in setting strategic directions and in definition of the current business situation and competitive position in the public transport industry.

Research goal: Development of a business strategy and long-term organizational planning.

Which tools and methods are selected and why?

In order to define the SPT business strategy and long-term planning, ***business roadmapping*** and ***scenario planning*** are selected. Both methods are combined in the ***Scenario based- Road Mapping tool*** (SBRM). This tool will facilitate SPT in scheduling projects over the long term and support them in the visualization of business strategies. A combination of the strategic planning roadmap and long-range planning roadmap is selected for the planning tool. Hereby, both organizational development over the long-term and strategic considerations are prioritized. The scenario planning part of the SBRM tool addresses alternative futures and technological drives that can affect the SPT business. By implementing both techniques in the Strategic Planning, a clear strategy direction can be taken and development of a long-term planning is supported. This will enable SPT to anticipate to the future business environment accompanied by new innovations and technological trends.

Design Proposition

The ***Scenario based- Road Mapping*** tool will support SPT in the visualization and communication of their business strategies and long-term planning, in order to anticipate to the business environment in which they are operating.

Tactical Planning

Research goal: Decision-making related to selection, prioritization and/or termination of projects, before, during and after project implementation.

Which tools and methods are selected and why?

In order to support SPT in decision-making related to selection, prioritization and/or termination of projects and be directive in making go/kill decisions, a set of differently themed ***portfolio management tools*** is selected (Table 9). Based on the initial interviews with SPT employees and preferences for pragmatic and easy to use evaluation tools, a set of simple and functional tools is selected. Moreover, preference is given by SPT employees to tools that support in visualization of the outcomes. This in order to ease and quicken assessment. These specific tools are selected as they meet the above mentioned requirements and represent key importance areas of project assessment, e.g. strategy, financials and risk spreading. Each one of the tools prioritizes in one of the aforementioned areas, all together allowing for an overall assessment of SPT projects.

Portfolio Management Tools	Focus area
Strategic Buckets	Strategy & Risk spreading
Bubble Diagram	Strategy, Financials and Risk spreading
Financial Calculations	Financials
Scoring Model	Strategy
Checklist	-

Table 9 Portfolio Management Tools

Design Proposition

Differently themed ***portfolio management tools*** will support SPT in decision-making related to selection, prioritization or termination of projects, based on strategy, visuals and/or hard metrics.

Operational Planning

Research goal: Development of guidelines for process-based and organized management of projects.

Which tools and methods are selected and why?

To support SPT in the development of guidelines for process-based and organized management of projects, a twosome elements out of the project management literature is addressed. Application of for SPT relevant project management phasing and project management specializations are selected.

Project Management Phases

To apply structure within project management processes, application of a suitable project management approach is required. Different project management phasing's have been studied in the literature study. A combination of different phases out of the traditional project management literature is selected to develop a tailor made solution for SPT, e.g. PMBOK, APM Body of Knowledge and RPINCE2. The selection of these phases is primarily based on the problem statement and deficiencies SPT employees acknowledged during the initial interviews. A set of sequential phases is composed to guide SPT in systematically executing management of projects. Table 10 presents the selected phases.

Phases Project Management
Project Initiation & Definition Requirements
Project Planning
Project Execution
Project Monitoring
Project Closure
Project Evaluation & Brainstorm

Table 10 Phases Project Management

Project Management Specializations

The literature addresses multiple project management specializations, enabling organizations to excel in various areas of project management. Different views towards the business problem were collected during the initial interviews with SPT employees. As a result of these interviews, there is decided not to focus on all existing specializations of project management. Based on the acknowledged problems and deficiencies, the for SPT relevant project management specializations are selected. In this manner, the for SPT important areas are addressed and will be taken into account in the Operational planning. Table 11 presents the specializations that will be addressed.

Project Management Specializations
Project Time Management
Project Scope Management
Project Requirements Management
Project Quality Management
Project Cost Management

Table 11 Project Management Specializations

Design Proposition

Emphasis on the ***PM specializations*** relevant for SPT (e.g. Time, Scope, Requirements, Quality and Costs) and synthesis of ***PM phasing*** based on PMBOK, APM Body of Knowledge and PRINCE2, will support SPT in the development of process-based and organized project management processes.

Prototype 1

After selection of the most suitable literature models and development of different design propositions, a first prototype of the planning tool is developed. This first prototype is based on previously obtained inputs, e.g. the studied literature, the formulated design propositions and results of the initial interviews with different SPT employees. In addition, my own insights and understandings of the business problem and relevant elements are part of this first prototype. In the forthcoming section, firstly a physical paper prototype of all three planning levels is displayed. In here, interaction of different activities, requirements, decisions and responsibilities is shown. Hereafter, an elaboration of the different prototype variables is presented, as well as a description of resp. the strategic-, tactical-, and operational level. To conclude, results of the first feedback sessions are provided and adjustments for the second prototype are made. Below an overview of the subjects that will be addressed in this chapter.

- Variables Prototype 1
- Physical paper prototype 3 levels
- Description 3 levels Prototype 1
- Feedback session
- Adjustments for Prototype 2

What are the different variables presented in Prototype 1?

Activities - Red numbers in ascending order (Figure 6)
The activities refer to the tasks and actions required for successful completion of a planning level. All three planning levels consist of different sequential activities in which requirements (pink) and departments (yellow) are mentioned. The selected activities are the basis of resp. the strategic-, tactical-, and operational level and are based on the researched literature. Each planning level is concluded with a monitoring phase.

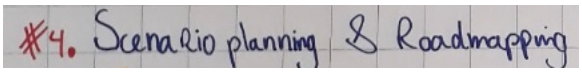


Figure 6 Red numbers

Requirements - Pink Post-it (Figure 7)
Requirements refers to the documents, templates, tools, knowledge etc. needed for a proper execution of the activities. In this first prototype, there is decided not to distinguish between the form of the requirements and in- and output requirements. In a further stage, more detail will be given to the requirements.

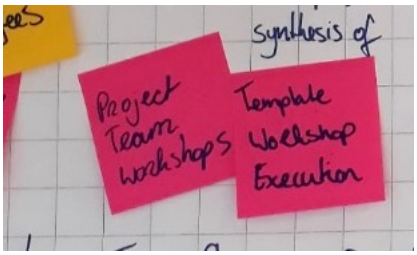


Figure 7 Pink post-its

Departments - Yellow Post-it (Figure 8)
In order to execute the aforementioned activities, different responsible departments are selected. Selection of these departments is based upon the type and scope of the activity. In this first prototype, there is decided to select a broad management department for execution of activities and keep options open in this initial stage of solution development. In this initial stage not all details of the activities and requirements are known. It is therefore hard to already decide what specific role or function matches certain activities. In a later stage, team roles will be assigned to the activities and a more detailed job description will be provided instead of the management departments. Table 12 presents the departments selected for this first prototype.

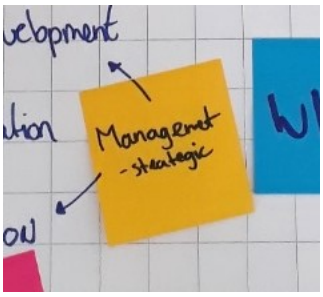


Figure 8 Yellow post-its

Management department	Other departments
Strategic management	Marketing
Financial management	
Product management	
Project management	
Operations management	
Commerce management	

Table 12 Applied departments

Strategic planning

In this first prototype, the Golden Circle of Simon Sinek is used as a source of inspiration for the design and layout of the Strategic Planning. By categorizing the Strategic Planning based on the elements of the Golden Circle, e.g. Why?, How? and What? (blue post-its), a systematic approach in SPT strategy development can be realized. In this section, firstly the paper prototype is presented (Figure 9). In here, interaction of different activities, requirements, decisions and responsibilities is shown. Hereafter, a detailed explanation of the different elements is presented.

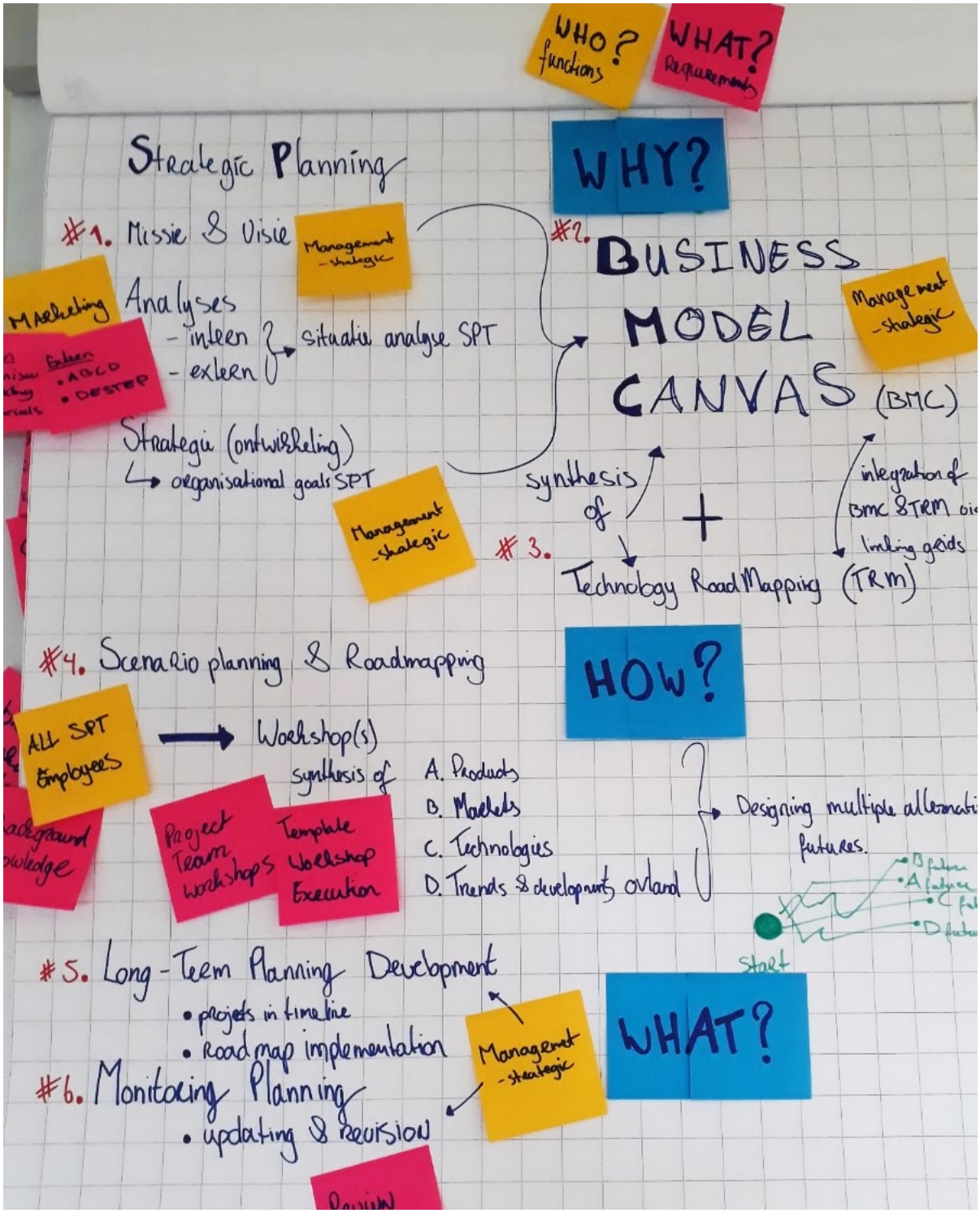


Figure 9 Strategic Planning Prototype 1

Why?
Different elements related to strategy development are included in this first prototype of the strategic planning. Of key importance is to centralize in what way SPT creates value for their customers and what their motives are for operating within the public transport industry. Identification of the SPT mission and visions and formulation of their organizational goals and objectives are a part of that. Internal and external analyses are performed in order to get an understanding of how SPT is positioned within the business environment and what characteristics are of this environment. Synthesis of the above mentioned will result in the SPT strategy.

The above mentioned elements of strategy development are expressed within a Business Model Canvas (BMC). The BMC is a graphical visualization of how SPT creates, delivers and maintains values for its customers. The BMC consists of different elements all individually contributing to value creation within SPT.

How?
Technology Roadmapping (TRM) is the next step within the Strategic planning. Via the Building Process Integration technique[2] and associated linking grids, integration of the aforementioned BMC and TRM is achieved. Results of this synthesis are used as input for the Roadmap & Scenario planning development. Differently themed workshops are selected to involve SPT employees in the roadmap process and to ensure commitment of their side. These workshops enable exploration of possible markets, products, technologies, trends and developments within the public transport industry. A graphical representation over time of these (future) organizational developments is developed by using the roadmapping technique.

Scenario planning is the second element part of the roadmapping process. By considering multiple alternative futures that might be applicable to the SPT business, an overview of opportunities and threats can be developed. This will enable SPT to identify risks, act according to these risks and allocate resources in line with them.

What?
A long-term SPT planning is selected in order to plan and visualize the SPT organizational goals and objectives and ease communication between internal- and external stakeholders. The previously developed business strategy is guiding in development of the planning. Furthermore, in this long-term planning the created roadmap elements (e.g. products, markets and technologies) and selected scenarios are shaped into feasible SPT projects and market opportunities, and unrealistic future scenarios are filtered out.

Monitoring portfolio
Revision and updating of the SPT strategy, Business Model Canvas, Technology Roadmap and selected scenarios, are of key importance within the Strategic planning. Periodically reviewing the aforementioned elements and the alignment between SPT and its core activities is part of the monitoring activity.

[2] The Building Process Integration technique prioritizes in the development of interrelations between resp. the Organizational Analyses, Business Model Canvas and Technology Roadmap.

Tactical planning

This first prototype of the Tactical Planning is roughly categorized into 3 parts, e.g. Portfolio Strategy, Selection Portfolio Methods and Portfolio Monitoring. In the forthcoming section, firstly the paper prototype is presented (Figure 10). Hereafter, a detailed explanation of the different elements is presented.

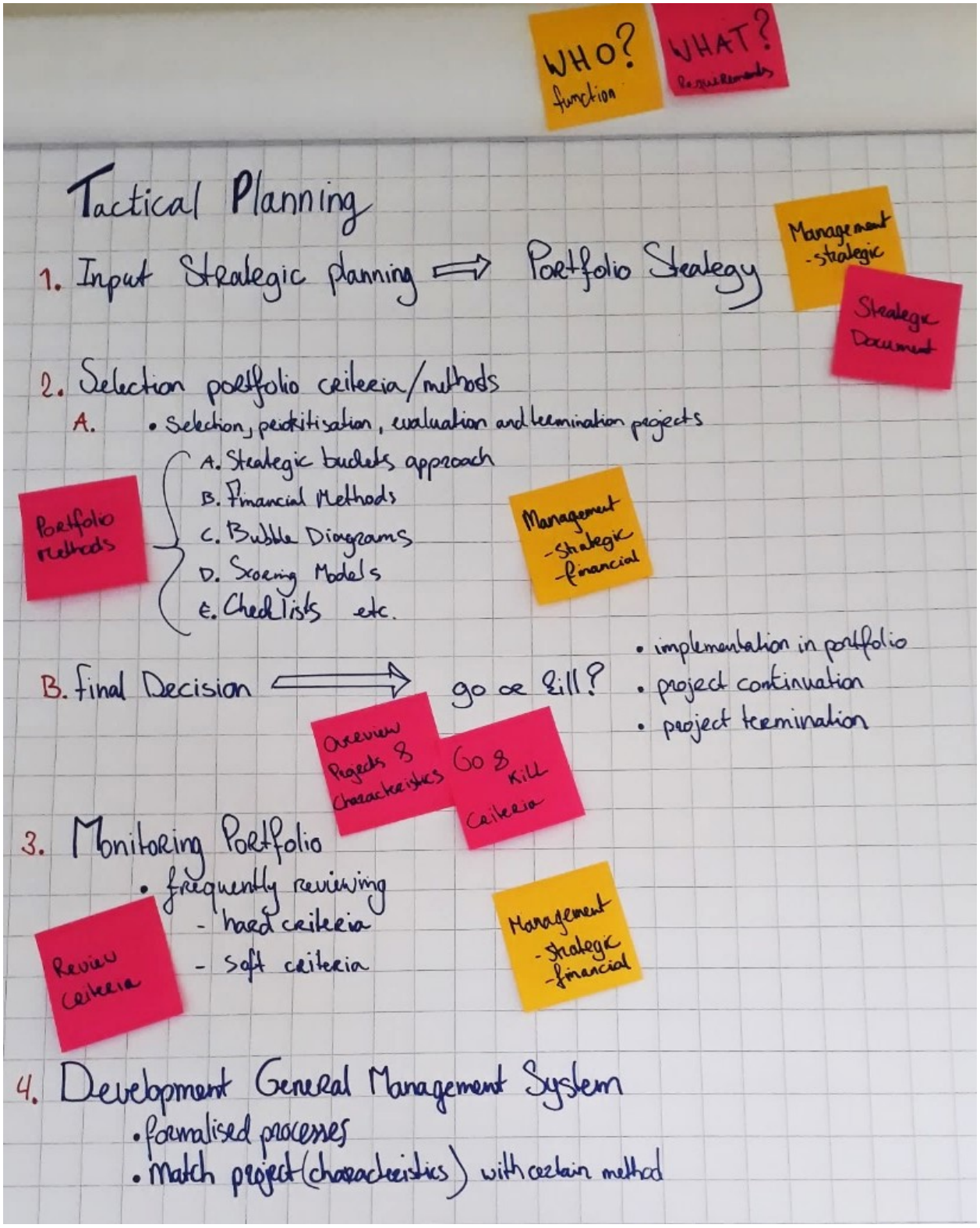


Figure 10 Tactical Planning Prototype 1

Portfolio Strategy

To create a business portfolio aligned with the strategic organizational goals and objectives of SPT, the portfolio strategy has to derive from the SPT business strategy as developed within the Strategic Planning. This strategy serves as a basis for the development of a portfolio strategy, comprising all essential elements of portfolio strategy development. By implementing these SPT business strategies into the portfolio, projects are in line with the SPT strategy positively contributing to project successes.

Selection Portfolio methods and criteria

A set of differently themed portfolio methods will support SPT in the evaluation and revision of projects. The final Go or Kill decision is based upon the outcomes of these portfolio methods and will support SPT in decision-making related to project prioritization, continuation or termination. Based on the initial interviews with SPT employees and the early stage SPT is operating in, a set of simple and functional portfolio management methods is selected. A preferences for pragmatic and easy to use evaluation tools is desired, as well as for tools supporting in the visualization of the outcomes as these eases and quickens assessment. The below mentioned portfolio management tools (Table 13) are selected as they represent key importance areas of project assessment (mentioned by SPT employees), e.g. strategy, financials and risk spreading. Each one of the tools prioritizes in one of the aforementioned areas, all together allowing for an overall assessment of SPT projects.

Portfolio Management Tools	Focus area
Strategic Buckets	Strategy & Risk spreading
Bubble Diagram	Strategy, Financials and Risk spreading
Financial Calculations	Financials
Scoring Model	Strategy
Checklist	-

Table 13 Portfolio Management Tools

Monitoring Portfolio

Frequently reviewing and updating the project portfolio is of key importance within the Tactical Planning. Application of the aforementioned tools will support SPT in the assessment of projects. However, these methods are only effective when projects are reviewed periodically. By periodically reviewing the project progress in terms of process, deliverables, profitability etc., appropriate measures can be taken in terms of project prioritization, continuation or termination.

Operational Planning

This first draft of the Operational Planning is categorized into different project management phases and addresses a set of 5 project management specializations. The selected phasing and specializations are primarily based on the selected literature and results of the initial interviews with different SPT employees. As already mentioned in the literature section, six project management phases are selected, e.g. Project- Initiation & Requirements, Planning, Execution, Monitoring, Closure and Evaluation. Management of Time, Scope, Requirements, Quality and Costs are selected in terms of specializations. On the next page, the initial paper draft of the Operational Planning is presented (Figure 11). Hereafter, a detailed elaboration of all phases addressed in the Operational Planning is given.

Figure 11 Operational Planning Prototype 1

Project Initiation & Definition Requirements

This first step covers initiation of a project. A project management plan is developed and contractual agreements between SPT and the customer are set up. A well-defined project management plan is recommend as this eases communication and assures alignment between both parties. Technical requirements are defined by means of a product backlog and user stories. Business/customer requirements are defined by means of a customer journey map or viable alternative. Essential in this initial step is involvement of all relevant stakeholders, in particular the customer, in order to set the right expectations and create commitment on both sides. To conclude, documentation is of key importance within this first phase.

Project Planning and Scheduling

This second step within the operational planning covers the planning and scheduling of activities required for successful project completion. Development of a Work Breakdown Structure (WBS) is recommended as this method divides requirements for project execution in a structured way provides insights into the work that needs to be delivered. Project activities, deliverables, milestones & deadlines, budget, resources and required personnel (competencies) are addressed within this WBS and in the operational planning. Furthermore, this phase supports in resource and budget allocation, assuring that the right resources are available at the right place and time.

Project Execution

This third step of the operational planning covers the execution of a project. Essential within this phase is continuous improvements of project deliverables and project process in order to achieve the highest level of customer satisfaction. Therefore, the Product Development Lifecycle is selected as a basis for this phase, following a set of sequential steps in order deliver customer satisfaction. Figure 12 presents the Product Development Lifecycle, including the cycle of continuous improvement.

Figure 12 Project Execution

Project Monitoring

This fourth step covers monitoring of the project. By periodically reviewing the project progress in terms of process and deliverables, the project can be controlled and on time project delivery can be assured. Monitoring and directing of project objectives and performance, as well as quality and costs of deliverables are part of this process. Key performance indicators and critical success factors are selected to support in the measurability of the aforementioned key elements. A set of measurements and checklists have to provide in this.

Project Closure

This fifth step of the operational planning covers project closure activities and final delivery of the product(s). Feedback and points of improvements concerning the project (process) are gathered and the final deliverables are assessed. Completion of project documentation is essential in this phase, as well as archiving this documentation in case of further project developments.

Project Evaluation & Brainstorm Session

This concluding phase is closely linked to the aforementioned project closure phase. However, this step takes into account future opportunities in product development. Employees of SPT (internal stakeholders) and customers & partners (external stakeholders) are invited to participate in a brainstorm session in which new market opportunities are explored and new project- and product innovations are stimulated. The acquired ideas and opportunities will serve as input for the Strategic Planning, resulting in new insights related to strategy development.

Feedback session Prototype 1

In order to gather the feedback of the first prototype in a structured way, different preparations have been made. Development of an interview approach and interview design are a part of this, as well as definition of the research setting and data collection method. This next section presents the aforementioned preparations. Furthermore, a summary of the feedback and improvement points is given.

Research setting and data collection

The research setting within this study is Sigmax Public Transport, a Dutch company operating within the ICT- and software development industry. Data in this feedback session will be collected by the use of a qualitative research method; individual interviews. This method is selected as it allows for in-depth conversations, leaves room for questioning beyond the standard predefined subjects if necessary and benefit from the expertise and creativity of the participants. Furthermore, introvert and less well-spoken interviewees will have the chance to express their self and will not be overruled by more extravert ones. In order to gather a variety of different perspectives towards the design of the first prototype, employees with different backgrounds and roles within SPT are approached. In addition, a Sales Consultant of Sigmax Group is consulted for his expertise in business value determination and proposition management. Individual meetings are scheduled to obtain non-bias opinions towards this first design. Table 14 presents the participants.

Name	Department	Function
Evert Veldhuizen	SPT	Business Unit Manager/Sales Manager
Sjoerd Luttikholt	SPT	Project Manager
Ewald Annink	SPT	Operations Manager
Anne-Gert Bultena	SPT	Technical Manager
Stefan Kuiper	Sigmax Group	Sales Consultant

Table 14 Participants feedback session

Interview approach

In order to come up with valid and reliable conclusions, all interviewees are questioned and approached in a similar way. Before start of the interview, the objectives are explained and the structure and time required for the session is made clear. An interview guide is prepared to assure all relevant topics concerning the planning tool are addressed. Appendix 4 provides an overview of this interview guide. Of key importance within these interviews is the role each interviewee has. In order to gather a variety of different perspectives towards this first prototype, it is essential each interviewee is asked to give feedback and points of improvement from their own perspective, e.g. the perspective of his role within SPT (e.g. Commerce, Projects, Operations, Technical etc.).

Interview design

The interview is divided into two sections. The first part consists of an introduction to the study subject. Not all interviewees are well aware of the exact subject and scope of his study, therefore further explanation is given and initial questions are answered. Hereafter, a short introduction to the prototype itself is given and the coherence between the three levels is addressed. To conclude, a more in-depth explanation of all three planning levels is given. The described processes, activities, requirements and responsibilities are elaborated. In addition, the use of differently colored post-it's is explained.

The second part of the interview covers a more interactive component. Interviewees are asked to give their opinion concerning resp. the strategic-, tactical- and operational level. Furthermore, they are asked about potential missing components and deficiencies in the prototype. Hereafter, interviewees are asked to give feedback based on their own role within SPT, e.g. Sales, Projects, Operations, Technical etc. This in order to gather the desired different perspectives towards the prototype. To conclude, additional remarks can be made and points of improvements are noted.

Data Analysis

After collection of the feedback of Prototype 1, the data will be analyzed. Based on the interview design, the feedback will be categorized into resp. the strategic, tactical and operational level. The mentioned deficiencies and redundancies are listed, as well as new input and suggestions for Prototype 2. Hereafter, the data will be divided into positive feedback and constructive criticism. Furthermore, overall feedback and additional remarks will be questioned. This data will be structured in a similar way as the aforementioned feedback. Results of these open questions will be categorized into resp. the strategic, tactical or operational level, hereafter divided into positive feedback or constructive criticism.

As discussed in the Methodology section, not all collected feedback will be implemented in Prototype 2. There will be distinguished between usable and non-usable feedback. Democratic decision-making and discretion of the researcher and SPT supervisor are leading in whether, or not, to implement the given feedback within Prototype 2.

Feedback & Improvement points

After conducting the interviews, different areas of improvement were identified. To structure the output of the interviews, the three levels of planning are used to categorize the feedback. Hereafter, the feedback is divided into positive feedback and constructive criticism. Furthermore, different quotes of the interviewees are added to support their given feedback and areas of improvement. Hereafter, adjustments for Prototype 2 are formulated. Additional remarks and points of improvement are taken into account as well. Appendix 5 presents the detailed notes and transcripts of this first feedback session. After description of the feedback, Prototype 2 will be developed.

Strategic planning - Positive feedback

Definition Organizational Blueprint

Overall, the interviewees responded positively towards this first level of the planning tool. They acknowledged the need for an organizational blueprint for SPT in order to build a future proof strategy and long-term planning. Definition and formulation of the SPT vision, mission and Business Model Canvas is observed as a necessary precondition for this. One of the interviewees agreed:

'' We do miss and long-term vision and future organizational goals we can pursue. ''

Another interviewee mentioned:

'' Currently, we concentrate on issues of the day. That will not last. ''

The performance of organizational analyses is also assessed with high value. Development of a long-term planning is assed as absolutely necessary in order to set long-term strategic directions.

Performance Internal- and External Analyses

The performance of different organizational analyses in order to define the internal and external business environment, is highly valued by the interviewees. They feel positive towards a complete exploration of SPT. Interviewees admit that currently insufficient attention is paid to exploration of the business environment in which SPT is operating.

Scenario-based Roadmap Workshop(s)

Furthermore, the interviewees are all very positive about the Scenario-based Roadmap workshop(s). The opportunities, e.g. exploration of new products, markets and technologies, that come with performance of the workshop, are well-received. Moreover, it is observed that the interviewees are curious about the workshop(s) and the effects it can have on the SPT business. Some interviewees even started brainstorming on how to implement the workshop(s) within the current SPT business immediately. One of the interviewees mentioned:

'' I think it is really valuable for SPT to start anticipating to the future within the public transport industry. Maybe such workshops can help. We already experience developments in the industry that we didn't see coming. ''

Strategic Planning - Constructive criticism

Input Sigmax Group

Some interviewees mentioned the absence of input of Sigmax Group as overarching organization. One participant stated that definition of the SPT mission, vision and core values, has to derive from the Sigmax Group strategy. This to assure alignment between Sigmax Group as overarching organization and SPT. It is therefore of key importance that the Sigmax Group strategic plan, including the business strategy, mission & vision and core values, is collected prior to formulation of SPT's strategic values.

Adjustments in prototype:
The strategic plan of Sigmax Group is required. This element is therefore included in the Strategic Planning as an input document at development of the Initial Strategic Plan document, e.g. SPT initial strategy, mission, vision and core values etc.

Performance Internal- and External Analyses
The performance of analyses in order to define the business environment, is highly valued by the interviewees. They understand the added value it brings. However, not all interviewees agree with the Marketing department as single operator for performance of the analyses. It is suggested that someone of SPT should be assigned responsible for this activity. This to capture the knowledge and expertise gained in the process of business environment exploration. One of the interviewees stated:

'' We should not outsource this type of organizational analyses, we should acquire this information ourselves. Collaboration between Marketing and SPT is fine though. ''

Adjustments in prototype:
The Product Manager is therefore selected to perform the organizational analyses instead of just the Marketing department of Sigmax Group. In this way, knowledge and expertise is obtained within the SPT department. However, it is recommend to collaborate with the Marketing department of Sigmax Group, as they can divide the amount of work and both have expertise in different fields. This would be beneficial for both departments.

Performance External Analyses – Governmental matters
One of the interviewees noticed the absence of governmental matters within the exploration of the external business environment. Mapping and understanding of for SPT relevant laws and regulations will be extremely valuable. By addressing governmental matters that (can) have an impact on the SPT business, e.g. regulations or policies with regards to software, security, law enforcement, ISO standards, GDPR[3] etc., SPT is able to better prepare for the future in the public transport industry.

Adjustments in prototype:
In order to address these governmental issues, new elements are included within the External Organizational Analyses. In here governmental laws, rules and regulations, policies etc. that can have an impact on the SPT business and/or the public transport industry are addressed. By exploration of these topics, SPT can react ore adapt to these changes on time, which allows them to better prepare for the future.

[3] General Data Protection Regulation

Closing strategy revision
Some interviewees mention that after completion of the different activities within the Strategic planning, e.g. BMC definition, Roadmap workshops, development Long-term planning etc., possible new insights in terms of the SPT strategy can have been developed. One of the interviewees mentioned:

'' Are those mentioned strategy tools and techniques not supporting in the strategy development process? ''

An additional strategy revision step will therefore be included into the planning level to review the previously developed strategy. This will allow for a revision of the initial strategy and adjustments if necessary.

Adjustments in prototype:
To allow for revision of this initial strategy and make adjustments if necessary, there is decided to differentiate between the Initial strategy and Strategy development in the end of this level; an additional step is included in the planning level. After completion of the different strategy developing activities, new insights and information concerning the SPT strategy could have become visible. Differentiation between these two types of strategy therefore allows for revision of the prior developed strategy if necessary.

Tactical planning - Positive feedback

Portfolio Tools

Overall, the interviewees responded positively towards the tactical planning level. They acknowledged the need for tools or a method for assessment of (ongoing) projects and their products. Currently, decisions related to project termination or prioritization are particularly based on prior experiences or gut feeling. A solid systematic process that supports SPT in basing their decisions and conclusions on rationale and metrics, is therefore of high value.

Visual and graphical Portfolio Tools

The visual and graphical review tools are well-evaluated by the interviewees. They prefer tools that support in visualization of the outcomes as those outcomes are more directive than a set of metrics or numbers. Furthermore, by application of these visual tools, the assessment of projects can be done more easily and quick. One of the interviewees pointed out:

'' It would help me if you would use tools that immediately present the outcome, no hard numbers or difficult calculations. ''

Differentiation hard- and soft review criteria

The differentiation between hard and soft review criteria is positively evaluated. By not only assessing projects on the hard (financial) criteria, but as well on soft criteria, as for example partners' commitment, mutuality, trust, a more overall assessment of projects can take place. This positively contributes to the tactical planning tool.

Tactical planning - Constructive criticism

Sophistication Portfolio Management Tools

In contrast to the aforementioned foremost positive feedback, some slightly negative criticism is expressed as well. Some interviewees question the practicability of the review tools presented in the tactical level. They believe some of these tools are too sophisticated, and as SPT is still in its initial phase, there is no need for that type of methods. Therefore, the review tools require simple and pragmatic conditions of use. One of the interviewees pointed out:

'' Make sure that you use tools and techniques that are simple and practical, SPT does not need all those fancy high tech solutions. Do we even need those tools? ''

Furthermore, it is observed that the interviewees emphasize on a right balance between the different portfolio tools, e.g. a right balance between strategic and financial methods.

Adjustments in prototype:

Categorization of review criteria

In the second prototype, there is decided to add review criteria on the basis of partnerships and features. Hereafter, the review criteria are restructured; Project-, Partner- and Feature based are selected to represent these new categories of reviewing (Table 15). This gradation in review criteria allows for reviewing on different characteristics, ensuring a complete and overall assessment of the project.

Project based	**Partner based**	**Feature based**
Strategic buckets	Commitment	Market value
Bubble diagrams	Mutuality	Risk reduction

Scoring models	Outcome	Capability building
Financial methods		
Checklists		

Table 15 Renewed categorization of review criteria

- Project based

This review element offers support in decision-making related to the allocation of resources, financials and risk. Furthermore, it supports in keeping on track of SPT long-term vision and related strategy. Different practical techniques can be applied to rank and prioritize projects, e.g. strategic buckets, bubble diagrams, financial methods etc. By practicing these techniques, ongoing projects can continuously be updated. Based on results of these tools, there is decided for project continuation, prioritization or termination. Allocation of resources is based on aforementioned decisions.

- Partner based

This category adds a soft review element into the review criteria. By enabling SPT to review on criteria as partnership commitment, mutuality and power-dependency, another perspective is offered. Based on the relationship with the partner/customer of a certain project, decisions in terms of project continuation, prioritization or termination can be made. This element will contribute to the overall assessment of projects.

- Feature based

By including this review element into the tactical planning, the business value of projects features can be determined. Different practical techniques can be applied to determine this value, e.g. business value poker, bubble sort, easy and hard financial calculations etc. (ScrumInc, 2014). By practicing these techniques, current customer demands will continuously be updated and prioritized, hereafter translated into feasible project features. Features with highest priority and return are implemented first, ensuring a best fitting software solution. Maximization of project features can hereby be realized (ScrumInc, 2014).

Absence Scrum approach

Some interviewees have their doubts on how this tactical level is compatible with the agile approach. One of the interviewees pointed out:

'' How does this fit within scrum? ''

Within the SPT business, a shift towards the agile approach is taking place and the scrum methodology is applied within different projects. An absence of coherence between the tactical planning an operational planning is observed. By implementing scrum in this level, coherence between these two levels will be enhanced.

Adjustments in prototype:

To include some scrum influences in the Tactical Planning and assure interrelation between the Tactical- and Operational Planning, an additional review element is added to the review criteria. By adding the possibility to asses projects based on product features, assessment on a deeper (feature) lever is enabled. Scrum Planning Poker is added to the portfolio management tools, allowing for the review of projects and product (features) based on the scrum methodology.

Operational planning - Positive feedback

Five key elements Operational Planning

All interviewees responded positively towards the five Key Elements as a basis and starting-point of the operational planning, e.g. Scope & Requirements, Planning, Quality, Costs and Monitoring & Directing. They acknowledged that those are the main areas that require attention in the project management processes.

Operational planning - Constructive criticism

Application traditional Project Management Methods

Compared to the previous planning levels, the operational level received most criticism. Nearly all interviewees believed that this planning was overly focused on the product development lifecycle. Used key terms as for example product development, prototyping etc., supported in that. One of the interviewees mentioned:

'' In your prototype, you mentioned a lot of terms originated of the product development domain, such as product design and prototype development. In here, we do not work with products, we deliver software as result of a project request. Product might be not the appropriate terminology, as well as approach in the Operational Planning. ''

Furthermore, some interviewees expressed their criticism towards the application of primarily traditional project management methods, as for example PMBOK, PRINCE2 and the Waterfall method. Within the current SPT business, a shift towards agile methods is taking place and scrum is applied in the majority of their projects. However, the scrum approach is missing in the design of the operational planning. The project management methods selected are evaluated as traditional and somewhat outdated, not appropriate for management of projects in the software and ICT industry. One of the interviewees mentioned:

'' Within SPT, we work with software. We apply, well we try to apply the Scrum approach in all our projects. I don't understand how your applied traditional project management approach combines with the Scrum methodology. ''

Adjustments in prototype:

In this second prototype, principles of both the traditional project management methods and the scrum approach are combined. The scrum approach emphasizes flexibility, speed and interim moments of revision (Schwaber & Sutherland, 2017). In contrast, the traditional project management methods e.g. Waterfall, PMBOK etc., underline predictability, stability, planning and in-time delivery. By combining principles of both aforementioned methods, benefits of both methods are obtained. This hybrid approach emphasizes on the predictability and flexibility. Predictability derives from the traditional methods and concerns the areas of Project Initiation, Planning, Monitoring and Closure. Flexibility derives from the scrum approach and concerns in particular the phase of Project Execution. As a result of this flexibility, customer requirements and preferences can be updated continuously, resulting into a best fitting software solution with a high level of customer satisfaction.

Absence Involvement and alignment stakeholders

In order to move in the same direction (SPT and stakeholder), alignment and continuously involvement of stakeholders is of key importance, as highly emphasized by one of the interviewees.

Project processes have to be aligned and usage of a common format or documentation method is desired. Furthermore, stakeholders continuously have to be involved within project processes, from project initiation till project closure. Planning, deadlines and deliverables have to be aligned between the customer and SPT.

Adjustments in prototype:
In order to continuously involve internal as well as external stakeholders in project processes, different meetings are planned to ensure on-time engagement of both parties. Examples of these are Brainstorm Meetings, Project Meetings, Project Evaluation Meetings etc. Application of similar formats and similar documenting of information is hereby required. Templates are developed to support in this. Furthermore, activities as for example the SBRM workshop and brainstorm meeting encourage SPT employees to engage in complex organizational problems, involving them in the SPT business.

Absence phase prior to Project Initiation
One of the interviewees mentioned the absence of a phase before Project Initiation. This phase should cover activities related to market exploration and activities involved in the process before project initiation. The interviewee pointed out:

'' Based on our current approach in project management, this prototype lacks a sort of introduction phase, a phase prior to actual start of a project. Usually, a project starts with a tender and sometimes a market consultation. I miss that in this planning. ''

In this first prototype, the operational planning starts slightly out of the blue with Project Initiation & Definition Requirements. This first step is evaluated as rather broad and short-sighted, not in line with the standard procedures. An additional stage prior to the Project initiation activity, covering activities related to the Market Consultation and/or Tendering procedure(s), is suggested.

Adjustments in prototype:
In the second prototype, there is decided to include a phase prior to the Project Initiation activity. This phase covers activities involved in the market consultation, tendering procedure and/or direct client request. Furthermore, a decision element is added. A Go/No-Go step is included before actual start of a project. Below a schematic overview of the adjustments:

Overall additional remarks and wishes

Besides the observations and feedback points as described in the aforementioned section, some overall remarks and wishes are formulated. These wishes will be applied in Prototype 2.

Definition roles and functions SPT

In order to implement the planning tool within the SPT business, a change in the current organizational structure and culture has to take place. One of the interviewees therefor explicitly mentions definition of (new) roles and functions within SPT. This, in order to assign the right (new) people to the right (new) functions. Besides new functions, new activities and tasks are a part of this organizational change. These activities and tasks can be assigned to these predefined (new) roles. Indication of organizational roles and activities is therefore desired.

Adjustments in prototype:

Within the first prototype, the yellow post-it's *(Who? function)* broadly defined a department or management area suitable for execution of a certain activity. In Prototype 2, more specified roles and functions are defined. A set of six team roles is compiled, addressing all relevant areas within the SPT business. Table 16 presents an overview of these roles.

Team roles
Sales manager
Project manager
Operations manager
Product manager
Product owner (Technical manager)
Portfolio manager
Management team
Project team

Table 16 Team roles

Possibilities Portfolio Management methods

As already mentioned before, the interviewees responded positive towards the application of portfolio management tools in the Tactical Planning. They acknowledged the need for methods for assessment of projects. Furthermore, some interviewees expressed their curiosity towards the portfolio tools. They are interested in the possibilities and opportunities these tools can bring and are curios how to apply them in the current SPT business. In the second prototype, the selected portfolio management methods and tools are therefore more detailed and specified. In the implementation plan, a detailed description of the portfolio management methods and the application within SPT is provided.

Documentation

All interviewees agree that documenting should not be a bother, but rather a supporting type of activity. Excessively documenting does not work for the employees of SPT and is far from practical. It is therefore desired to find a consensus between the amount of documentation and the practicality of it. One of the interviewees mentioned:

'' We do not need excessive documentation of our projects and business processes. '' followed by

'' It is not practical and does not work. However, we could use some initial steps in documenting, as currently we do no such thing. ''

Furthermore, the interviewees prefer clear and transparent definition and formulation of the requirements presented in the planning tool (Pink Post-It's), e.g. resources, documents, checklists etc. By appropriate formulation of these requirements, implementation of the requirements can start immediately.

Adjustments in prototype:
Within the first prototype, the pink post-it's *(What? requirements)* broadly defined the input, documents or criteria required for performance of a certain activity. In Prototype 2, these requirements are categorized in templates and documents and more detail is applied.

Development General Management System
All interviewees acknowledged the need for an systematic and step-by-step approach supporting the SPT business in their daily activities. Structure is desired, as well as guidance in the process of management tasks related to product development projects. A General Management System is therefore desired. By development of the Planning Tool, first steps towards such a system are taken. In the second prototype, a more organized and structured process is presented, in order to respond to the wishes of the interviewees. A User Manual for implementation of the planning tool will be developed in later stage to support in this.

Prototype 2

Based on the results of the feedback sessions of Prototype 1, a second prototype of the planning tool is developed. In the forthcoming section, an elaboration of these renewed prototype variables is presented, including a job description of the team roles. Furthermore, a description of resp. the strategic-, tactical-, and operational level is presented as well as the paper prototype. To conclude, results of the second feedback sessions are presented, as well as adjustments for the Final Design of the Planning Tool. Below an overview of the subjects that will be addressed in this chapter.

- Variables Prototype 2
    - Job description team roles
- Physical paper Prototype 2
- Description levels Prototype 2
- Feedback session
- Adjustments for Final Design

What are the different variables presented in Prototype 2?

Prototype 2 consist of 2 prototypes, prototype 2A and 2B. Both models depicts the same. However, 2A prioritizes more in displaying the roles and required documents, whereas 2B focusses on displaying an organized and process-based model. Nevertheless, the content of both 2A and 2B is similar. In the next section, elements of both prototypes are displayed, as well as the entire paper prototypes.

Activities - blue framed blocks (Figure 13)
The activities refer to the tasks and actions required for successful completion of a planning level. All three planning levels consist of different sequential activities in which documents are mentioned and team roles are assigned. Compared to the first prototype, the activities are ranked in a more logic order and some additional information is provided.

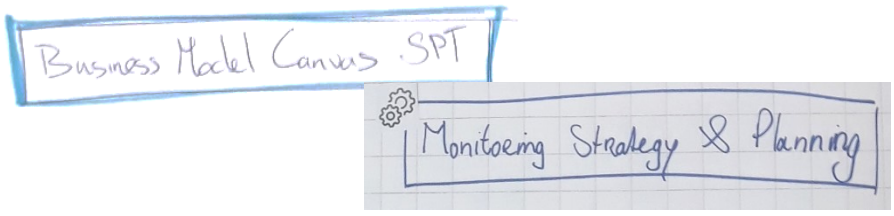


Figure 13 Blue framed blocks

Documents - pink framed document figures (Figure 14)
Documents refer to the physical documents and templates needed for proper execution of the activities. Compared to the first prototype, more detailed documents are presented. In addition, the documents are attached to matching activities.

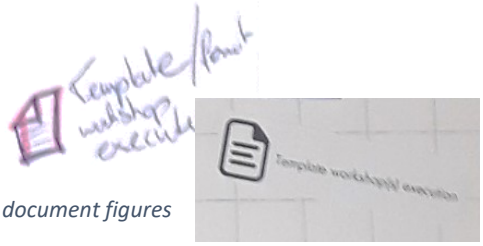


Figure 14 Pink framed document figures

Team roles - yellow underlined functions (Figure 15)
In order to execute the aforementioned activities, different team roles are selected. Besides some already existing roles within SPT, additional ones are introduced. Selection of these roles is based upon the type and content of the activities/documents and in collaboration with the business unit manager. Table 17 and the next section provide a detailed description of the selected team roles.

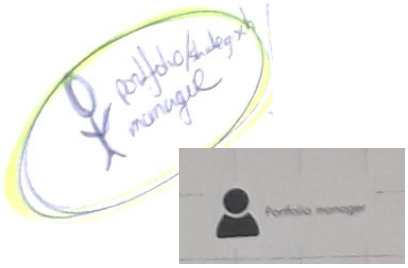


Figure 15 Yellow underlined functions

Team roles
Business Unit manager/Sales manager
Project manager
Operations manager
Product manager
Portfolio manager
Product owner (or technical manager)
Management team
Consists of all managers as mentioned above.
Project team
Consists of those SPT employees involved within a particular project

Table 17 Team roles

Job description team roles

Team roles
Project manager
The project manager is responsible for management of all projects involved within the SPT business. He facilitates and supports the project team in successful completion of projects. The project manager is responsible for project preparations, establishment, guidance and closure. Monitoring of budget, planning and progress are as well part of his job responsibilities. Moreover, the project manager contacts with customers and reports progress.

Operations manager
The manager operations is responsible for all activities related to personnel of SPT. He is involved in the appropriate allocation of work-related tasks among employees and divides client and project requests among available employees. Personnel planning and division of labour are part of his job responsibilities. The manager of operations fulfills a more facilitating role towards project management, but is however not involved in the technical part.

Sales manager
A sales manager is responsible for the sale of SPT software products and related issues. He is business oriented and commercially positioned. A sales manager is point of contact for clients of SPT

and is responsible for maintenance of all client- and business relationships. He is present in business meetings and prepares sales pitches. Moreover, he collaborates with the Product manager in search of new market- and sales opportunities.

Portfolio manager
A portfolio manager is responsible for management of the portfolio, in other words: strategic management. The portfolio manager is involved in all activities related to the achievement of long-term organizational goals, objectives and strategies. Strategy development, implementation and monitoring of the business strategy are part of his job responsibilities. Furthermore, a portfolio manager monitors the interrelation between different projects in the business portfolio and aligns organizational goals.

Product manager
A product manager is responsible for the entire life-cycle of a product. He is involved in product development, marketing, logistics and implementation. Furthermore, he translates and prioritize customer requirements and preferences into feasible product requirements in order to direct the SPT software team. In contrast to a product owner, a product manager is more business oriented. He is point of contact for clients of SPT and collaborates with the Marketing & Communication department of SPT for marketing and product related strategies.

Product owner (or technical manager)
The product owner is responsible for the technical development and implementation of software products. He and his project team operate by the agile way of working and the scrum methodology is embedded within their approach of projects. Furthermore, the product owner sets directions for the team, guides them if necessary and monitors the project.

Other roles
Management team
The management team includes all managers as described above. This team manages and directs the entire SPT department, each manager responsible for his own field of expertise. As a team collectively, they set directions for SPT and pursue predefined long-term organizational goals and objectives.

Project team
The project team includes SPT employees involved within a particular project. Employees with different backgrounds and expertise are involved, e.g. software architects, software developers and software testers. Management expertise is part of the team as it supports in managing and directing the project.

Prototype 2

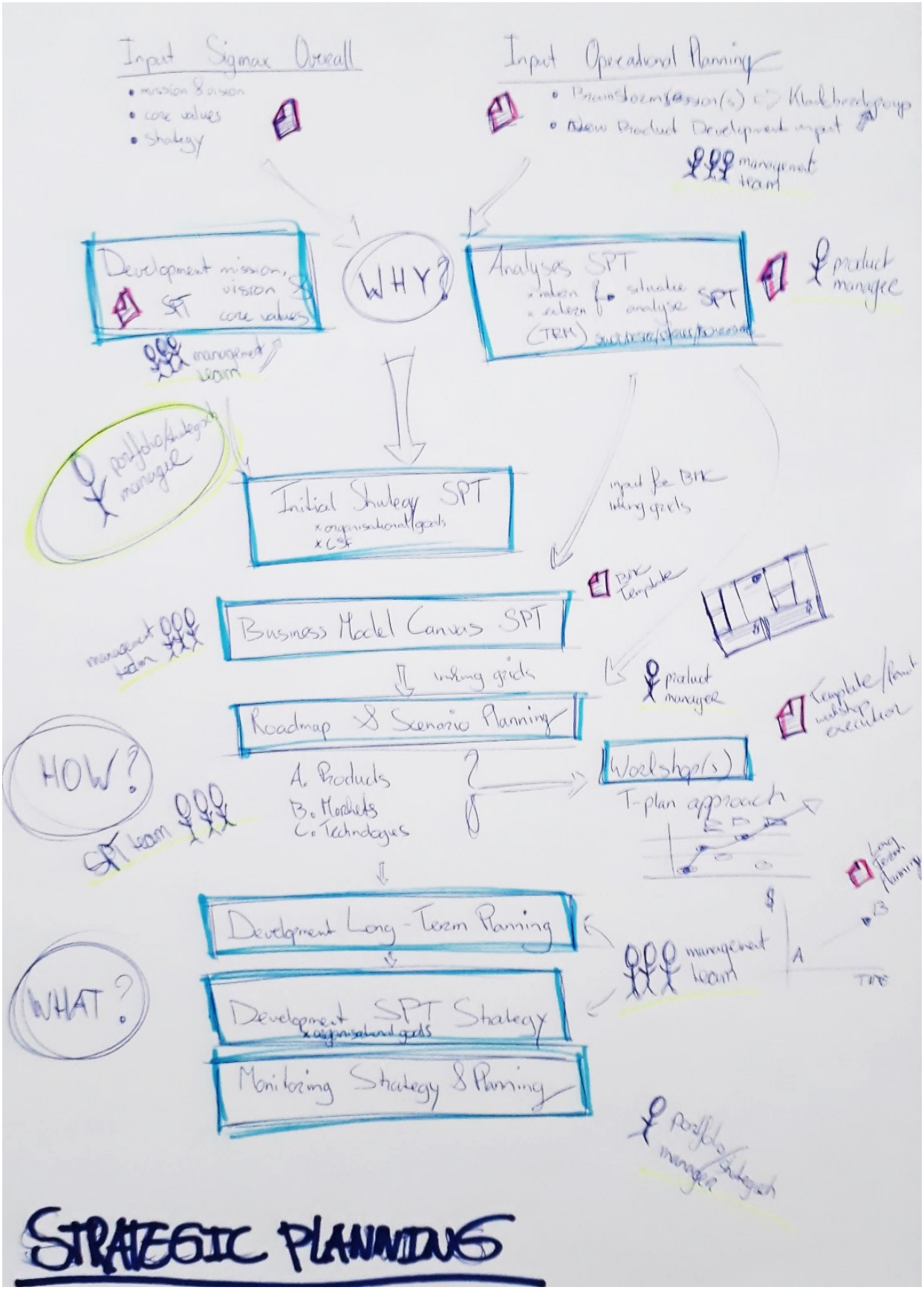


Figure 16 Strategic Planning Prototype 2A

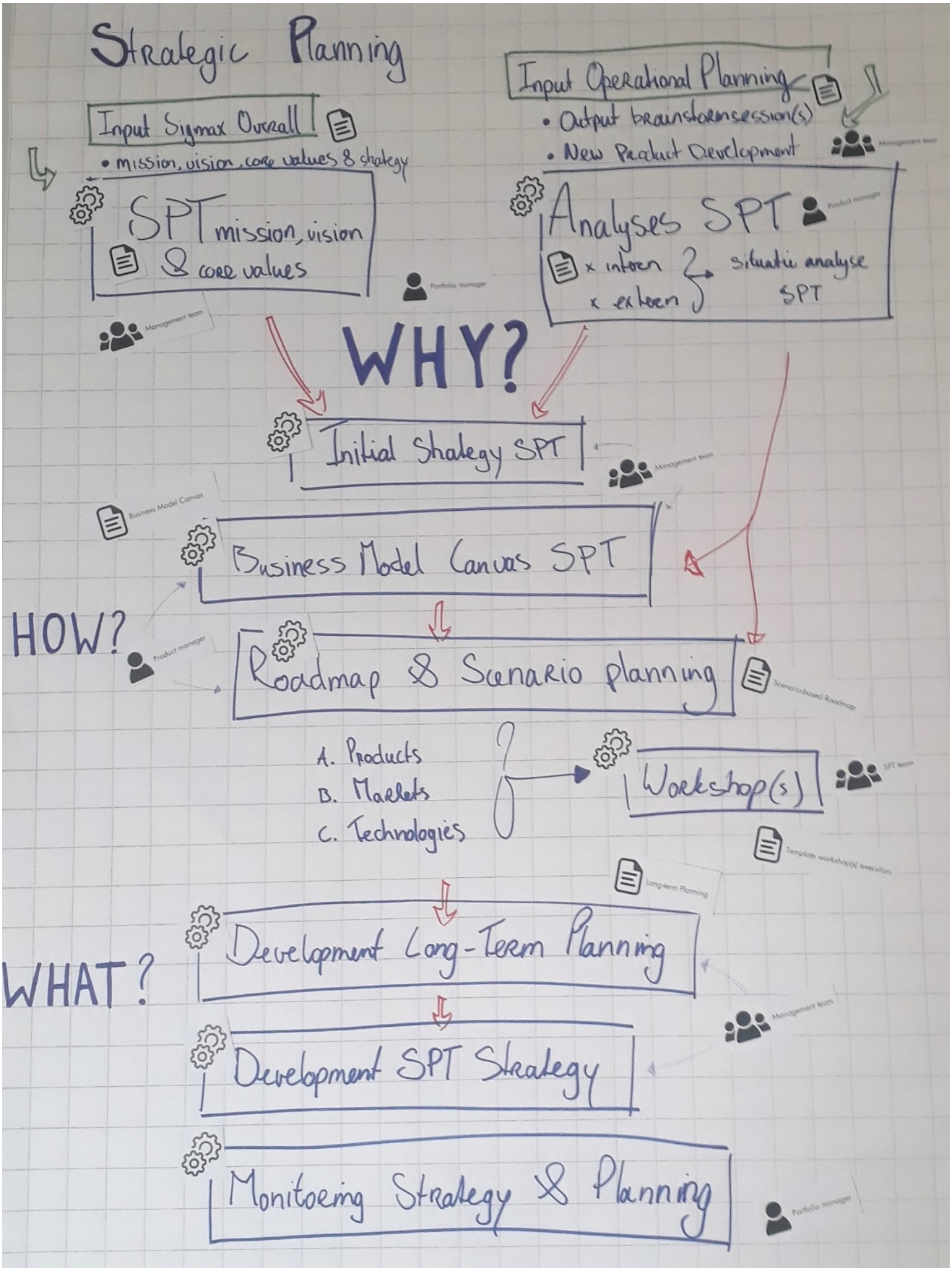


Figure 17 Strategic Planning Prototype 2B

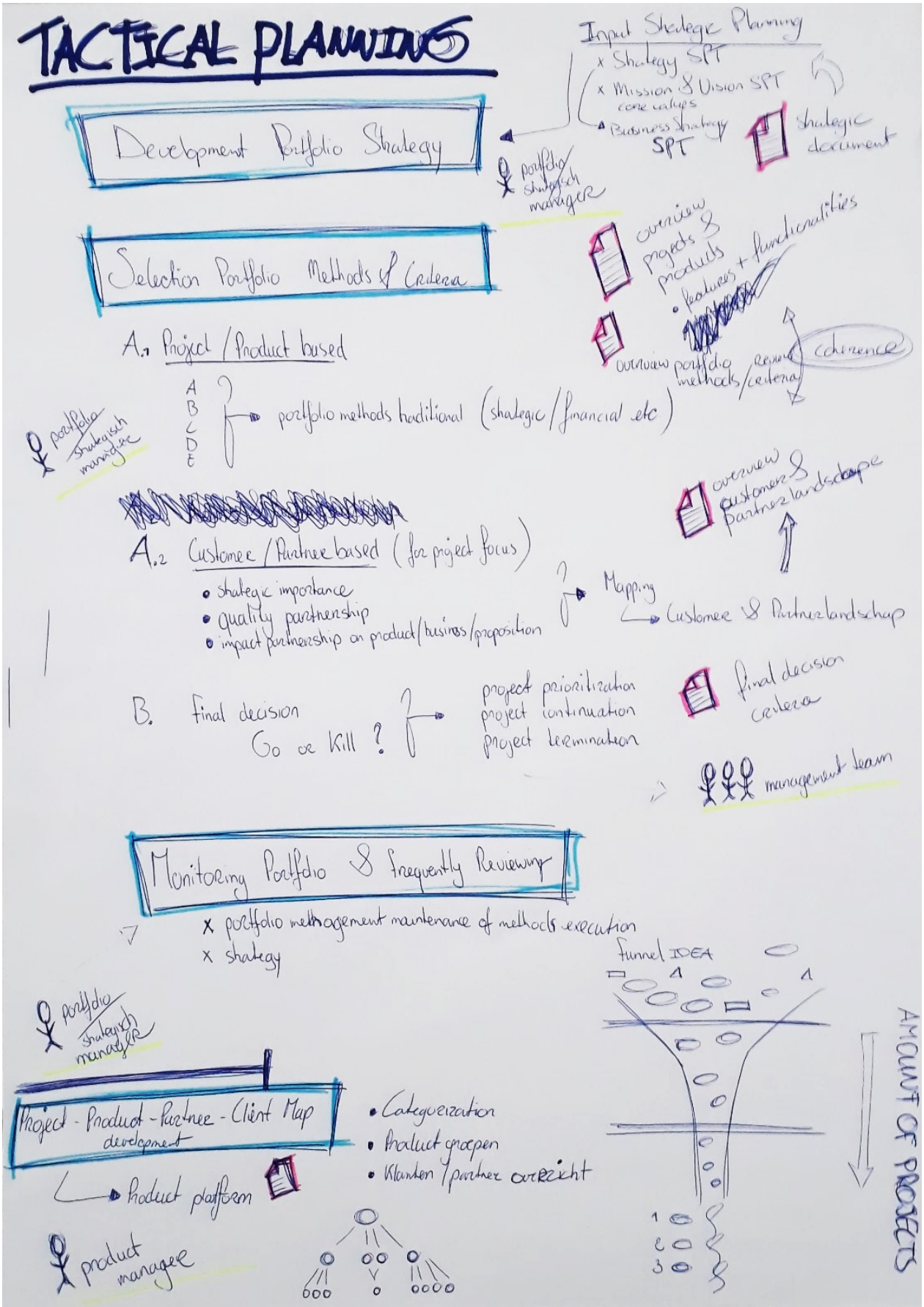


Figure 18 Tactical Planning Prototype 2A

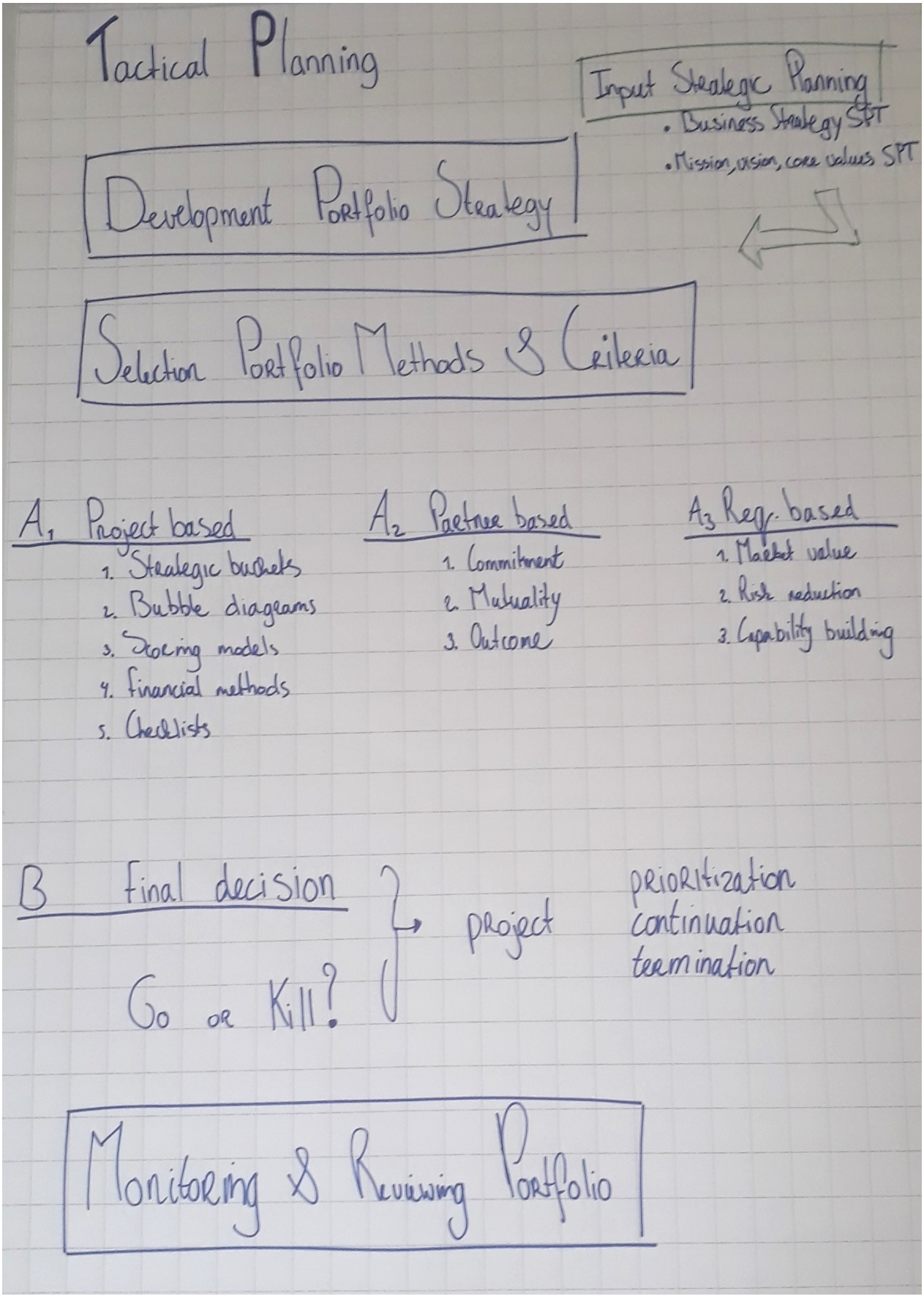
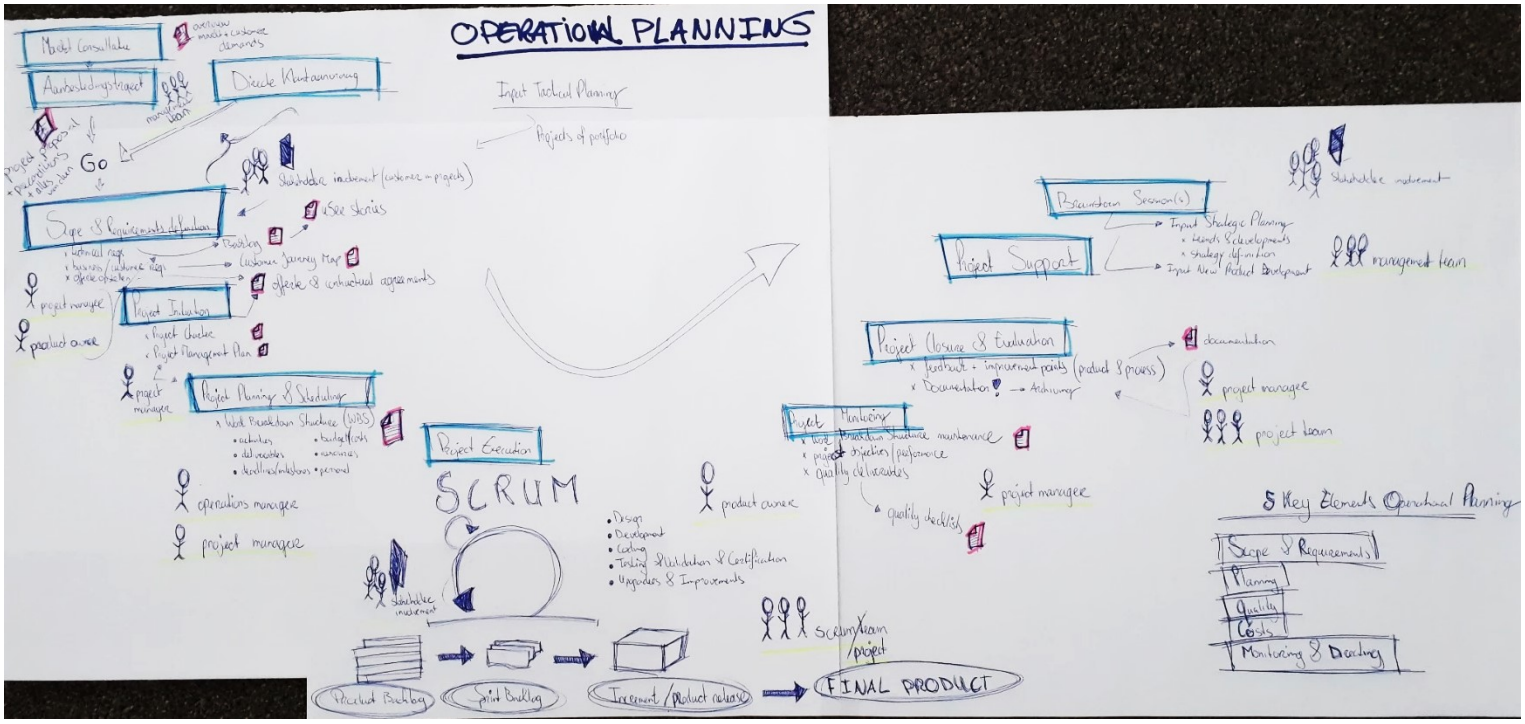


Figure 19 Tactical Planning Prototype 2B



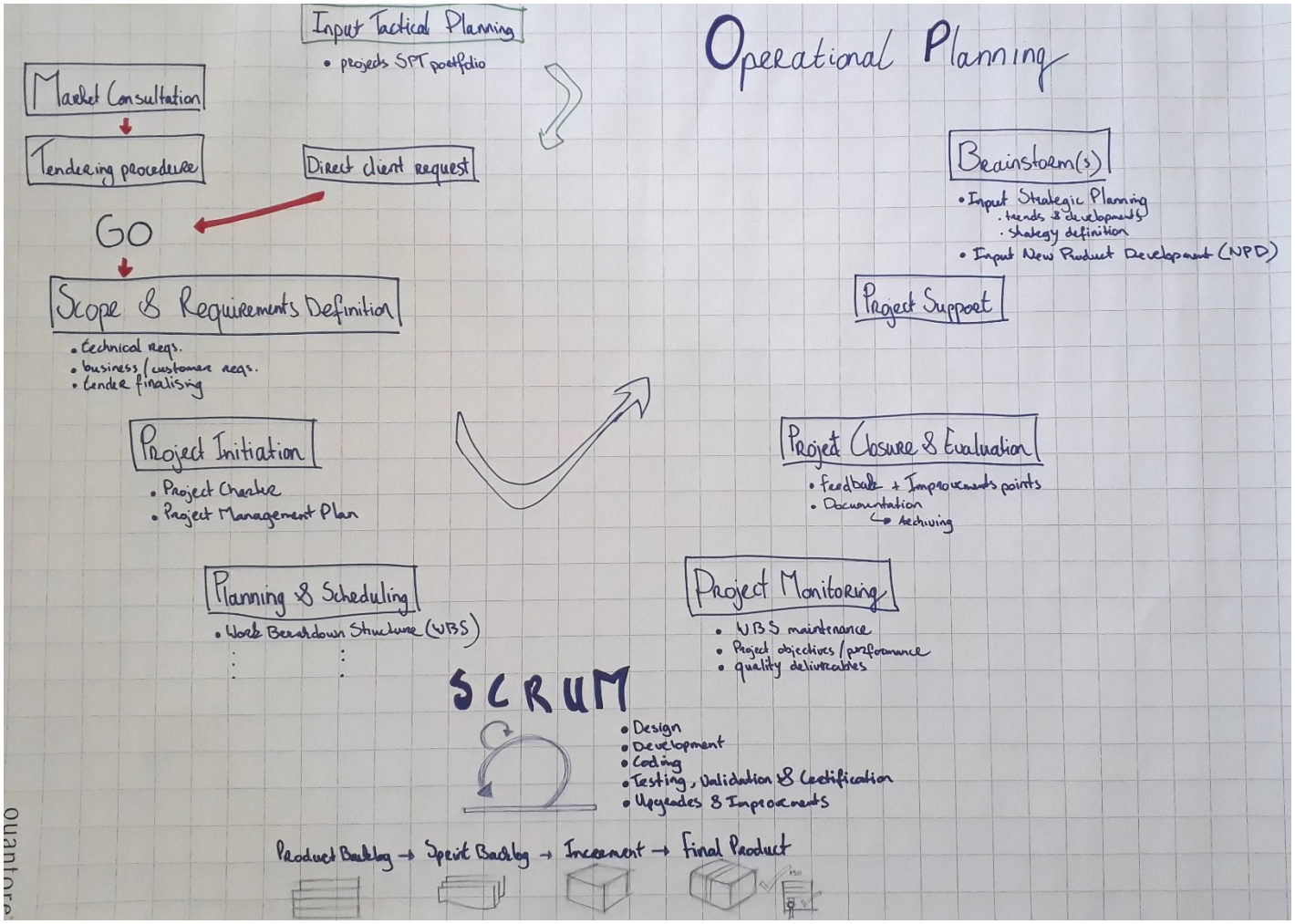


Figure 20 Operational Planning Prototype 2A and 2B

Description levels Prototype 2

In the forthcoming section, an explanation of the 3 different planning levels of Prototype 2 is provided. In addition, this prototype is compared to Prototype 1 and similarities and differences are appointed.

Strategic Level
In terms of content, the strategic level is quite similar to the strategic level of Prototype 1. Firstly, different tools and analyses are described to define the SPT business and the environment in which they are operating. An initial business strategy can be defined hereafter. The road mapping- and scenario planning workshops are applied in order to explore future possibilities in terms of markets, products and technologies. Involvement of differently skilled SPT employees is highly valuable in this process, as both technical- and strategic oriented input is desired. A synthesis of the aforementioned elements results in a long-term planning for SPT. In here long-term organizational goals are defined and the SPT strategy is visualized. The monitoring activity concludes this strategic level.

Tactical Level
In Prototype 1, the tactical level is broadly categorized into 3 components, e.g. Portfolio strategy development, Selection of portfolio methods & criteria and Portfolio monitoring. These components correspond with the ones in this second prototype. However, the second element, Selection of portfolio methods & criteria element is quite different. Based on the feedback of Prototype 1, additional review criteria are included in the design. Besides solely reviewing entire projects by means of portfolio management tools, evaluation on the basis of partnerships and features is included. This new categorization in review criteria allows for reviewing on different characteristics, e.g. on Projects, Partnerships and Features. By means of this new gradation in review criteria, a complete and overall assessment of the projects is established.

Operational level
In Prototype 1, the operational planning primarily focused on traditional and outdated project management methods, phasing and elements. Moreover, this level overly focused on product development instead of the modern nowadays agile methods. Within SPT, a shift towards agile methods is taking place and the scrum method is applied in the majority of SPT projects. Based on the feedback of Prototype 1, a different approach in project management is developed. The SPT software projects require a suitable approach in management, e.g. stability and structure offered by the aforementioned traditional methods and speed and flexibility as offered by the agile approach. The second prototype therefore combines principles of both the traditional methods and scrum approach. Hereby, advantages of both approaches are gained. Application of this hybrid approach empathizes on the predictability and stability derived from the traditional methods and the flexibility of the scrum method.

Besides the above mentioned, a stage prior to the Project Initiation phase is included in the design of the operational planning. This stage includes activities prior to start of a project, e.g. activities related to market exploration and procedures related to tendering and client requests. By including this in the design of the planning tool, more alignment with the actual proceedings in the SPT business is created.

Overall remarks

Compared to Prototype 1, this prototype includes more details and logical sequential steps. The described activities are explained in more detail and associated documents are assigned to matching activities. In addition, team roles are formulated n this prototype and assigned to corresponding activities. To conclude, the input documents considered as precondition for each level, are clearly defined at start of resp. the strategic-, tactical-, and operational level.

Feedback session Prototype 2

Different inputs and opinions in the design process of the planning tool are desired. Therefore, people outside the SPT department are approached as well. A Process Manager of Sigmax Group is consulted for her expertise in process management and process modelling techniques. Before start of the feedback session, a short introduction of the prototype is given and the coherence between the three levels is addressed. Hereafter, she is provided with a more in-depth explanation of all three planning levels. The described processes, activities, requirements and responsibilities are explained. The interview format, guide and interviews transcripts can be found in resp. Appendix 6 and 7. Below an overview of the feedback, adjustments for the Final Design are described as well. The Final Design will be presented in the next section.

Feedback Prototype 2

Strategy to action
In line with the prior feedback, the process manager missed guidelines in term of practicability for the actual implementation of strategy. She suggested the Hoshin Kanri matrix for guidance in this implementation process. By means of this tool, predefined strategic goals and objectives are translated into feasible project targets. Hereby contributing to the actual implementation of formulated SPT business strategies.

Adjustments in prototype:
The Hoshin Kanri matrix is selected to support SPT in actual implementation of the defined strategic goals and objectives. The tool is implemented within the Strategic Planning. The tool supports in the definition of organizational goals and strategies (long-middle-short term), tasks and action plans and on how to operate on them. Concrete actions and tasks are determined by application of this method and employees are assigned responsible. By application of this tool, a link between the Strategic- and Operational Planning will be established, supporting actual implementation of the defined strategic goals and objectives.

Project Assessment Criteria Checklist
The process manager responded positively towards the application of the differently themed portfolio management tools. However, she missed guidelines for practical and actual implementation within SPT. She therefore suggested a questionnaire or checklist as evaluation tool for projects, in order to ease and quicken project assessment.

Adjustments in prototype:
A Project Assessment Criteria Checklist is developed and is implemented within the Tactical Planning. In the checklist, a set of different questions is composed, questions that require the answer Yes of No. The questions are put in a weighted fashion, e.g. some questions outweigh others. Based on the results of the questionnaire, project continuation, prioritization or termination can be decided. These review questions are based on Project, Partner and Feature level. This gradation in review criteria allows for reviewing on different characteristics, ensuring a complete and overall assessment of the project. The Project Assessment Criteria Checklist can be found in Appendix 8.

Coherence planning levels
Within the chapter Design Requirements of the Planning Tool, a pre-established relation between the planning levels is defined. Due to the different discussions we had throughout the feedback session, I raised some new insights in terms of this coherence. This new flow of information between levels is illustrated in the figure entitled with *Interrelation Planning Levels*. Furthermore, differently themed meetings are part of this new approach. The figure entitled with *Overview Annual Meeting* illustrates the meetings. On the next page both figures are displayed. Below an description of these new organizational meetings.

Adjustments in prototype:
Portfolio Meeting
Description: In quarterly scheduled portfolio meetings, ongoing projects will be assessed based on their progress and process. The Project Assessment Criteria Checklist will be use to assess projects on project-, partner- and feature level. Entire management team has to be involved in completion of this assessment. A detailed explanation of the checklist is provided below.
Furthermore, the results of the application of portfolio tools will serve as input for this meeting. Projects that require attention will be presented, as well as projects in line for potential prioritization. These results are of key importance in decisions concerning project prioritization, continuation or termination. Essential within these meetings is a centralized focus on prioritization of projects and resource allocation.

What? Portfolio meeting
Who? Management team
When? Quarterly

Tactical Meeting
Description: In the Tactical Planning, projects are reviewed and assessed upon a set of portfolio metrics. Each project in the SPT portfolio will be evaluated quarterly. Hereafter, results and outcomes, in terms of project continuation, prioritization or termination, are gathered. In annually scheduled tactical meetings, these results are discussed. The feedback and results of these meetings will give the opportunity to review and redirect the SPT strategy and update if necessary.

What? Tactical meeting
Who? Management team
When? Annually

Overall Project Evaluation Meeting
Description: In order to evaluate on each project after completion and allow for a moment of feedback and improvement, the project evaluation meeting is one of the concluding steps in the Operational Planning. In here, the project is evaluated in terms of process, quality, costs, planning, deliverables etc. Results of these meetings are gathered. In biannual overall project evaluation meetings, the results, best practices and lessons learned are evaluated and taken into account in the Tactical Planning. By biannually discussing and assessing all project evaluations, decisions in terms of project prioritization and termination can be kept up-to-date.

What? Overall project evaluation meeting
Who? Management team

When? Biannually

Brainstorm Meeting
Description: In order to foster new opportunities and innovation in project- and product developments, differently themed brainstorm session(s) will be initialized. Participation of internal stakeholders (employees SPT) is desired in these meetings, both technically and strategically skilled. Besides internal stakeholders, external stakeholders as for instance partners, customers and financers, are welcomed as well. This brainstorm session will be scheduled biannually. A *Brainstorm* project team is assembled and held responsible for the theme definition, e.g. exploration new markets, trends & developments, new technologies etc. Furthermore, they are responsible for guidance of the session(s), development of a plan of action based on the outcomes and implementation this plan. The acquired ideas and opportunities will serve as input for the Strategic Planning, resulting in new insights and opportunities related to New Product Development (NPD).

What? Brainstorm meeting
Who? Internal- and external stakeholders
When? Biannually

Figure 21 Interrelation Planning levels

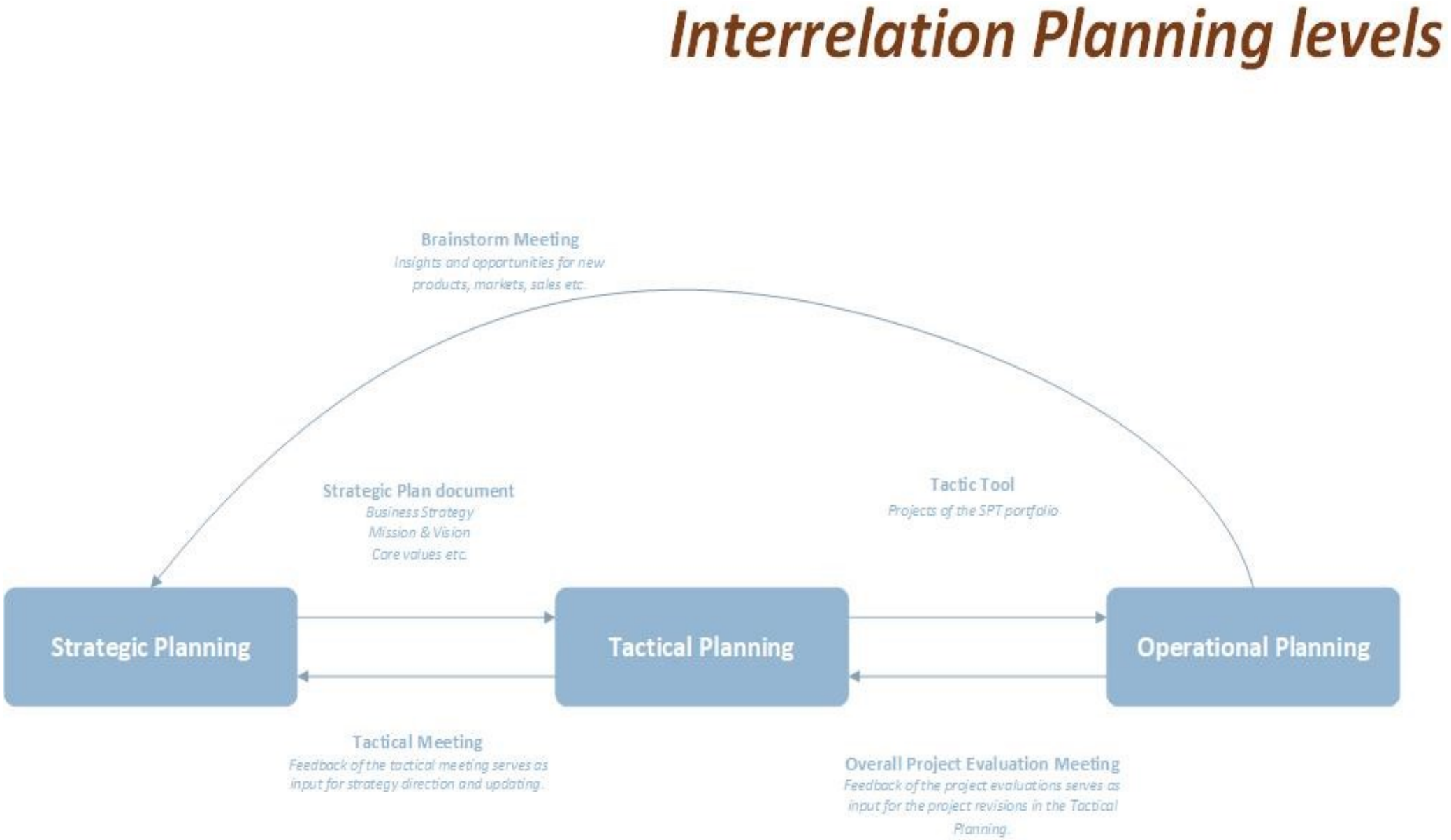
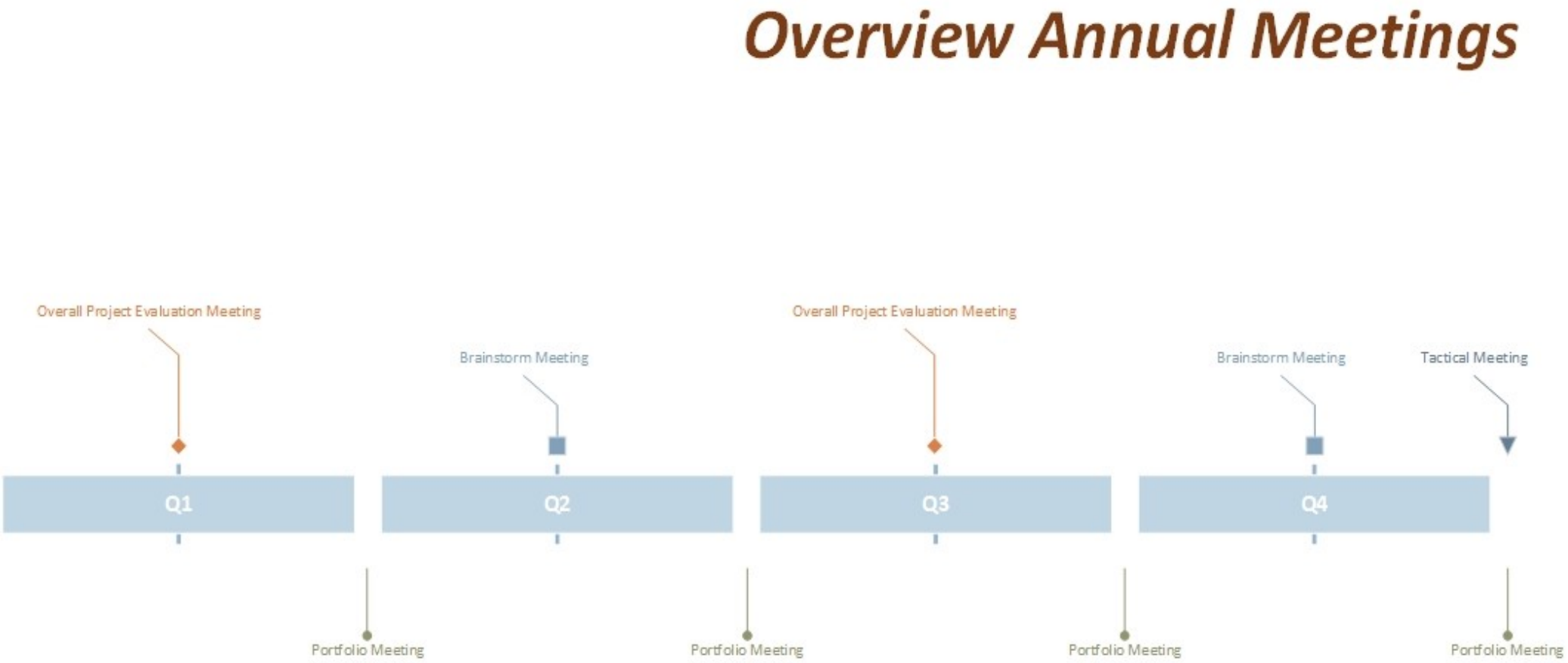


Figure 22 Overview Annual Meetings



Final Design Planning Tool

Based on the results of the feedback sessions of prototype 1 and 2, a Final Design is developed. This final design is a digital draft of the planning tool and associated 3 planning levels. The variables and their content are similar to those presented in the second prototype. However, some additional ones are included in the digital design.

The Final Design is a digital process model developed by means of the Business Process Model and Notation (BPMN) technique. Activities, documents, meetings, decisions and those responsible, are addressed in this final design. In the forthcoming section, an elaboration of these different variables is presented, as well as the choice for application of BPMN. Furthermore, a User Manual and a supporting Document Templates is developed to guide implementation of the Planning Tool. To conclude, results of the last feedback sessions are mentioned in this section. Below an overview of the subjects that will be addressed in this chapter.

- Design Planning Tool and BPMN
- Variables Planning Tool
- Digital Process Model of Planning Tool
- Description levels Planning Tool
- User Manual Planning Tool & Templates
- Feedback session

Design Planning Tool and Business Process Model Notation

In order to design a transparent and easy-to-use planning tool, different process modeling techniques and tools can be applied. Broadly defined, all modeling techniques have a common purpose; the visualization of a business process or flow of work. By mapping the processes and interrelations between activities, events, information streams, decisions and requirements, the business workflow can be displayed. These visualization techniques divide the work in manageable components, allowing for improvement in processes of business operations and in- and external communication. The ultimate goal of visualizing business processes is to improve organizational processes in terms of efficiency, effectivity and quality.

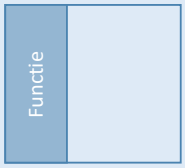
Different process mapping techniques are presented within the literature. Some well-known visualization techniques are mentioned below.

- Flowchart technique
- Gannt chart
- Business Process Modeling Notation (BPMN)
- Unified Modeling Language diagram (ULM)
- Data flow diagram

All of the aforementioned modeling techniques have their strengths and weaknesses and each is best applicable in certain situations. The solution design requires a simple and easy to understand mapping of processes, no sophisticated visualization is required. A simple elements and a commonly known process language is desired. Therefore, the Business Process Model Notation technique is selected as process modeling language. The software programme Visio will be used to digitalize the Planning Tool.

What are the different variables presented in the Final Design?

The final design of the planning tool consists of different variables as applied within the BPMN technique. Table 18 presents an overview of these graphical elements, as well as a detailed explanation of the variables.

Planning Tool Variables		**Description**
Activity		This variable refers to the tasks and actions required for successful performance of resp. the strategic-, tactical-, and operational planning.
Document		This variable refers to the physical documents and templates required for execution of a certain activity. A distinction between input- and output documents is made, indicated by the direction of the arrow connected.
Team role		This variable refers to the SPT employee (often manager) responsible for performance of a certain activity and related documents. In the swim lane, only those activities, meetings, decision etc. applicable for the responsible manager, are displayed.
Decision		This variable refers to decisions moments, as for example yes/no for project initiation of go/no go for project execution.
Meeting		This variable refers to meetings and sessions in which multiple stakeholders are invited, both internal as well as externals stakeholders. The required attendance of stakeholders (e.g. SPT employees, customers, partners etc.) depends on the type and nature of the meeting. *Both the Decision and Meeting variables are similar, in the digital process model distinction between both variables is clearly defined.*
Involvement External stakeholders		This variable refers to the required involvement of external stakeholders (e.g. customer, partner etc.). By continuously involvement of concerned stakeholders in the project process, planning, documentation, execution etc., both parties are on the same page and expectations are clear.

Comment		This element is used to further clarify a variable and include some additional information if necessary.
Start event		This element refers to the start of resp. the strategic-, tactical- and operational level. This figure is the trigger of the subsequent activities and decisions in all levels.
Closing event		This element refers to the closure of resp. the strategic-, tactical- and operational level. Hereby, a level is finalized.

Table 18 Planning Tool Variables

Digital Process Model of Final Design

The 3 levels of the digital planning tool are presented in the next section.

Figure 23 Strategic Planning Final Design

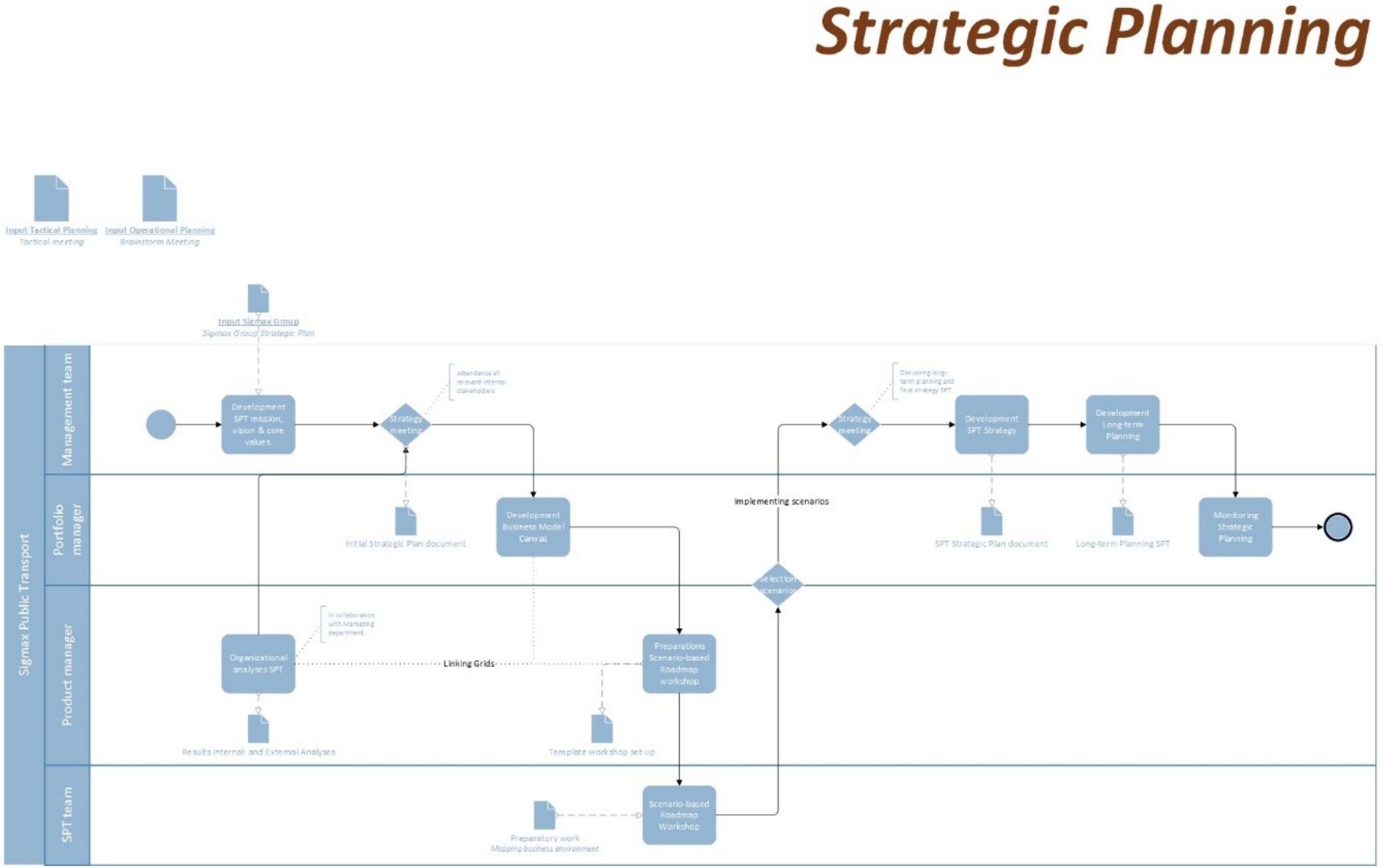


Figure 24 Tactical Planning Final Design

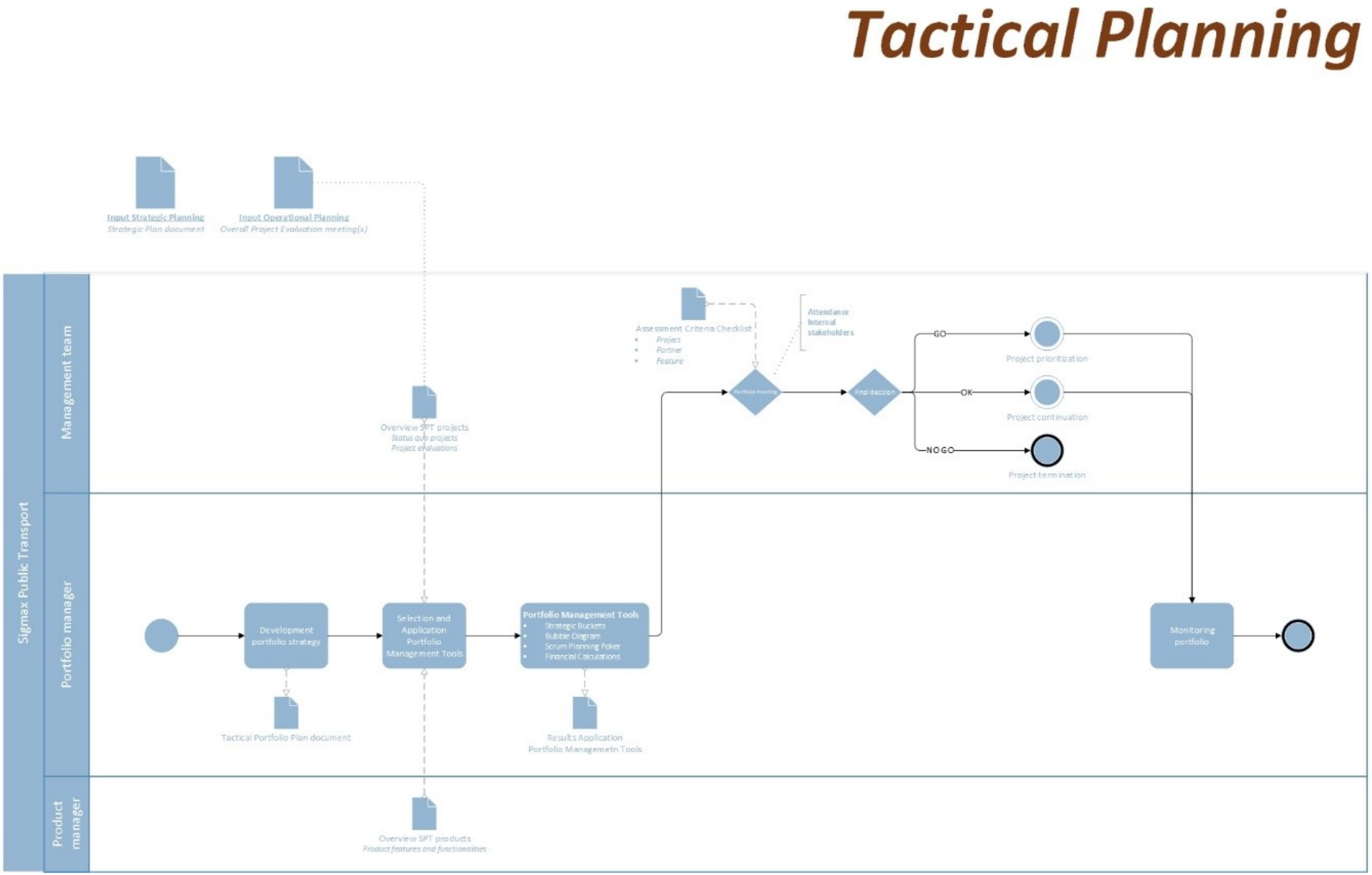
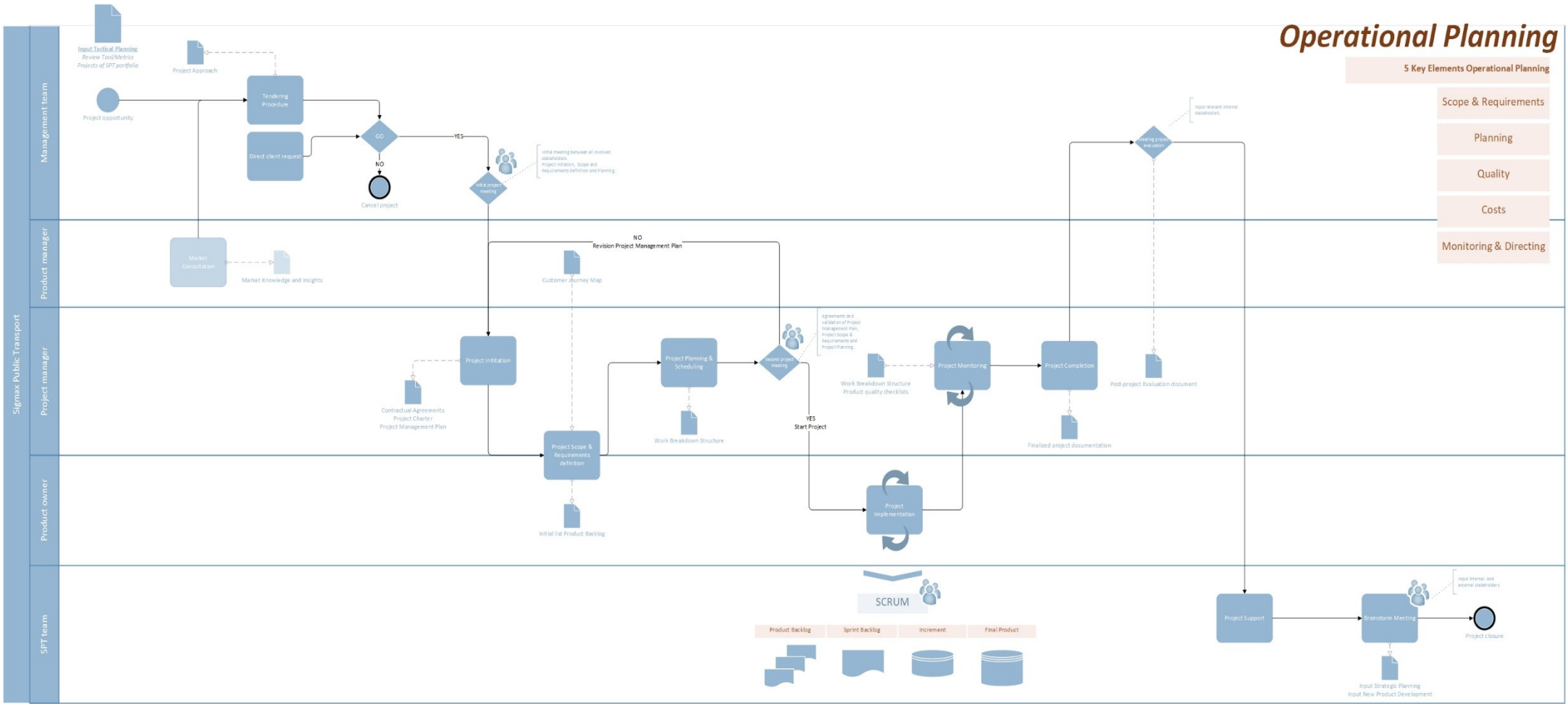


Figure 25 Operational Planning Final Design



Description levels and variables Final Design

As already mentioned, the Final Design is a digital process model developed by means of the BPMN technique. This design is based on the literature, developed design propositions and feedback of Prototype 1 and 2. A Process Manager is consulted for her expertise in the BPMN technique and Visio[4]. Different variables are addressed in this final design, e.g. activities, documents, meetings, decisions and those responsible etc. The addressed variables and their content are quite similar to those of Prototype 2. However, some additional ones are included and overall, much more detail is added. Furthermore, extra attention is given to development of a logical and structured business flow as the BPMN technique facilitates in that. Moreover, extra focus is given to the aesthetics and layout of the Final Design. In the next section, an explanation of the different levels of the Final Design is presented.

Process model design
In all three planning levels, a similar approach is used to display the variables. These different variables, as mentioned in the previous section, are part of the BPMN notation. The black arrows indicate the sequence of the process. This sequence is defined on the basis of the selected literature and the design propositions. Swim lanes are used for those employees responsible for execution of certain tasks. Rounded blue rectangles are used to display the activities and document shaped figures are selected for required documentation. These documents are divided into input- and output documents, recognizable by the direction of the connected arrow. To conclude, the diamond shaped figures denote a decision, go/no go or a meeting. Differences between these three is specified in the digital process model.

User Manual Planning Tool & Document Templates

A User Manual is developed to describe each variable and their coherence in detail. The manual includes a step-by-step description of the variables of the planning tool and provides insights into all relevant elements required for implementation of the design. A detailed description per variable is provided, as well as the required input and output of a certain activity. In addition, responsibilities of SPT employees are specified, as well as required attendance of SPT managers within meetings. Appendix 9 presents the User Manual Planning Tool.

A Document Templates is developed as reference work to support the User Manual of the planning tool. This document includes templates, guiding principles and question to support the implementation of the planning tool. Appendix 10 presents the Document Templates.

[4] Software programme used for the final design of the Planning Tool

Feedback session Final Design

Research setting and data collection
The research setting in this final feedback session is quite similar to the first feedback session. Data will be collected by means of a qualitative research method; a focus group. By collecting feedback via this focus group, commonly shared opinions of SPT employees can be gathered. Moreover, comments of other participants stimulate explanation and clarification of one's own statements and allows for deeper discussions. The interviewees that participated in the first feedback session are invited to take part in this focus group as well. Hereby, consistency in feedback is assured, as well as the ability to gather different perspectives towards the final design. Table 19 presents the participating SPT employees.

Name	Function
Evert Veldhuizen	Business Unit Manager/Sales Manager
Sjoerd Luttikholt	Project Manager
Ewald Annink	Manager Operations
Anne-Gert Bultena	Technical Manager

Table 19 Participants feedback session

Interview preparations
In contrast to the first feedback session, this meeting requires more preparation for the interviewees participating. A week before the focus group meeting, the participants are provided with different documents as presented in Table 20. In addition, the participants received a printed version of the process model. They are asked to review the documents and the process model and identify points of improvement. Extra attention is asked for a threesome templates of the Operational Planning, since these templates are selected for implementation within the ERP system of Sigmax at a later stage. It is therefore of key importance that the templates are conform to the requirements and needs of managers utilizing them.

Document
Planning Tool printed version
Explanation Planning Tool & Variables
User Manual Planning Tool
Templates Planning Tool

Table 20 Documents

Interview approach
To come up with valid and reliable conclusions, all participants are approached in a similar way in this focus group. Before start of the meeting, the objectives of the meeting are explained and the structure and time required for the session is made clear. An interview guide is prepared to assure all relevant topics are addressed in this final meeting. Appendix 11 provides an overview of this guide, including the structure of the meeting. A slide projector is used to display the structure of the session and the different levels of the planning tool (digital process model). The goal of this focus group is the achievement of commonly shared opinions towards the final design. Deeper conversations are encouraged to expose last possible weaknesses of the model.

Interview design
The meeting is divided into two sections. The first part consists of a small introduction to the planning tool and resp. the strategic-, tactical- and operational level and their coherence. Hereafter,

the goal of the meeting is explained, as well as the structure of the meeting. Furthermore, the overall opinion towards the design is questioned and beforehand questions are answered if necessary. The second part of the interview is more interactive. Participants are asked to give their opinions towards resp. the strategic-, tactical- and operational level. They are encouraged to discuss potential missing elements or deficiencies of the final design. Feedback is gathered and additional comment and remarks are noted.

Data Analysis

After collecting the feedback of Prototype 2, the data will be analyzed. Similar to the data analysis approach in Prototype 1, feedback will be categorized into resp. the strategic, tactical and operational level. Hereafter, the data will be divided into positive feedback and constructive criticism. Furthermore, overall feedback and additional remarks will be questioned. This data will be structured in a similar way as mentioned above. As this feedback session includes a focus group in which discussion and interaction between the participants is encouraged, structuring and analyzing the data will be more complicated compared to the previous feedback sessions.

As discussed in the Methodology section, not all collected feedback will be implemented. There will be distinguished between usable and non-usable feedback. Democratic decision-making and discretion of the researcher and SPT supervisor are leading in whether, or not, to implement the given feedback within the final prototype. As this feedback session includes a focus group, discussion between participants will be encouraged. Adjustments for the final prototype will be on the basis of consensus.

Feedback & Improvement points

After collection of the final feedback via a focus group, small areas of improvement were identified. To structure the results, the three planning levels are used to categorize the feedback. In addition, different quotes of the interviewees are added to support their given feedback and areas of improvement. Appendix 12 presents the detailed notes and transcripts of this feedback session.

Overall additional remarks and wishes

Overall, the interviewees responded positively towards the Planning Tool and the three levels. They all agreed on the fact that the Tool captured all aspects of management relevant for SPT, e.g. strategic, tactical and operational. One of the interviewees specified:

'' I think you tackled our problem in a good way. You did not just address Portfolio Management as agreed upon in the initial stage of your project. You expanded the scope by addressing the strategic and project management areas as well. I think this model gives us tools that can supports us in moving forward. ''

In particular the Strategic level was assessed as quite useful, as this process could really support SPT in development of a long-term strategy and vision. One of the interviewees mentioned:

'' I think especially the strategic part of your model could help us forward, we do need to set long-term organizational goals, also strategic ones. ''

Besides rather positive feedback, some criticism was expressed as well. Some interviewees criticized the size of the User Manual. In contrast, others believed that the manual captured all elements necessary to implement the Planning Tool if I would be not the one implementing it. Opinions were divided. s

Strategic Planning

As already mentioned in the section above, the interviewees evaluated the Strategic level extremely valuable. This, in order to define the SPT business and set long-term strategic directions. Relative little notes or additional remarks were expressed towards this planning. However, one interviewee mentioned absence of the CEO as stakeholder in the model. Others were triggered by this comment, resulting in a discussion. Despite the discussion, no conclusion could have been drawn.

Tactical Planning

The Tactical planning received some criticism in terms of the selected portfolio management tools. Whereas the Project Assessment Criteria Checklist and outcome visualizing portfolio tools received mainly positive reactions, the Scrum poker did not. One of the interviewees mentioned:

'' In my opinion, Scrum Poker is part of the scrum methodology and should be part of your operational planning. Not here in the tactical part. I get your idea, however, I don't think it will work in this level. ''

Another interviewee mentioned:

'' Scrum Poker is intended to estimate the size product backlog items, or the effort. In the tactical level you asses projects. This poker method functions on a whole other level. ''

Operational Planning

As the elements included in the Operational Planning were mostly related to day-to-day activities and current SPT (project) processes, this part received the most feedback. The interviewees were content with the inclusion of the Scrum approach in the planning. For them, this was a precondition as a shift towards the agile way of working is taking place within SPT. Furthermore, the application of different documents to support in project documentation, was positively evaluated. However, nearly all interviewees mentioned the absence of the maintainability of a certain project. By allowing SPT to assess whether or not a project is futureproof, well-informed project decisions can be made. One of the interviewees suggested:

" It might be a possibility to include this topic into the Tactical level, since overall project decisions are made in that stage. Maybe the Project Assessment Criteria Checklist can cover this subject? "

After discussion, consensus was reached concerning these topics, as presented below. These topics will be included in the Project Assessment Criteria Checklist in order to asses if a project is futureproof.

Futureproof in terms of:

- Technology
- Maintainability
- Complexity
- Skills of employees

Implementation plan

An implementation plan describes how the implementation of the Planning Tool will be realized in practice. This plan will support SPT in the implementation of (new) organizational processes, roles and routines. New tools, techniques and methods will assist SPT in effectively creating structure within management processes related to project- and product developments. Furthermore, this plan will support SPT in anticipating to the future business environment, as well as in long-term thinking. The Implementation plan can be found in Appendix 13.

SPT Overall
As already mentioned, the implementation plan introduces new organizational roles and functions, periodic meetings and the application and implementation of certain activities and documents. Clear and transparent team roles are highly emphasized and appointment of the right people for activities and tasks is therefore of key importance.

In addition to the aforementioned, a change in mindset of the employees of SPT is required. New organizational processes, roles and routines are developed, requiring acceptance and indulgence of employees. A first step in this process is informing and involving the employees of SPT within the new organizational processes and roles. The strategic planning will be the first part of this new experience. By involving SPT employees in the interactive part of the strategic planning, e.g. workshop(s) related to road mapping and scenario planning, they familiarize themselves with new organizational processes and hopefully get adapted more easily.

User Manual Planning Tool & Templates

As already mentioned in the previous section, a User Manual of the planning tool is developed. This user manual includes a step-by-step description of all elements of the tool and provides insights into the activities, requirements, responsibilities, input, output etc. required for implementation. The manual can be found in Appendix 9. Furthermore, templates are included as well as guiding principles and questions to support the implementation of the planning tool. This Document Templates is developed as reference work for the user manual and can be found in Appendix 10.

Conclusion

In this study has been searched for an answer to the following question:

‘ In what way can SPT be supported in the development of a long-term vision,
decision-making related to software projects
and
in the implementation of structure within project management processes? ‘

To find and answer to this question, a variety of management literature has been studied, design propositions are developed, qualitative research methods are conducted and a threesome prototypes is developed. To conclude, a final Planning Tool is designed by means of the Business Process Model Notation technique. This process model visualizes new activities, documents, organizational roles, periodic meetings, decisions and responsibilities that supports SPT in the implementation of structure within their management processes.

The Planning Tool, consisting of a resp. a Strategic-, Tactical- and Operational Level, will support SPT in the implementation of structure within management processes, by implementation of a hybrid project management approach. This method merges principles of both the traditional management methods and principles of the scrum methodology. In addition, the for SPT key important project management phases and specializations are applied as well. Furthermore, application of differently themed portfolio management tools and the use of the developed Project Assessment Criteria Checklist, will support SPT in decision-making related to project selection, prioritization and/or termination. To conclude, SPT will be enabled to anticipate to the (future) public transport industry, by implementation of the Scenario-based Roadmapping Tool and performance of differently themed organizational analyses.

Furthermore, a User Manual and Templates Document are developed as reference work for the Planning Tool and to provide SPT with additional information if required. In addition, an Implementation plan is developed, supporting SPT in the implementation process of the developed Planning Tool.

Reflection

Reflection Requirements Planning Tool

In the initial phase of this study, a threefold research goals is de developed. Furthermore, a set of Planning Tool Requirements was determined. Both the research goals and the design requirements were based on the business problem context and initial (literature) research findings. These requirements were categorized into *Functional requirements* and *Design requirements*, as presented below. In this section, achievement of the research goals will be discussed, as well as accomplishment of the requirements. Furthermore, a critical look is taken to the applied methodology in this development process. The stages of the Problem solving Cycle are reviewed and areas for improvements are suggested.

Functional requirements Planning Tool
- 3 planning levels
- Coherence planning levels

Design requirements Planning Tool
- Process modeling techniques
- Variables

Functional requirements Planning Tool

3 planning levels

Based on the results of the problem exploration interviews and initial (literature) research findings, 3 focus areas were selected for the planning tool levels. Each of these levels had specific goals and objectives. A research goal for resp. the strategic-, tactical- and operational levels is formulated to guide the literature study. Design propositions are developed to merge the relevant literature tools, models and techniques. In the next section, achievement of planning level research goals is discussed and areas for improvement are suggested.

Strategic Level

Research goal 1a: Formulation of the SPT business and definition of the competitive position within the business environment.

The research goal for the Strategic level was twofold. The first part covered formulation of the SPT business and definition of their competitive position within the business environment. Within this study, several methods and models have been applied to comply with the aforementioned. Formulation of the SPT business is covered by application of the concepts of ***mission, vision and core values*** and the ***Business Model Canvas***. By a correct formulation of both the aforementioned, SPT is enabled to clearly define their current business, core activities and the way in which the create, deliver and capture value for their customers.

Different internal- and external ***organizational analyses*** are selected to define SPT's competitive position within the public transport industry. By application of ***organization-, marketing-, and portfolio analyses,*** exploration of the internal business environment is covered. ***Market-, product- and technology analyses*** are applied to explore the external business environment. The ***SWOT*** and ***Porters Five Forces*** analysis are selected for the solution design as they allow analyzing the competitive SPT business environment by identification of organizational strengths and weaknesses. The ***Hoshin Kanri matrix*** is applied to support SPT in actual implementation of the defined strategic goals based on results of the aforementioned tools.

Research goal 1b: Development and communication of a business strategy and long-term organizational planning.

The second part of this research goal covered the definition of a business strategy and a long-term planning. Based on the findings in the literature section, business technology roadmapping and scenario planning are selected to accomplish these goals. The ***Scenario-based Road Mapping tool*** is therefore applied. This combination of tools will allow SPT to formulate, visualize and communicate a clear business strategy and develop a long-term organizational planning. Furthermore, it will enable SPT to anticipate to possible alternative futures associated with new trends and technological developments.

Tactical Level
Research goal 2: Decision-making related to selection, prioritization and/or termination of projects, before, during and after project implementation.

The research goal for the Tactical level covered decision-making related to selection, prioritization and/or termination of projects. Portfolio Management is therefore applied as overarching concept in this level. Different portfolio management tools, methods and techniques are examined in the theory section. As a result, a twofold solution design is developed to achieve the research goal. First, a set 5 of differently themed ***portfolio management tools*** is selected. Second, a ***Project Assessment Criteria Checklist*** is developed to assess projects on project-, partner- and feature level. Results of this checklist guide SPT in the decision-making process of projects. Both solutions represent key importance areas of project assessment, e.g. strategy, financials and risk spreading, allowing for an overall assessment of projects. Preferences for pragmatic and easy-to-use evaluation tools were expressed during feedback sessions. Therefore, a set of simple and functional portfolio tools is compiled. Moreover, preference was given to tools that support in visualization of the outcomes of the tools, in order to ease and quicken assessment for SPT. Aforementioned preferences were taken into account in compiling an appropriate tactical solution that will support SPT in decision-making related to projects and be directive in making go/kill decisions.

In order to align business strategies (long-term) with organizational projects (short-term), development of a portfolio strategy is required. In the theory section of this study, several techniques and tools are addressed on how to develop a portfolio strategy and align business strategies with the portfolio strategy. During the development phases and feedback sessions, focus has been primarily one the application and potential of the different portfolio tools. However, alignment of the business strategy with the portfolio strategy is of similar importance. By not aligning both strategies, projects of the wrong type can enter de portfolio, e.g. projects that do not contribute to SPT strategic objectives. Therefore, some extra attention should be given to this area, further research in suggested.

Operational Level
Research goal 3: The application of guidelines for process-based and organized management of projects.

The research goal for the Operational level covered the development of guidelines for process-based and organized management of projects. To establish formalization and structure within project management processes, a ***hybrid management approach*** is applied. Different project management approaches, phases and specializations were analyzed in the theory section. Based on this literature,

and input of the feedback meetings, the hybrid solution design is developed to achieve the research goal. This approach emphasizes the ***traditional project management*** methodology (including associated phasing), as well as the ***Scrum method***. The applied traditional project management components underline predictability, stability and planning, requirements supporting in structure and organized management of projects, as defined in the research goal. Preferences for application of the Scrum methodology were expressed during multiple feedback sessions. Therefore scrum, and its emphasize on flexibility and speed, is implemented in the operational level as well. This hybrid approach in management of projects, enables SPT to implement guidelines for process-based and organized management of projects and apply structure in their management processes.

SPT is still in its initial phase and their business is mainly guided by external project requests. The design and elements of this level (and partly the Tactical level) are therefore based upon this ''project controlled'' phase. However, project controlled organizations will not withstand. A shift in organizational focus is desired, a focus from a project controlled organization to a product controlled organization. The current design shows some weaknesses in terms of this product focused organization. Currently, SPT is starting to engage in this shift from project to product focus. Further research is therefore suggested in this area.

Coherence planning levels

To design an organized and logic planning tool, coherence between all three levels was required. By a well-defined interrelation, a logical flow of information, requirements and decisions is achieved. This predefined coherence between levels (Figure 4), is partly applied within the solution design. Based on the feedback of the process manager, a renewed business process flow of information is designed. This new process better connects flows of information, inputs and outputs of levels. Different meetings were introduced to support in this. Figure 21 displays this new coherence between the levels. Figure 22 displays these meetings.

Design requirements Planning Tool

Variables

Differently themed variables were selected for implementation within the Planning Tool, e.g. actors, activities, requirements, decisions, milestones and flows of information. All variables are implemented in the Final Design of the Planning Tool, whether or not with a different name. The predefined variables proved to be relevant in the development process of the Planning Tool, as well as for guidance in the literature section. By taking these variables as a starting point for the theory section, I was able to focus my literature search and select the relevant theories. Furthermore, the different variables supported me in application of a systematic approach in prototype development.

Process modeling technique

The Business Process Model Notation technique is used for the design and layout of the Planning Tool. This technique is applied as it visualizes business processes in a simple and practical manner. Different standard objects, figures and annotations are part of the BPMN technique, in line with the variables selected for the Planning Tool. Furthermore, the applied unified modelling language in BPMN is beneficial in terms of communication towards internal- and external stakeholders. Other examined visualization techniques showed some deficiencies in terms of transparent mapping of business processes or indicating the different Planning Tool variables, e.g. data flow diagram and Gannt chart. For these reasons, BPMN is assessed as best suitable for visualization of the Planning Tool.

Reflection Methodology

In my opinion, I used a structured stepwise approach in the definition of the SPT business problem. I decided to conduct initial informal interviews in order to uncover (possible) underlying sub problems and structure the problem mess. I developed an interview guide to structure these meetings and formulated a set content specific questions to find causes of the business problem(s). Appendix 2 presents the interview guide and guiding questions. Based on these informal interviews, I defined different problematic areas within SPT. Multiple perspectives towards the SPT business problem were gathered as I interviewed employees with different expertise, e.g. Operations, Project, Sales, Software etc. By collecting these different inputs, I was able to formulate a more saturated problem statement and validate the business problem.

In order to design a best fitting solution, relevant data is collected and analyzed. In my opinion, I used a structured and stepwise approach in collection of the data. Before conducting the feedback interviews, I prepared interview guides and guiding questions to structure and support the sessions. Data was collected in 3 feedback moments and different perspectives towards the prototypes were gathered. SPT managers, a Process Manager and Sales Consultant of Sigmax Group were consulted for their expertise. After data collection via different interviews and a focus group, I structured the feedback based on the 3 levels of the planning tool. Additional remarks and overall comments were taken into account as well. Based on the feedback, I added or removed elements in the next prototype.

However, the data analysis part of this study leaves some room for improvement. Whereas the data collection part used a quite structured and stepwise approach as described above, the data analysis part shows some weaknesses. The collected feedback was structured, summarized, reviewed and implemented. Implementation was based on two factors, e.g. democratic decision-making and discretion of the researcher in collaboration with the SPT supervisor. If certain feedback was reviewed as not valuable, implementation was reconsidered.

An alternative to analyze the gathered data, is the grounded theory approach. This approach is data driven and application of this approach allows for data analysis in a structured and systematic way (van Aken et al., 2009). Open coding can be used to categorize the raw data and label it. This strategy would have made the data analysis process more structured and systematic (van Aken et al., 2009). However, this study had a design-oriented focus. Development of different prototypes and selection of suitable elements and techniques was highly emphasized. Feedback was particularly gathered to evaluate a prototype and make adjustments. Coding the feedback would not have been very helpful as exploration of a phenomenon was not part of this study.

The developed solution design consists of 3 different items. The first item covers the digital Business Process model developed by means of the Business Process Model Notation technique. The model is complemented by a User Manual and a Document Templates as reference work. Furthermore, I developed an Implementation Plan in which activities, documents, organizational team roles, periodic meetings and responsibilities are defined. In addition, I took some initial steps in the implementation of documents and templates in AFAS, e.g. the ERP[5] system of Sigmax. I performed multiple feedback rounds in which I gathered opinions of different internal SPT stakeholders. This, in order to design a best fitting solution design, in line with the wishes and needs of SPT. I approached

[5] Enterprise Resource Planning system: a software system supporting organizations in the automation of their business processes.

the design process of the solution design in multiple different ways and developed a solution consisting of differently interrelated items. By addressing actors, activities, requirements, periodic meetings etc., I tried to involve all elements relevant for a solution design supporting in structured and more process-based management of projects.

Challenges to Implementation

The main challenge for proper implementation of the Planning Tool, is a change in mindset of involved organizational members. New organizational processes, team roles and activities are developed. This requires acceptance and indulgence of the employees. Time and adaptation is required for this organizational change. As a first step in this adaptation process, organizations have to inform and actively involve employees in the new business processes. This requires mentoring and leadership of responsible managers. Secondly, management has to take responsibility for the actual implementation of the Planning Tool and has to educate involved employees. The activities of the Strategic Planning are first in this adaptation process and suitable for actively involving employees within the new business processes. By engaging in the interactive part of the Strategic Planning (e.g. Scenario-based roadmap workshops), they familiarize themselves with this new organizational processes, contributing to their adaptation process.

School of Thoughts and Strategy as Practice

As discussed in the introduction section of this study, SPT is currently situated in the collectivity stage in terms of the Organizational Life Cycle (Quinn & Cameron, 1983). In this stage, informal communication, little planning and structure is performed (Quinn & Cameron, 1983; Greiner, 1989). Nevertheless, formalization and strict management processes are required; core elements of the subsequent formalization and control stage. SPT was in need for organizational stability, efficiency of work and formalization of rules and procedures (Katz & Kahn, 1978; Scott, 1971; Quinn & Cameron, 1983). Accordingly, a Planning Tool solution design is developed in line with these requirements, embedding different practical tools and guidelines out of the Strategic Management literature.

Mintzberg, Lampel and Ahlstrand (1998) developed a model, including 10 Schools of Thought, to categorize this field of Strategic Management. The approach applied within this study has as a strong resemblance to the Planning School of Thought. This management perspective emphasizes on formal processes, procedures, trainings and a strict plan in order to define, formalize and implement strategy (Mintzberg et al., 1998). The aforementioned are key principles of the developed Planning Tool, as different formal business process and procedures are implemented in resp. the strategic-, tactical and operational planning. Furthermore, the Planning School of Thought is characterized by a set of predefined rigorous steps to realize strategy and define a clear business direction. The consecutive steps contribute to achievement of predefined business goals and objectives. In line with this stepwise approach, the developed Planning Tool includes a similar approach, by application of multiple consecutive steps. The majority of these steps include activities or decisions contributing to the achievement of goals of a particular planning level. The goal of the solution design included the introduction to organized and formal management processes, and emphasis on structure and being in control. Both the design of the Tool and approach taken within this study therefore show strong resemblance with principles of the Planning School of Thought.

The concepts of formalization, planning and rationality are highly emphasized within the solution design of this study, as well as in the traditional strategic management literature. Different traditional strategic management tools and frameworks are therefore addressed in the solution design. However, criticism against these traditional methods is expressed within the literature. The Strategy as Practice (SAP) approach is one of the results of this criticism. This approach emphasizes the social domain, in contrast to the foremost traditional structured approaches in the strategic management sciences. Whittington (2006) proposed a framework in which elements of SAP converge, e.g. practitioners, praxis and practices. In contrast to the Planning School of Thought who prioritizes in formality, predictability and structure (Mintzberg et al., 1998), SAP emphasizes 'on how the practitioners of strategy really act and interact' (Whittington, 1996) and describes strategy as 'something people do' (Hambrick, 2004; Jarzabkowski, 2004). In other words, the SAP approach relies on a more social practice, in which practitioners and their (inter)action with strategy is highly emphasized. Recent research has shown that implementation of the SAP approach brings organizational advantages as a result of the social dynamics. By application of the SAP approach in this study, different perspective towards the initial business problem and solution design would have been obtained. By embedding the social perspective in the solution design, a less planned and strict Planning Tool would have been developed. By prioritizing on the interaction between practitioners, praxis and practices, and not merely on the development of a strict stepwise business process, the solution design might have been be more resilient to organizational change and related factors.

Theoretical contributions

Already a considerable amount of literature is present on the theoretical concepts addressed in this study. Strategic management, product management, technology road mapping, scenario planning, portfolio management and project management are all extensively elaborated in the management literature for many years (Phaal et al. 2004; Phaal & Muller, 2009; Groenveld, 2007; Cooper et al., 1999; Willyard & McClees, 1987). However, a comprehensive tool that combines these concepts into a functional organizational planning solution, does not exist in the literature. As already mentioned, SPT is a relative young business unit. In this early stage of maturity, they face challenges associated with internal growth and organizational development. Existing literature does not present relevant research addressing both the aforementioned theoretical concepts, and guidelines on how to face internal growth and development. A holistic approach is therefore applied within this study. This research has merged differently themed theoretical concepts into one overall planning solution, prioritizing in the areas of resp. strategic, tactical and operational management. By combining the different tools, techniques and methods, this study contributes to the pragmatic literature on product planning in which merely one perspective on product planning is applied.

Practical contributions

SPT is a relative young business unit and employs only 25 people. They are still in their initial phase and do not have a solid body of structure concerning their portfolio and related (project) management processes. Furthermore, a long-term organizational vision and focus is absent. Well-established organizations already have structured and organized management embedded in their business processes, in contrast to the relative young businesses. It is therefore particularly interesting to analyze how the developed Planning Tool will support SPT in defeating issues part of this maturity process and thereby set an example for other young businesses. The elements of the strategic, tactical and operational level will provide management of SPT with the tools and guidelines to overcome obstacles related to long-term vision development, project decisions and the implementation of structure within (project) management processes.

The planning tool and its elements have a wide application range, different industries, business sectors and organizations are suitable for implementation of the planning tool. Proper implementation of the tool will provide organizations with structured and process-based management processes and will support organizations in continuity of their business processes.

Recommendations for SPT

One-year pilot

Implementation of the Planning Tool does involve application of entirely new organizational business processes. It is therefore recommended to start a one-year pilot to embed these new business processes into the SPT business culture and assess whether, or not, the Planning Tool functions properly. Execution of all Planning Tool elements is a necessary precondition for this, e.g. the implementation of new activities, documents, organizational team roles and meetings.

Responsibility SPT employee

To guide the implementation phase of the Planning Tool, it is recommended to assign an organizational member responsible. Preferably, someone of the SPT management team. Different activities and responsibilities are part of this job, below an overview of these activities. Furthermore, making investments and allocating resources in favour of the implementation process is part of the job. Investments in terms of workshops, training, software packages and marketing is referred to in here.

- Assigning (new) team roles to employees
- Hiring new personnel (if required)
- Assigning responsibilities to employees
- Performance of Planning Tool activities
- Implementation of documents and templates into SPT business processes
- Implementation of periodic meetings into SPT business processes
- Mentoring and educating involved employees

Implementing all elements

To obtain the organizational advantages of the solution design, it is recommended to implement and execute áll elements of the Planning Tool, as all different elements are related. Output of certain activities is required input for subsequent activities or even for another planning level. By omitting different elements of the Planning Tool for reasons as time constraints or lack of (financial) resources, the full benefits of the tool cannot be obtained.

Limitations

Insufficient input different perspectives & Imbalance feedback

Employees with different backgrounds and roles within SPT were approached (e.g. Commerce, Projects, Operations, Technical etc.) in order to gather a variety of different perspectives towards the prototypes. However, as not all interviewees were familiar within the field of resp. strategic-, tactical and operational management, the obtained feedback resulted in a more global assessment of the prototypes with lack of input of the different SPT perspectives. Consequently, more criticism and feedback towards the operational planning was received, as this level presumably included the most recognizable elements related to day-to-day activities and processes. This in contrast to the strategic and tactical planning, which received significantly less feedback probably caused by unfamiliar elements and processes within the design. This imbalance in feedback resulted in significantly more adjustments and changes in the operational level, compared to the strategic and tactical level. More feedback regarding the strategic and tactical planning would have been valuable. Verifying the prototypes by other (more mature) business units within Sigmax could have been of value.

Verification qualitative results

This study relied on qualitative research methods, e.g. individual interviews, personal meetings and a focus group. The interviewees based their opinions in these feedback sessions on prior experience and expertise in the field, completed by their general knowledge regarding the questioned subjects. Received feedback could therefore be biased, as the interviewees are the ones in control of their answers. Furthermore, their opinions and perceptions are hard to verify as a results of the selected research method.

Reproducibility research methods

In addition to the difficulties in terms of data verification, this study shows limitations in terms of replicability of the interviews. Despite the fact that interview guides are prepared, the interview structure is described and the interview approach and design are explained, the applied research method is difficult to replicate. This occurs because these research methods allow for questioning beyond the standard predefined subjects and discussion amongst participants is encouraged (van Aken et al., 2009). This hinders replication of the interview approach in for example further research on this topic or further prototype developments.

Future research

Practical future research areas

One-year pilot

Implementation of the Planning Tool does involve application of entirely new organizational processes. In order to assess how these new business processes will function in the SPT business context, a one-year pilot is suggested. Reason for this pilot is exposing weaknesses in the design of the Tool and make adjustments accordingly. In the pilot, the Planning Tool and all its elements will be implemented within SPT. Team roles will be assigned to (new) employees, as well as responsibilities. The predefined activities will be executed and documents and templates are implemented within current SPT business processes. Furthermore, the predefined periodic meetings are introduced and implemented. All together, these new activities, documents, organizational team roles and periodic meetings, require a solid and correct implementation within SPT in order to assess practicability of the Planning Tool.

Implementation AFAS and data analysis

Different elements of the Planning Tool are suitable for implementation within AFAS, the Sigmax ERP system supporting in the automation of business processes. Processes that are of the repetitive type and require central documentation and storage, are highly suitable for implementation. As the scope and limited time for this study did not allow a full implementation of the Planning Tool, merely some initial steps in the AFAS implementation process are taken. Further research in this area is therefore suggested. By assessing all elements of the Planning Tool on their eligibility for implementation within AFAS, suitable project processes, meetings, documents and templates can be automated, supporting SPT management in their daily working routines.

By implementation within AFAS, repetitive processes are automated and central documentation is ensured. Another area for further research is a follow-up of the implementation process, namely analyzing the stored data. Within AFAS, a variety of data, project specifications and characteristics is collected, e.g. results of the Portfolio Management Tools, the Project Assessment Criteria Checklist, the Operational Planning Templates etc. Analyzing this data could be extremely valuable in terms of future project decisions. Further exploration of this subject is therefore suggested.

Academic future research areas

Strategy as Practice

The developed solution design includes multiple different theoretic models, frameworks, tools and techniques. The Business Model Canvas, Scenario-based Roadmapping tool, Hoshin Kanri matrix and different Portfolio Management tools are a small selection of these implemented theoretical models. The applied traditional models and tools, referred to as ‘’technologies of rationality’ (March, 2006), are part of the Strategic Management literature and support SPT in strategy formulation, development, as well as practice of strategy. While this traditional performance is appropriate for the initial stage in which SPT currently is operating, support in the actual practical field is missing. The Strategy as Practice approach can support in this, as this method prioritizes in the practical domain (Jarratt and Stiles, 2010; Jarzabkowski and Kaplan, 2015). By means of the SAP approach, practitioners of strategy are provided with relevant knowledge on how to actually implement the aforementioned tools and techniques in the strategy development process. Further research in the SAP domain is therefore suggested. This research should in particular focus one the possibilities in the practical implementation of the applied traditional strategic tools and techniques.

Managerial Implications

The results of this study have important implications in terms of management actions. Based on the elements of the developed Planning Tool and associated Implementation plan, managerial implications are developed. In the following section, these implications are described and clarified.

The developed Planning Tool will support organizations in the implementation of new organizational processes and procedures, new team roles, periodic meetings and the implementation of new activities and documents. New tools, techniques and methods will assist firms in effectively creating structure within management processes related to product development and in decision-making related to project selection, prioritization and termination. Furthermore, the tool will support in vision development and long-term thinking. The next section provides specific managerial implications, based on the elements presented in the Planning Tool.

Which activities and documents of the Strategic-, Tactical and Operational level are advised to initiate within organizations?

Multiple differently themed activities and documents are embedded within the tool. The developed User Manual and Document Templates, provide managers with a step-by-step guide of these activities and documents. A detailed description is provided, responsibilities are specified and the required input and output is defined. Implementation of all these activities and documents is therefore advised. An extensive overview of the activities and documents can be found in Appendix 9 User Manual. .

Furthermore, various documents and templates are highly suitable for implementation within ERP systems of organizations, e.g. processes of the repetitive type and files which require central storage and documentation. It is advised to embed suitable documents and templates into the ERP system to enable organizations to be more effective, efficient and productive in terms of business process automation.

Which organizational team roles are advised to implement within organizations?

A set of 6 organizational team roles is advised for proper implementation of the Planning Tool. The roles will support organizations in proper execution and application of the tool. The selected roles cover all activities, required documents and responsibilities within the Strategic-, Tactical and Operational level. The table below presents these team roles.

Team roles
Project manager
Operations manager
Sales manager
Portfolio manager
Product manager
Product owner (Technical manager)

Table 21 Team roles

Which periodic meetings are advised to initiate within organizations?

5 different types of meetings are advised for proper implementation of the Planning Tool. By introduction of these periodic meetings within organizations, interim moments of reflection and timely direction of strategy can be realized. Furthermore, it allows managers to review and evaluate

project progress and processes at predefined moments. The table below presents a short description of the meetings.

Type of Meeting	Description
Portfolio Meeting	In this meeting, ongoing projects will be assessed based on their progress and process. Decisions concerning project prioritization, continuation or termination are discussed. Essential within these meetings is a centralized focus on prioritization of projects and resource allocation.
Tactical Meeting	In this meeting, the results of multiple Portfolio Meetings are discussed. Actions are taken accordingly.
Project Evaluation Meeting	In this meeting, a completed project is evaluated and feedback and improvement points are gathered. The project is evaluated on the basis of project process, quality, costs, planning, deliverables etc.
Overall Project Evaluation Meeting	In this meeting, the results of multiple Project Evaluation Meetings are gathered and discussed. Best practices, lessons learned and overall improvement points are discussed.
Brainstorm Meeting	In this meeting, new opportunities and innovation in project- and product developments is encouraged. Results act as input for strategy direction within organizations.

Table 22 Periodic meetings

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Design of a Planning Tool for effective management of software development projects

Appendices

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MSc Business Administration – Track Entrepreneurship, Innovation & Strategy
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University of Twente
Dr. M. de Visser
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Sigmax Public Transport
Evert Veldhuizen

30-06-2019

Table of Content

Appendix 1a - Company information

Sigmax Dream

To capture their core values, mission and vision, Sigmax developed The Sigmax Dream. This dream incorporates what Sigmax stands for and shows how the organizations makes itself visible for their customers, clients as well as employees.

''Sigmax develops and provides best-in-class ICT solutions for organizations that want to realize their ambitions and achieve their organizational goals. In order to realize this, Sigmax offers talented and passionate people room for development and enables them to work on innovative projects and solutions. The continuously improvement of customer expectations is what Sigmax empowers; market leadership and expansion further into Europe is their ambition.''

Sigmax Vision

Sigmax does not only want to respond to ICT and software expectations of their customers, Sigmax wants to exceed them as well. This requires a more in-depth analysis of the relationship between the customer and Sigmax itself. By anticipating to chancing preferences of specialists at an early stage and only invest from own resources, Sigmax guarantees its continuity. Sigmax guides professionals and organizations in a rapidly and continuously changing environment. Sigmax delivers what is promised, even at European level.

Sigmax Mission

Sigmax is driven by making technology as efficient and pleasant as possible for people to use in their daily working routine. Sigmax provides ICT and creates software with tangible value, they innovate through passion. Software considered number one in its niche, smart and reliable; in The Netherlands, but also in Europe.

Sigmax Core Values

Committed, innovative and motivated, those three core values characterize Sigmax. By means of these core values, Sigmax empowers customers with genuine attention and supports employees in reaching their goals and making their dreams and ambitions come true. Since the start of their activities, Sigmax engages in the visible and invisible needs of their customers, all in order to support them in reaching their organizational goals. Sigmax aims for the development of relevant technologies for their customers, but at the same time want to distinguish from others. In order to reach this goal, a perfect alignment of customers' needs is required. This characterizes Sigmax, as a brand and organization.

Strategy

Sigmax' strategy comprises the development of best-in-class ICT and software solutions with tangible value for organizations that want to realize their ambitions and goals. By well-maintained customer relationships and enabling talented and passionate people to develop high-end software solutions, they can continuously improve on customers' expectations and increase competitive advantage. This enables Sigmax to become market leader and rises possibilities for further expansion into Europe.

Appendix 1b - Overview Internal and external business environment

- Huidig klantenportfolio
    - Lopende producten/projecten + kleine toelichting

      Arriva:
        - heeft op dit moment CheckIn en Checkout oplossing op Android in buurtbusjes. Famoco FX 300 wordt als Hardware gebruikt
        - heeft inspectie en handhavingssoftware op Windows mobile. 2019 dient deze te vervangen worden door de Android versie
        - Vlinder project, het flexibel inzetten van buurtbusje zie

      Keolis
        - heeft op dit moment CheckIn en Checkout oplossing op Android in buurtbusjes. Famoco FX 300 wordt als Hardware gebruikt
        - heeft inspectie en handhavingssoftware op Windows mobile. 2019 dient deze te vervangen worden door de Android versie

      Qbuzz
        - heeft op dit moment inspectie en handhavings oplossing voor DAV concessie op Android. Famoco FX 300 wordt als Hardware gebruikt
        - heeft inspectie en handhavingssoftware op Windows mobile voor Groningen. 2019 dient deze te vervangen worden door de Android versie

      Connexxion
        - heeft inspectie en handhavingssoftware op Windows mobile. 2019 dient deze te vervangen worden door de Android versie

      GVB
        - heeft inspectie en handhavingssoftware op Windows mobile. 2019 dient deze te vervangen worden door de Android versie. Marktconsultatie is door GVB opgestart wordt daarna over gaat in een RFP.

      HTM
        - HTM heeft een eigen oplossing voor Handhaving en zij gebruiken een aantal losse Apps van ons(CheckIn en CheckOut en OVchip inspectie). Willen in 2019 van Windows mobile af en naar Android.
        - HTM heeft ook een tender uitgebracht voor Validators en software CheckIn /CheckOut waarvoor wij geselecteerd zijn. RFP volgt in januari 2019
        - HTM maakt gebruik van Sigtix. Wij leveren barcodes op aangekochte tickets die via een aantal websites besteld kunnen worden en die gecontroleerd kunnen worden door HTM handhavers. (Customer journey ppt)

      RET

- Heeft eigen applicatie voor handhaving. Maakt alleen gebruik van inpectiesoftware van Sigmax op Windows Mobile
- Validators en Software is nu een nieuw project/product
- Monitoringssoftware voor de Validtors

NS

- Leveren en beheren 6500 hardware devices FX300 voor de conducteurs
- Leveren we team van expertise en IP van Sigmax om Apps (Electronische Kniptang)te ontwikkelen voor conducteurs

- Concurrenten
  Voor mobiele HW en SW
  - Telexis
  - Ximedes,
  - Roolit,
  -

  Voor validators:
  - Thales
  - Kapsch
  - Scheidt&Bachmann
  - Vics

- Huidige ontwikkelingen in public transport industrie

- Huidige ontwikkelingen binnen Sigmax (SPT)
  Nieuwe structuur van kernteam.

- Competitive position SPT in public transport industry tov concurrenten
  Marktleider in mobiele handhavingssoftware
  Nieuwkomer in een gevestigde markt van Validators

- Huidige management taken m.b.t. product/project management
  In beginstadium. Diengt meer structuur en procesmating en planmatig gewerkt te worden

Appendix 2 - Interview guide initial interviews

Opzet meeting Initial interviews (+/- 20min pp)

1. Introductie
    a. Kennismaking; achtergrond medewerker + rol binnen SPT
    b. Korte introductie afstudeer project → reden interview

2. Voorleggen Vragen *Mogelijke oorzaken probleem* (volgende pagina)
    a. Onderwerpen voorleggen → op zoek naar onderliggende problemen SPT
    b. Vraag aan SPT medewerker (onderstaande vragen):
        i. Wat vind u dat er mis gaat/ waar het beter kan?
        ii. Hoe zou je dat zelf oplossen?

Wat is het probleem binnen SPT mbt product portfolio management?

Hoe ziet het huidige product portfolio management systeem er uit?

Hoe ziet u het probleem?

Waarom bestaat het probleem?

Waarom is het probleem nog niet opgelost?

Wat zijn concreet de **oorzaken** van het probleem?

Wat is de kern oorzaak (1) van de problemen?

Wat zijn concreet de **consequenties/effect** hiervan?

Welke **oplossingen** zouden mogelijk zijn?

Zo ja, zijn deze al eens uitgeprobeerd? Waarom niet succesvol?

Wat zou je zelf zien als oplossing?

Wat zijn vereiste in een dergelijke oplossing?

Op de volgende pagina een weergave van de guiding questions die gebruikt zijn tijdens de eerste probleem verkennende interviews met SPT medewerkers.

Mogelijke oorzaken probleem

Time
Wordt tijd verkeerd verdeeld binnen projecten? Tijd verspild?
Worden deadlines niet gehaald? Vertraging van projecten?
Worden er onrealistische deadlines gezet?

Knowledge
Is de juiste kennis beschikbaar tijdens/binnen projecten?
Is er inzicht in de benodigde kennis voor projecten?

Resources
Werken de juiste mensen aan projecten? Mensen met de juiste competenties?
Wordt er inefficiënt en/of niet productief gewerkt binnen projecten?
Ontbreken er resources binnen projecten? (Niet beschikbaar zijn van de juiste competenties)
Is er inzicht in de benodigde resources/capaciteiten voor projecten?
Is er sprake van een onjuiste resource verdeling? bv binnen projecten
Zijn er te weinig resources aanwezig?

Wordt er teveel risico genomen? Of juist te weinig? Mbt resources

Financials
Zijn er voldoende financiële middelen aanwezig om een project te kunnen voltooien?
Wordt er teveel risico genomen? Of juist te weinig? Mbt financieen.

Amount of projects
Te veel lopende projecten? (Geen focus mogelijk?)
Te veel kleine projecten? (Drijven grote (meer winstgevende) projecten weg?)
Te veel grote projecten? (Veroorzaken te veel werkdruk?)

Opportunity identificatie
Wordt er ingespeeld op toekomstige trends mbt de public transport industrie?
Wordt er alleen gekeken naar projecten op korte termijn?
Hoe wordt er gekeken naar projecten op lange termijn?

Wordt er verantwoordelijkheid genomen door de juiste personen binnen projecten?
Wordt er goed overzicht bewaard mbt het gehele product portfolio?

Appendix 3 - Interview transcripts initial interviews

Interview details

Name	Function
Evert Veldhuizen	Operational Manager & Sales Manager
Sjoerd Luttikholt	Project Manager
Ewald Annink	Software Tester (soon to be Operational Manager)
Rob Nijhuis	Software Designer
Anne-Gert Bultena	Software Designer

Samenvatting interviews

1.

Gemeenschappelijk: Te weinig mensen, resources en tijd. → vertraging/lange projecttijden, missen deadlines, te weinig mensen op projecten etc.

2.

Klantbehoefte → Klantproces in kaart krijgen!

Klant requirements/functionaliteiten duideljik formuleren → reduceren vertraging + echt juiste klant oplossing ontwikkelen

Te weinig aandacht specifieke eisen/wensen klant, klant weet vaak eigen behoeftes niet geheel!

Strategic planning

→ Meenemen in design roadmap. Lange termijn visie ontwikkelen samen met klant, op basis van ontwikkelingen en trends die zij zien in de markten en technologieën in OVland.

3.

Scope van projecten mist, afbakening/begrenzing van projecten mist.

Duidelijke project omschrijving mist (aanvang project)

Operational planning

→ Meenemen in project management?

4.

Vooral korte termijn focus → short term projecten

Lange termijn visie en strategie mist, planning voor de lange termijn mist.

Strategic planning

→ Meenemen in design roadmap. Lange termijn visie ontwikkelen, producten/projecten etc. uitzetten op tijdlijn. Op deze manier onderbouwde keuzes kunnen maken die strategisch gezien belangrijk zijn.

5.

Werken vanuit een standaard SPT software oplossing → efficiënter en effectiever werken.

Hierna per klant kijken naar de specifieke behoeftes (customizable features), als aanvulling op basis oplossing. (bouwstenen idee)

Juiste onderdelen van projecten/producten koppelen → gezamenlijk voordeel behalen.

Tactical planning

→ Meenemen in design product portofolio. Categorisering/indeling van producten. Basis software oplossing + customizable features per klant specifieke behoefte(s). (Mix and match idee)

6.

Gebruikte technologie niet perse vernieuwend? Wordt er achter de feiten aangelopen?

Rob Nijhuis - Software Designer **29/11/2018**

4 jaar werkzaam bij Sigmax

Te weinig mensen, resources en tijd.

Vertraging van projecten, deadlines. → product roadmap voor lange termijn zou wel helpen. Mits er ook daadwerkelijk naar gehandeld wordt.

Wordt nu veel geroepen maar er wordt niets gedaan.

Korte termijn (projecten) wordt op gefocust. Focus op lang termijn mist.

Te weinig mensen werken soms aan een project. → te weinig financiële middelen.

Soms te veel lopende kleine projecten, fijn voor de flexibiliteit maar halen focus weg.

Klant waardeert kleine projecten tussen door wel. → onderhouden klant relaties.

Grotere strategische belangrijkere projecten lopen daardoor vertraging op

Procedure/proces om (voor)tijdig te kunnen beslissen of een project moet worden uitgevoerd mist.

Behoefte aan duidelijk richtlijnen en argumentatie → meer personeel

Aanbrengen van structuur zou wel helpen. In bv behandeling/afhandeling van klantaanvragen. (standaardisering)

Ook om eventueel nee te kunnen zeggen/onderbouwen waarom.

Wel ruimte blijven/flexibel blijven om spontane kleinere projecten te kunnen blijven uitvoeren. → dit typeert Sigmax.

Niet echt perse een probleem, gaat al jaren zo. Maar met meer structuur en formalisatie zou het wel voordeel brengen op het gebied van doorvoeren beslissingen en vasthouden aan eerder gemaakte afspraken.

Ewald Annink – Software Tester **30/11/2018**

3 jaar werkzaam bij Sigmax

Duidelijke en heldere projectbeschrijving mist. → vooral mist een duidelijke klanten behoefte!

Wat is de scope van de opdracht, duidelijk opdracht omschrijving

Wat zijn de grenzen, afbakening mist.

Planning op lange termijn mist → interne deadlines

Juiste mensen moeten bezig zijn met de juiste 'onderdelen' van projecten → juiste functie hierbij

Belangrijkste: scope mist, afbakening/grens project!

Te weinig resources en capaciteit → gebruik aan mankracht.

Een juiste behoefte dekken → lastig. Er mist een goed onderhouden van de klantencontact tijdens projecten.

De klant weet ook niet precies wat gewenst is: SPT (ovPocket) moet naast het technisch uitwerken van de functionaliteiten, ook invulling geven aan deze functionaliteit. (zelf scope aangeven) → dit zou een taak moeten zijn van de klant zelf! NIET van OVpocket

Al eens aangekaart om periodiek samen met klanten om tafel te zitten om dit contact te onderhouden → geen capaciteit/focus vanuit de klant. → verwaterd.

Consequenties:
Is het resultaat vanuit SPT wel de juiste/gewenste oplossing? Geen behoefte vervulling

Lange project tijden, uitlopen van deadlines

Kost meer mankracht, tijd en moeite dan gewenst is.

Vooral focus op de korte termijn, kortlopende projecten. Komen ook veel kleien projecten vanuit klanten tussendoor, hier wordt ook aan voldaan. → opschuiven deadlines/werk/focus andere lopende projecten.

Weinig aandacht besteed aan de lange termijn.

Gebruik van technologie en functionaliteit per project verschillend. Er wordt gewoon voldaan aan de eis/wens van de klant. Gebruik van (ver)oudere tech/hardware kan zo zijn.

SPT loopt bij gebruik van nieuwste technologieën niet echt voorop→ maar is dit er wel?

Meer inzicht/op de hoogt van het reilen en zijlen op dit moment, hoe staat BU STP er voor?

Inzicht in financials?

Anne-Gert Bultena - Software Designer **30/11/2018**

x jaar werkzaam bij Sigmax

Te weinig resources; personeel en tijd.

- ➔ Alles komt telkens terug op te weinig capaciteit → te weinig mensen.

Te weinig aandacht voor concrete wensen van de klant → klantbehoefte.

Forecasting (planning dmv roadmapping/product portfolio planning)

→ niet redeneren vanuit het product maar vanuit de klant.

Wensen van de klant duidelijker hebben, om deze vervolgens op de juiste manier te kunnen vertalen naar een planning.

Duidelijk de requirements van de klant in kaart brengen: klantproces schetsen! (vaak onduidelijkheid)

Goed de context beschrijven, beiden kanten op elkaar begrijpen zodat meteen een juiste aanpak in uitwerking van functionaliteiten kan worden gefaciliteerd.

Grenzen en scope van een project horen hierbij. Hoewel flexibiliteit in handelen ook een must blijft.

Optie: 1 standaard product waaraan meerdere customizable features kunnen worden toegepast.

- ➔ Op deze manier zowel voldoen aan de specifieke klant behoefte maar ook meest efficiënt werken.

Juiste projecten koppelen en op die manier gezamenlijk voordeel behalen. Voordeel wat niet gerealiseerd kan worden wanneer projecten als individueel worden gezien.

- ➔ Soms overlap in delen van projecten, te laat zichtbaar + snelle oplever datum → efficiëntere aanpak hierin is gewenst.

Veelal nadruk op short term projecten, klanten komen met een vraag → wordt zsm naar gehandeld.

Andere projecten lopen hierdoor (soms) vertraging op.

Lange termijn wordt vrij weinig aandacht aan besteed, hoewel RET een 10/15 jaar project is.

Mooi voorbeeld RET: ja op gezegd (wel overwogen beslissing na meermalig meedoen in aanbestedingen), maar misschien zijn er wel andere projecten over het hoofd gezien? Strategisch beter?

Sjoerd Luttikholt – Project Manager **04/12/2018**

9 maanden werkzaam bij Sigmax

Alle weergeven punten is gebrek aan: tijd, personeel, resources, financials etc.

Rode draad: Het ontbreekt aan de lange termijn visie!

Te veel lopende (kleine/korte) projectjes, die moet je ook wel doen voor de klant.

Beter strategisch slimme keuzes maken → strategisch niet zo belangrijke/kleine projecten laten lopen.

Meer projecten ook automatisch meer werknemers? Op deze manier groeien? Nee

Bij groei in aantallen van projecten: efficiëntere en effectieven werkvorm, niet perse meer mensen! (evt uitbesteden? of niet overal ja op zeggen?)

Mogelijkheden: Werk vanuit een basis software oplossing ontwikkeld vanuit Sigmax → efficiënter en effectiever werken.

Hierna per klant kijken naar de specifieke behoefte, dit als aanvulling van het basis model. (soort van bouwstenen idee)

Ideaalbeeld

We zitten vaker bij de klant, duidelijker de behoefte van de klant beschrijven. (klant weet ook niet altijd wat ze nu willen)

Samen een pad schetsen welke markten ze willen benaderen/aanboren, welke technologie daarbij komt kijken en welke functionaliteiten met producten daarbij horen.

➔ Meenemen in design roadmap, op deze manier duidelijk pad voor lange termijn schetsen.

(meerdaags) samen zitten met de klant en samen een pad tot bv 2025 bepalen. Niet achter de feiten aanlopen.

Voorbeeld: Vlinderproject, te snel ja gezegd, niet goed gekeken lange termijn en toekomst. Wel een leuk project, maar draagt dit echt bij aan onze toekomst? Zijn de functionaliteiten wel echt de moeite waard? (plat gezegd)

Wordt een opdracht ingeschoten zonder commercieel model, zonder oog op de toekomstige markt

➔ Een duidelijke klant behoefte dient ingevuld te worden + daarbij horende functionaliteiten!

Oplossing

Documentatie mist, geen duidelijk beeld, ook omdat dit nooit in het verleden is gedaan.

In kaart brengen van product/ontwikkeling specificaties, op deze manier zonder zorgen het werk eventueel kunnen uitbesteden.

Qua tech loopt SPT een beetje achter de feiten aan. Geen juiste keuzes gemaakt.

Maar we handelen vanuit klantvraag, als zij willen werken met deze software/hardware/technologie etc. dan werkt SPT hier in mee.

Merkt wel dat Sgmax soms sneller wil dan de klant, Sigmax willen meer mee met nieuwe/toekomstige technologie en de trends daarin.

Grootste/belangrijkste oorzaak van het probleem:

De visie mist, het lange termijn plannen. Gebaseerd op missie, visie en strategie vanuit Sigmax breed en SPT.

Verkeerde keuzes. Niet gebaseerd op lange termijn en strategisch belang.

Mogelijkheden:

Enorme hoeveelheid data verzameld bij OV bedrijven: Data verwerking

Potentie in deze dataverwerking, moeten we als SPT van mee profiteren, voordeel uit halen.

Verwachting afstudeeropdracht:

OV land in kaart brengen, behoeftes en toekomstbeeld van de klant.

Eigen mening daarin (gebaseerd op literatuur en eigen bevindingen)

Evert Veldhuizen – Operationeel manager/ Manager Sales **05/12/2018**

10 maanden werkzaam bij Sigmax

Alle weergeven punten is gebrek aan: tijd, personeel, resources, financials etc.

Werken er wel de juiste mensen aan projecten? Met juiste kennis/capaciteiten? Te veel inhuur?

We weten wat A is en B moet worden. De weg er naar toe, van aanpak tot uitvoering, is vaak een vraagteken → onderbouwing met meer structuur in proces.

Alleen short term focus, lang termijn ontbreekt compleet.

Geen duidelijke besluitvormingsproces.

Keuzes en afwegingen maken op onderbuik gevoel, niet de juiste keuze!

Te veel kleine/los lopende projecten vb. OVpocket → te lang looptijd project, loopt nog steeds.

Duidelijke tussentijdse deadlines en een lange termijn visie hadden dit kunnen verhelpen.

Structuur en documentatie is nooit onderhouden door voorganger Evert.

Er worden wel veel nieuwe projecten binnen gehaald + interne groei, maar capaciteit blijft achter.

Ook op organisatie niveau blijft het achter. → eerst huis op orde dan pas doorbouwen.

Mogelijkheden toekomst

Klankbordgroep diverse thema's → feedback projecten/producten + aankaarten nieuwe trends en ontwikkelingen

Samen met de klant om tafel m.b.t. toekomstige trends en ontwikkelingen in OV-land.

Toekomstbeeld vanuit de klant (markt/technologie/product) + mogelijkheden creëren om hier op in te spelen.

Ruimte voor verbetering

1 Organisatie structuur, juiste processen in (be)handeling van producten/projecten

2 Doen we wel de juiste dingen? Überhaupt aannemen van sommige projecten als binnen de projecten zelf qua invulling.

3 Meer user story's: de behoefte van de klant moet duidelijk geformuleerd worden!

Verwachting afstudeeropdracht:

(proces) Model dat handvaten geeft in besluitvorming. → **tools lange termijn visie**

➔ Een format dat ondersteunt in het maken van keuzes en de afweging hierin.

Appendix 4 - Interview guide Prototype 1

Opzet Feedback Meeting **(+/- 1uur pp)**

5 min intro
15 min – strategisch niveau
15 min – tactisch niveau
15 min – operationeel niveau

1. Introductie
    a. Eerste prototype Planning tool (Proces model/flowchart vormgeving)
        i. Eerste globale versie → hierna detaillering
        ii. Input diverse invalshoeken nodig
    b. Aanbreng structuur in (management) processen product en project uitvoering
    c. Planning lange + korte termijn (3 niveaus lang/middel/kort)

2. Korte uitleg per niveau
    a. Stapsgewijs proces uitleg
    b. Activiteiten/Requirements/Functies

BELANGRIJK!!

Juiste perspectief (Commerce/Operationeel/Project/Technisch)

- Missende kritieke onderdelen/stappen? Tekortkomingen in uitvoering?
    - Eigen invulling/vergelijk met huidige procesvoering
    - Overlap huidige procesvoering en prototype?
    - Missende kritieke onderdelen (activiteiten/taken) vanuit huidige procesvoering?
- Welke functies bij bepaalde activiteiten? Bestaande/mogelijke functies
    - Aan welke taken zou jij je functie hangen?
- Wat wil je dat deze planning oplevert/als uitkomst heeft?

Strategisch management
Project management
Operationeel management
Financieel management
Sales/commerce management
Product management — extern georiënteerd (business/commerciële inslag)
Product owner — intern georiënteerd (technische inslag)

Appendix 5 - Interview transcripts Prototype 1

Samenvatting interviews

Strategy
Sigmax Overall strategie eerst duidelijk definiëren → daaruit voortvloeien SPT strategie.

#6. Na gehele proces strategic planning misschien nogmaals gehele strategie herzien? Door proces tot nieuwe inzichten gekomen?

One of the feedback points was that after completion of the different steps within the Strategic planning, possible further insights could have been developed in term of the SPT strategy. To conclude the Strategic planning, an additional step can be included to revise the prior developed strategy if necessary.

Tactical
Portfolio Methods → te geavanceerd SPT? Te veel doordacht? → simpel en functioneel SPT houden!

Aanduiding van tijd in deze planning? → is daar gewenst en is er meerwaarde?

In order to develop a functional and feasible planning tool, a simple and non-sophisticated design is required. Different portfolio management methods are desired, however, these methods have to be simple.

Operations
Ontbreken duidelijke Alignment with stakeholder → erg belangrijk!

Lopen processen samen? Documentatie in eenzelfde format (Visio, Word etc.) WOW way of working

Ook Planning!; blijf stakeholder goed betrekken in je process.

- Bepaal gezamenlijk deadlines, milestones, deliverables etc.
- Neuzen dezelfde kant op!

In order to move in the same direction, alignment with involved stakeholders is of key importance. Project processes have to be aligned and usage of a common format or documentation method is desired (e.g. documentation, xxxx).

Voor stap 1. → offerte stadium

-duidelijkheid formuleren voorafgaand:

- requirements/docus meesturen bij offerte

- specs van (te gebruiken/mee te werken) producten meesturen

3.3. als aanvulling testen en certificeren

Ontbreken onderdeel support → after sales/ ondersteuning van nazorg (Invullen na closing project (of bij monitoring ?))

3. → service & support (2 verschillende zaken)

3. → logistiek (m.b.t. hardware: validators) (→ inkoopprocess)

Logistiek/inkoop ook in offerte benoemen/aan denken; vb. transport validators

Proto is te veel focus product ontwikkeling; stap 3. Project execution: Product Development Cyclus → trek meet naar software cyclus toe!

KPI's → nog niet aan toe, te geavanceerd voor nu, misschien voor toekomst. (nu finacieen gebaseerd, → naar strategy toe)

Om tafel met klanten; zij hebben dezelfde markten/concurrenten in ovland.

- Beleid, (meer) jaarplannen te weten komen grote klanten.

Indirect speelt de overheid ook een deel in de planning (policies, law enforcement etc.) hier moet op ingespeeld kunnen worden. mappen relevante (toekomstige) regelgeving door overheid vb: AVG, software policies, ISO normen etc. → input voor strategische planning

Te weinig input vanuit de agile/scrum methode? → meer focus op scrum?

Operationele planning → 3. Project execution → te veel focus op product development

Wens/additional remarks
Niet té veel documentatie, werkt niet, not practical

Definieren rollen

Inzicht in product/ overview product categorisatie is erg gewenst! intern sub projecten definiëren

Duidelijk weergave van diversiteit en mogelijkheden in portfolio management methodes

General management system wordt op prijs gesteld, daar is behoeft aan. (niet alleen tactische planning, ook andere 2 planningen)

Evert Veldhuizen - Business Unit Manager + Manager Commerce/Sales 06/02/2019

Strategische planning

Definiëren van rollen → vb. Marketing, HBO stagiair ?

Scenario planning

Tactische planning

Operationele planning

Ontbreken onderdeel support → after sales/ ondersteuning van nazorg

➔ Invullen na closing project (of bij monitoring ?)

Additional remarks

Rollen SPT
Wens om rollen binnen/van SPT in te vullen/aan te geven bij taken/functies in het model. Dit zou erg helpen bij invulling van huidige rollen/functies SPT medewerkers.

Duidelijk formuleren requirements (documenten, resources etc.) zodat daar ook daadwerkelijk mee aan de slag kan worden gegaan.

Sjoerd Luttikholt – Project Manager **06/02/2019**

Strategische planning

Missie/visie/strategie Sigmax breed meenemen in opstellen strategie SPT

Sigmax Overall strategie eerst duidelijk definiëren → daaruit voortvloeien SPT strategie.

Analyses (+ andere taken voor marketing) → niet perse door marketing functie/afdeling

- ➔ Zelf uitvoeren; eigen mensen: Zorgen dat alle kennis binnen SPT blijft.
- ➔ Om tafel met klanten; zij hebben dezelfde markten/concurrenten in ovland.
    - Beleid, (meer) jaarplannen te weten komen grote klanten.

Indirect speelt de overheid ook een deel in de planning (policies, law enforcement etc.) → hier moet op ingespeeld kunnen worden. → mappen relevante (toekomstige) regelgeving door overheid vb: AVG, software policies, ISO normen etc.

Risico → niet concreet in planning benoemd, is dat nodig? (in scenario planning → wel risico spreiding behandeld)

Wel concreet benoemen? → toepassen in risico's/scenario's? → risico spreiding

Tactische planning

Zorg wel dat het werkbaar/functioneel blijft/word voor SPT.

Portfolio Methods → te geavanceerd voor SPT? Te veel doordacht?

Inzicht in product/ overview product categorisatie is erg gewenst!

Operationele planning

3. Execution project (stap in project management lifecycle process)

3.3. als aanvulling testen en certificeren. Inzicht in wanneer personeel tekort? Evt inhuur etc.

3. → service & support (2 verschillende zaken, toepassen in operationele planning?)

3. → logistiek (m.b.t. hardware: validators) (→ inkoopprocess)

Opslag validators, verscheep proces validators/uit elkaar houden verschillende units etc.

Logistiek/inkoop → ook in offerte benoemen/aan denken; vb. transport validators

KPI's → nog niet aan toe, te geavanceerd voor nu, misschien voor toekomst.

KPI's worden nu vooral gebaseerd op financials → niet op strategische doeleinden, zou wel zo moeten zijn.

1. Project Initiation & Requirements Definition

Voor stap 1. → offerte stadium → zinvolle toevoeging aan PM process!

-duidelijkheid formuleren voorafgaand:

- requirements/docus meesturen bij offerte
- specs van (te gebruiken/mee te werken) producten meesturen

Stapsgewijs proces voor aanvang van project

1. Marktconsultatie (niet altijd het geval)
2. A. Aanbestedingstraject B. directe aanvraag vanuit de klant
3. A. Offerte B. Requirements definition
4. Scope definition (3A. en 3B. samengevat)
5. Project initiation

Ontbreken duidelijke Alignment with stakeholder → erg belangrijk!

Lopen processen samen? Documentatie in eenzelfde format (Visio, Word etc.) WOW way of working

Ook Planning!; blijf stakeholder goed betrekken in je process.

- Bepaal gezamenlijk deadlines, milestones, deliverables etc.
- Neuzen dezelfde kant op!

Additional remarks

Niet teveel documentatie → werkt niet, is niet functioneel. → er moet wel wat mee gebeuren.

Documentatie moet wel goed bijgehouden worden → maar wie gaat dat doen?

Anne-Gert – Software Designer (Product owner) 06/02/2019

Strategische planning

Roadmapping ook mogelijk voor andere doeleinden? → bv voor beoordelingscriteria employees Sigmax? → wel meerdere layouts/formats en purposes van TRM, niet echt toepasbaar in beoordeling van SPT employees

BMCnow (current) → via roadmap → BMCfuture (desired)

De meerwaarde van scenario's die meerdere alternatieve toekomsten weergeven en risico kunnen spreiden wordt niet echt ingezien. → niet nodig wanneer je al weet wat de uitkomst gaat zijn, geen tijd verspillen aan meerdere alternatieven

Tactische planning

Product categorisatie → mogelijkheid tot intern sub projecten definiëren

Hoe past dit in scrum/agile? → weinig mee te maken aangezien dit een

Operationele planning

Gebruik van traditional Project Management lifecyle (PRINCE2&PMBOK) → redelijk achterhaald

➔ Scrum wordt nu gehanteerd in de software SPT → hier ook naar handelen?

Scrum: tijd en kosten zijn van ondergeschikt belang → niet af wanneer de back log leeg is, maar wanneer er geen waarde meer wordt toegevoegd voor de klant.

➔ Scrum implementeren in project management? Maar op welke manier?

➔ Samenvoeging van traditional Project Management methodes and Scrum? HOW?

Toepassing DevOps?

Ewald Annink – Manager Operations **07/02/2019**

Strategische planning

#1. Strategy/missie/visie/analyses etc. → bij elkaar nemen als input voor BMC → niet perse rangorde (ook niet zo bedoeld, beter samenvoegen)

#4. en #5. Wat is het verschil? → nuance, start met een groot aantal scenario's/projecten → in de lange termijn planning, alleen meest realistische scenario's uitwerken.

#6. Na gehele proces strategic planning misschien nogmaals gehele strategie herzien? Door proces tot nieuwe inzichten gekomen?

Tactische planning

Geen aanduiding van tijd in deze planning? → is daar behoefte aan?

Benieuwd naar mogelijkheden en diversiteit in portfolio technieken → goed verwerken/uitwerken in volgende proto?

General management system wordt op prijs gesteld, daar is behoeft aan. (niet alleen tactische planning, ook andere 2 planningen)

Operationele planning

Te weinig input vanuit de agile/scrum methode? → meer focus op scrum?

Proto is te veel focus product ontwikkeling; stap 3. Project execution: Product Development Cyclus

Input & Output → goede juiste benadering dmv continuous improvements. (meer scrum oriented)

Overeenkomsten in proces traditionele PM methods + agile/scrum onderzoeken?

➔ Synthese van PM traditional methode en scrum

Planning & scheduling behoefte aan

Requirements → bij #1 (traditional PM) of bij #3 (scrum/agile)

Appendix 6 - Interview guide Prototype 2

Opzet Feedback Meeting (+/- 1uur)

1. Introductie
    a. Tweede prototype Planning tool (Proces model/flowchart vormgeving)
    b. Aanbreng structuur in (management) processen product en project ontwikkeling
    c. Planning 3 niveaus lang/middel/kort

2. Korte uitleg per niveau
    a. Stapsgewijs proces uitleg
    b. Activiteiten/Requirements/Functies etc.

3. Input vanuit proces management?
    a. Op welke manier kan proces management mij helpen in mijn model?
        i. BPMN & Visio?
        ii. Structuur in proces beschrijving?
        iii. Esthetiek model?

Appendix 7 - Interview transcripts Prototype 2

Marjolijn – Process Manager Sigmax **26/03/2019**

Strategic Planning

Gebruik Hoshin Kanri Matrix? → opzoeken

True Nort → WHY bepaling van SPT → missie visie organisatie doelen etc, kan misschien bruikbaar zijn in mijn model

WHY duidelijk aankaarten, daar draait het om!

Propositie SPT

Tactical Planning

Portfolio methods 3 niveaus, per methode een 2/3 vragen bedenken → SPT management meenemen aan de hand

Soort van Checklist idee → ja/nee (rood of groen) → Go/Kill

Metrics opstellen om te kunnen beoordelen in excel

Maak een keuze voor bepaalde PM tools, niet allemaal. De meest praktische. Schrijf hier een soort van handleiding bij hoe te gebruiken. Dan maak je het praktisch. No nog niet zo.

Zorg dat alle assesment criteria op eenzelfde informatie niveau zitten! Dat is nu niet zo → kijk hiernaar!

Operational Planning

Verschil tussen Tender en Direct Client request → aangeven in je model? → niet veel mee doen. Buiten mijn scope van thesis → lastig

Scrum → refinement of business process opnemen in scrum methodology. blijven evalueren van bedrijfsprocessen!! Belangrijk

Scrum en Monitoren gelijk trekken? Valt dit onder hetzelfde ?

Andere doorstroom van informatie tussen de levels → andere coherence

Opstellen van diverse project meetings? Kijken naar deze mogelijkheden → waardevolle input!

Brainstorms, niet na elk project en dan strategy aanpassen. Beter 1x per jaar

2/3x per jaar tactisch overleg op basis van de uitkomsten vanuit de portfolio management tool

1/2x per jaar project evaluaties behandelen → blijven evalueren op je process!

Overall feedback BPMN

Activiteiten → niet definition benoemen, defining, maak er een werkwoord van

Activiteiten mogen niet overlappen in 1 lane → maar 1 iemand verantwoordelijk

Cirkels → altijd een begin en een eindpunt, houd dat in de gaten. Altijd een trigger!

Zorg dat elke start een trigger heeft, zo niet? Eventueel weglaten

Elk niveau heeft een output, die moet fungeren als input voor een ander niveau

Appendix 8 - Project Assessment Criteria Checklist

Project Assessment Criteria Checklist

A set of different questions is composed, questions that require the answer Yes of No. The questions are put in a weighted fashion, e.g. some questions outweigh others. Based on the results of the questionnaire, project continuation, prioritization or termination can be decided. The review questions are based on Project, Partner and Feature level. This gradation in review criteria allows for reviewing on different characteristics, ensuring a complete and overall assessment of the project.

What?	Portfolio Meeting – Project Assessment checklist
Attendance by?	Entire SPT management team
Time required?	± 1 hours
Responsibility?	Portfolio Manager

Project based

Strategic importance

Is it of crucial importance that this project will be executed by SPT? (Strategic point of view)
Does this project contribute to the long-term vision, mission and strategic organizational goals of SPT?

Financial attractiveness

Is it of crucial importance that this project will be executed by SPT? (Financial point of view)
Is this project financially attractive in terms of profitability and return?

Risk

Does execution of this project increase risks in terms of financials?
Does execution of this project increase risks in terms of resources? e.g. personnel, capabilities etc.

Partner based

Commitment

Is SPT strongly committed to this partnership?
Is the partner strongly committed to a long-term relationship with SPT?

Power-Dependence

Is there an alternative to this partnership?
Is it difficult to find a replacement for this partnership?

Mutuality

Does SPT trust this partner?
Would SPT supply another partner at the expense of this partner?
Would this partner collaborate with another supplier at the expense of SPT?

Is doing business with this partner part of a wider relationship and would it enable possible future business opportunities?

Outcome
Is SPT satisfied with the deliverables/outcomes of earlier collaboration with this partner?

Feature based - Determine Business Value

Market value
Does this feature enable SPT to sell more units?
Does this feature enable SPT to charge a higher price?

Risk reduction
Does this feature reduces risks?

Capability
Does this feature motivates employees achieve work related goals?
Does this feature reduce the need for low-value activity?

Appendix 9 - User Manual Planning Tool

Table of Content

Strategic Planning 1 to 3 years

Input Operational Planning – *Brainstorm Meeting*

Description: In order to foster new opportunities and innovation in project- and product developments, differently themed brainstorm session(s) will be initialized. Participation of internal stakeholders (employees SPT) is desired in these meetings, both technically and strategically skilled. Besides internal stakeholders, external stakeholders as for instance partners, customers and financers, are welcomed as well. This brainstorm session will be scheduled biannually. A *Brainstorm* project team is assembled and held responsible for the theme definition, e.g. exploration new markets, trends & developments, new technologies etc. Furthermore, they are responsible for guidance of the session(s), development of a plan of action based on the outcomes and implementation this plan. The acquired ideas and opportunities will serve as input for the Strategic Planning, resulting in new insights and opportunities related to New Product Development (NPD).

What? Brainstorm meeting
Who? Internal- and external stakeholders
When? Biannually

Input Tactical Planning – *Tactical Meeting*

Description: In the Tactical Planning, projects are reviewed and assessed upon a set of portfolio metrics. Each project in the SPT portfolio will be evaluated quarterly. Hereafter, results and outcomes, in terms of project continuation, prioritization or termination, are gathered. In annually scheduled tactical meetings, these results are discussed. The feedback and results of these meetings will give the opportunity to review and redirect the SPT strategy and update if necessary.

What? Tactical meeting
Who? Management team
When? Annually

Development SPT vision, mission and core values.

Description: To express a clear and transparent SPT and to set strategic directions for the future, development of the SPT vision, mission and core values is required. In order to develop the aforementioned, input of the Sigmax Group (overarching organization) Strategic Plan is required. In here, the overall business strategy of Sigmax Group, motives and organizational goals are defined. The SPT vision, mission and core values are developed as derivatives of the Sigmax Group overall strategy plan, so both are aligned. This to assure interconnection between Sigmax Group and SPT. The vision, mission and core values have to be completely embedded in the SPT business culture in order to be effective. Furthermore, clear communication towards employees is required.

Chapter XXXX, Theory addresses the concepts of vision, mission and core values and elaborates on them. Furthermore, Chapter XXXX, Templates Planning Tool provides guiding questions in order to support the development process. Both chapters can be consulted in the process of vision, mission and core values development.

Required input: The Strategic Plan document of Sigmax Group, including the Sigmax Group dream, business strategy, mission & vision and core values.

In Chapter XXXX, Templates Planning Tool an initial draft of the Sigmax Group Strategic Plan is provided. This draft can be consulted in the process of vision, mission and core values development.

Output: A compact document (1A4) that describes the SPT mission, vision and core values. Use of bullet points is allowed.
Responsibility: Portfolio Manager. However, the entire management team has to be involved within the development process as it concerns decisions of fundamentals of the SPT business. It is therefore of crucial importance that the whole management team collectively defines the SPT vision, mission and core values.

Organizational analyses SPT - Internal and external

Description: To get an understanding of how SPT is positioned within the public transport industry and what the characteristics are of the business environment they operate in, performance of differently themed internal- and external organizational analyses is required. These analyses serve as guidance throughout the exploration of the business environment and serve as input for strategy development.

Chapter XXXX, Theory addresses different organizational analyses and elaborates on them. This chapter can be consulted in the process of analysis performance.

Required input: Templates on how to perform an analysis, including main focus points and supporting questions in order to guide the process.

Chapter XXXX, Templates Planning Tool offers an overview of different organizational analyses that can be applied to the SPT business (environment). Furthermore, it provides the templates, including focus points and supporting questions, guiding in the process of analyses performance.

Output: Insights and understanding of the internal- and external business environment of SPT.
Responsibility: Product Manager, in collaboration with the Marketing department of Sigmax Group.

Strategy meeting - Initial strategy development

Description: Within this initial strategy meeting, below mentioned topics will be called into question. Moreover, results of the organizational analyses are discussed. Attendance of all relevant internal stakeholder is required. A first draft of the SPT strategy will be developed on the basis of the answers to the following questions.

1. *What are we doing?*
2. *For who are we doing it?*
3. *How and in what can we as an organization excel?* *etc..*

Required input:
1. The SPT mission, vision and core values, in line with those of Sigmax Group.
2. Outcomes of the internal and external Organizational Analyses of SPT.

Output: An initial Strategic Plan document of SPT. A compact document (1A4) that entails an inspiring message and briefly describes the internal and external business environment in which SPT is operating. Furthermore, the SPT mission, vision and core values are described.
Responsibility: Portfolio Manager. He is responsible for directing and managing the meeting and for the formulation and implementation of the initial Strategic Plan document.
Attendance meeting: As in this meeting initial strategic directions are set for SPT, involvement and attendance of the entire management team is required;

Sales manager
Project manager
Operations manager

Portfolio manager
Product manager
Product owner

Development Business Model Canvas

Description: In order to define how SPT creates, delivers and captures value, a Business Model Canvas (BMC) will be developed. The BMC supports in expressing the SPT business model in a visual and graphical way and can be defined as the blueprint of the organization. The BMC is composed out of nine building blocks, collectively representing all areas of business.
Required input:
1. The initial Strategic Plan document of SPT, e.g. mission, vision, core values and the initial strategy direction etc.
2. Outcomes of the intern and extern Organizational Analyses of SPT.
3. The graphical BMC template and description and explanation of the nine building blocks of the BMC.

Chapter XXXX, Templates Planning Tool presents the BMC template and description of the nine building blocks of the BMC. This chapter can be consulted in development of the SPT BMC.

Output: The SPT Business Model Canvas.
Responsibility: Portfolio Manager. However, the entire management team has to be involved in the development of the BMC as this blueprint is one of the fundamentals of SPT as an organization.

Preparations Scenario-based Roadmap workshop

Description: In order to match short-term actions with long-term goals and to prepare SPT for different potential futures and situations, a scenario-based roadmap has to be developed. This map is a graphical representation of organizational developments over time, presenting possible markets to tap into, products to offer and technologies required. The roadmap will be combined with a scenario planning method, supporting SPT in how to coop with uncertainty and act in a more flexible way. Preparations regarding the workshop set-up and guidance of the process and participants are addressed within this activity.

Chapter XXXX, Theory addresses the concepts of road mapping and scenario planning and elaborates on them. Chapter XXXX, Templates Planning Tool provides a template for execution of the SBRM workshop and a visual representation (example) of a roadmap. Both chapters can be consulted in preparation of the SBRM workshop.

Required input: Outcomes of the internal and external Organizational Analyses of SPT.
Output: A template and guiding principles for the set-up of the Scenario-based Roadmap workshop.
Responsibility: Product manager.

Scenario-based Roadmap workshop

Description: In order to match short-term actions with long-term goals and to prepare SPT for different potential futures and situations, a scenario-based roadmap workshop is executed. Possible products, markets and technologies are discussed, as well as trends and developments within the public transport industry. Attendance of differently skilled participants is required in order to make the workshop successful, e.g. SPT employees and management both strategic and technical oriented.
Required input:
1. Template workshop set-up By: product manager

2. Preparatory work, e.g. business environment mapping. By: participants workshop.
Output: A completed and filled out roadmap, accompanied by a set of differently themed scenarios.
Responsibility: Product manager. As he is responsible for the organization, management and guidance of the SBRM workshop.

Selection scenario's

Description: In the workshop, different scenarios are generated. Is it highly unlikely that all scenarios will become reality, therefore, a selection will be made. Scenarios including the most crucial drives are selected; those environmental elements and factors that shape market demand. This in order to focus on the most valid ones. Selection of 3 to 5 scenarios is considered most likely to be successful. As this decision requires expertise in the fields of product- and strategic knowledge, both Product Manager and Portfolio Manager are responsible for selection of the scenarios.
Required input: The performed Scenario-based Roadmap workshop.
Output: A set of selected scenarios.
Responsibility: Product manager and Portfolio manager.

Strategy meeting

Description: In this meeting, results and outcomes of the prior activities come together, e.g. results of the initial Strategic Plan document, the organizational analyses and the SBRM workshop. Essential within this meeting is a centralized focus on the pooling of these results. The Portfolio Manager manages and directs the meeting, however, involvement of the entire management team is required. Discussing and pooling of results has to lead to a direction for the final SPT strategy, accompanied by a Long-term Planning.
Required input:
1. The initial Strategic Plan document of SPT, e.g. mission, vision, core values and the initial strategy direction etc.
2. Outcomes of the intern and extern Organizational Analyses of SPT.
3. Outcomes of the Scenario-based Roadmap workshop.
Output: Guidelines and input for the development of the final Strategy and Long-term Planning.
Responsibility: Portfolio Manager
Attendance meeting: As in this meeting the strategy and long-term planning for the upcoming years is discussed, involvement and attendance of the entire management team is required;

Sales manager
Project manager
Operations manager
Portfolio manager
Product manager
Product owner

Development SPT Strategy

Description: In order to achieve long-term organizational goals and objectives and to realize competitive advantage, a business strategy is required. By emphasizing on the combination of skills, competencies and resources, competitive advantage can be realized. The Hoshin Kanri Matrix will be applied in order to guide the final process of strategy development. This tool supports in the definition of organizational goals and strategies (long-middle-short term), tasks and action plans and on how to operate on them. In order for the strategy to work, concrete actions and tasks have to determined and employees have to be assigned responsible. In this way, a link between the

Strategic- and Operational Planning will be established, supporting actual implementation of the defined strategy.

Chapter XXXX, Templates Planning Tool presents a description and guidelines on how to apply the Hoshin Kanri Matrix. This chapter can be consulted in the process of strategy development.

Required input: The outcome of the prior strategy meeting, e.g. a strategy direction for the upcoming years. This strategy direction is based on all previously executed activities of the Strategic Planning, e.g. organizational analyses, BMC development, SBRM workshop etc.
Output: A Strategic Plan document. A compact plan (± 3A4) describing the SPT mission, vision and core values, the organizational goals and objectives and an action plan describing specific actions, tactics, policies and responsibilities in line with the SPT strategy.
Responsibility: Portfolio Manager

Development Long-term Planning

Description: In order to merge and formalize the prior executed activities (e.g. development of roadmap, scenarios, strategy etc.), a Long-term Planning is desired. This formal graphical representation will visualize the long-term organizational goals and objectives and SPT strategy, plotted against a selected time horizon. The planning combines people, resources, technologies, financials and processes into one compressible graphical overview. Only the strategically most interesting and promising paths will be implemented in the long-term planning. Furthermore, it will ensure good communication to both internal, as well as external stakeholders.

Chapter XXXX, Templates Planning Tool presents an example of a Long-term Planning. In here, visualization of products, markets and technologies is presented. The planning is based on the layout of the roadmap. This chapter can be consulted in the process of long-ter planning development.

Required input: The Strategic Plan document, including the SPT mission, vision and core values, the organizational goals and objectives and specific actions.
Output: The SPT Long-term Planning.
Responsibility: Management Team. As the long-term planning affects all departments of SPT, involvement and participation of the entire management team is required in this development process.

Monitoring Strategic Planning

Description: By time to time evaluation of the Strategic Planning and its components, the defined strategic direction can be re-evaluated and updated if needed. Furthermore, strategic actions can be reconsidered and new decisions can be made if necessary. This, in order to successfully implement the defined business strategy. The Portfolio Manager is responsible for this monitoring activity and can base decisions on the Hoshin Kanri Matrix. In here, actions and targets are defined, supporting the Portfolio Manager in monitoring the progress of strategy implementation. Moreover, employees are assigned responsible for these tasks and targets, supporting in the verification of employees and their responsibilities.
Required input: The Strategic Plan document and Long-term Planning.
Output: Maintenance of the Strategic Planning and its elements.
Responsibility: Portfolio manager

Tactical Planning — Quarterly

Input Strategic Planning – *Strategic Plan document*

Description: Within the previous Strategic Planning, the organizational SPT strategy, mission & vision, core values, organizational goals and objectives and a long-term planning are developed. A synthesis of the aforementioned resulted in a Strategic Plan document for SPT. This strategic plan serves as the foundation for the Tactical Planning, guiding the prioritization process that comes with strategic portfolio management applied in tis planning.

Input Operational Planning – *Overall Project Evaluation Meeting*

Description: In order to evaluate on each project after completion and allow for a moment of feedback and improvement, the project evaluation meeting is one of the concluding steps in the Operational Planning. In here, the project is evaluated in terms of process, quality, costs, planning, deliverables etc. Results of these meetings are gathered. In biannual overall project evaluation meetings, the results, best practices and lessons learned are evaluated and taken into account in the Tactical Planning. By biannually discussing and assessing all project evaluations, decisions in terms of project prioritization and termination can be kept up-to-date.

What? Overall project evaluation meeting
Who? Management team
When? Biannually

Development portfolio strategy

Description: Development of a portfolio strategy is the initial step within the Tactical Planning. The previously developed Strategic Plan document, will serve as a basis for the SPT portfolio strategy, allowing for alignment between the SPT business strategies and the portfolio strategy. The predefined SPT business strategies will connect the Strategic- and Tactical Planning and acts as guidance throughout the entire prioritization process of projects. The Portfolio Manager is responsible for development of the portfolio strategy.

Chapter XXXX, Theory addresses the concept of Portfolio Management and defines how to align the portfolio strategy with predefined business strategies. This chapter can be consulted in the process of portfolio strategy development.

Required input: The Strategic Plan document, output of the Strategic Planning.
Output: A Tactical Portfolio Plan document. A compact plan (± 1A4 in bullet points) describing the SPT business strategies followed by in what way implementation of these strategies can be effective through the process of tactic project prioritization.
Responsibility: Portfolio manager

Selection and Application of Portfolio Management Tools

Description: In order to assess the SPT projects and their products and base decisions on rationale and metrics, a set of differently themed portfolio tools is selected. These review tools ease assessment of projects and take into account all relevant facets of project evaluation. Assessment is based on the type and characteristics of the project/product, e.g. strategic contribution, costs, risks etc. The portfolio manager is responsible for selection and implementation of appropriate tools. Not

all four methods have to be applied at all times, this is at discretion of the portfolio manager. Results will serve as input for the forthcoming portfolio meeting. Below an explanation of the portfolio tools.

Template implementation Portfolio Management Tools
A variety of evaluation methods and review criteria are addressed in Chapter xxxxx. A set of four portfolio management tools is selected for SPT, as presented in the table below. There is given preference to tools that support in visualizing the outcomes, this in order to ease and quicken assessment for management. Collectively, the four tools represent key importance areas of project assessment, e.g. strategy, financials and risk. By using these tools, projects of the portfolio are compared and assessed based on predefined values, e.g. strategy, risk, financials etc. Based on the results, decisions can be made in terms of project continuation, prioritization or termination.

Portfolio Management Tools
Strategic Buckets
Bubble Diagram
Scrum Planning Poker
Financial Calculations

Chapter XXXX, Theory addresses a variety in portfolio management tools and elaborates on them. Chapter XXXX, Templates Planning Tool provides an explanation of the selected tools, as well as guiding principles supporting in application of these tools. Both chapters can be consulted in the process of project assessment.

Required input:
Two different inputs are required for assessment of SPT projects and their products.

1. Overview SPT products, their features and functionalities.
Responsibility: Product manager

2. Overview SPT projects, their status quo and project evaluations.
Responsibility: Management team

Output: Results Application Portfolio Management Tools. This report bundles the choice, application and results of the portfolio method(s). In addition, the visualized outcomes are presented if applicable. Outcomes will serve as input for the Portfolio Meeting.
Responsibility: Portfolio manager

Portfolio Meeting

Description: In quarterly scheduled portfolio meetings, ongoing projects will be assessed based on their progress and process. The Project Assessment Criteria Checklist will be use to assess projects on project-, partner- and feature level. Entire management team has to be involved in completion of this assessment. A detailed explanation of the checklist is provided below.
Furthermore, the results of the application of portfolio tools will serve as input for this meeting. Projects that require attention will be presented, as well as projects in line for potential prioritization. These results are of key importance in decisions concerning project prioritization, continuation or termination. Essential within these meetings is a centralized focus on prioritization of projects and resource allocation.

Project Assessment Criteria Checklist
A set of different questions is composed, questions that require the answer Yes of No. The questions are put in a weighted fashion, e.g. some questions outweigh others. Based on the results of the questionnaire, project continuation, prioritization or termination can be decided. The review questions are based on Project, Partner and Feature level. This gradation in review criteria allows for reviewing on different characteristics, ensuring a complete and overall assessment of the project.

Chapter XXXX, Templates Planning Tool provides the Project Assessment Criteria Checklist, including the guiding questions.

Required input: Report Results Application Portfolio Management Tools, including explanation and outcomes of the applied portfolio tool(s).
Output: A decision for project prioritization, continuation or termination.
Responsibility: Portfolio Manager
Attendance meeting: Attendance of the entire management team is required within these quarterly portfolio meetings, as project prioritization, project termination and resource allocation are discussed. Additionally, all managers are involved within the SPT projects, therefore their opinion is highly valued;

Sales manager
Project manager
Operations manager
Portfolio manager
Product manager
Product owner

Final decision

Description: The final decision derives from the portfolio meeting. A Go or No Go in terms of project prioritization, continuation or termination is the result of the final decision. In order to make a well informed decision, the entire management team needs to be involved within the decision process as the outcome will affect different departments within SPT.
Required input: Results of the previous portfolio meeting.
Output:
Decisions on project prioritization, continuation or termination.

Project prioritization: *Allocation of more resources, e.g. personnel, financials, assets etc.*
Project continuation
Project termination: *Cancelling of project.*

Responsibility: Management team

Operational Planning — Start each project

Input Tactical Planning

Description: Within the previous Tactical Planning, there is decided for project prioritization, continuation or termination. The SPT business portfolio is revised and updated, based on a set of predefined evaluation metrics and review criteria. The Tactical Planning is more of a tactical tool and functions similar to a funnel; it filters projects that are not (any more) suitable for the SPT portfolio and narrows down to the appropriate ones. These remaining projects will be implemented by SPT and are guided by means of the Operational planning.

Project opportunity

Description: A project opportunity refers to the starting-point of a new project and can derive of different inputs, e.g. a prior collaboration with a client or partner, a previously executed project, a tendering procedure or a new trend or development within the public transport industry. The project opportunity acts as trigger for initiation of the project.
Required input: As mentioned above, a prior collaboration and/or project, a tender or new trend/development within the public transport industry.
Output: Opportunity for Project Initiation.
Responsibility: The Sales- and Product Manager are responsible for the search in project opportunities. However, considering that SPT is still in its initial phase, the entire management team is responsible for exploring project opportunities, e.g. new collaborations with partners, new trends etc.

Market Consultation (optional; only if requested)

Description: A market consultation can be described as a preparatory tool to gain a better understanding of the market place. This tool is used by the requesting organization, e.g. NS, Arriva, RET etc., in preparation of a tender for complex and innovative projects. These organizations obtain their market knowledge via the participating organizations, e.g. SPT. This enables the requesting organization to prepare for the actual tender and associated project request. By actively participating in this procedure, SPT can benefit as they already gain knowledge about the market and delve into the project request.
Required input: The market consultation request.
Output: Market knowledge and insights.
Responsibility: Product Manager, in collaboration with Sales Manager. The rest of the management team will support in their field of expertise if necessary.

Tendering procedure

Description: (non) Governmental authorities disclose a tender in order to select the best matching organization for their innovation project. This the tendering procedure refers to the description and documentation of the entire project process, executed by the participating organizations. The project approach, planning, budget and other involved requirements are defined. In a tender, participating organizations explain in detail how they would approach the project and they present how, what and why they can offer. Multiple organizations participate in tenders, increasing competition among participants.

Chapter XXXX, Templates Planning Tool provides an overview of elements optional in the tender, e.g. project approach. However, alternatives are optional as each tender is unique and content specific.

Required input: A project request. Furthermore, a Market Consultation can be executed prior to the tender.
Output: A completed Project Approach.
Responsibility: Management Team. The entire management team is involved within the procedure of tendering; expertise of different managers is desired (e.g. project manager, sales manager, product manager etc.)

Direct client request

Description: Besides the aforementioned types of project requests and initiation via a tendering procedure, a direct client request is also an option. Via prior collaborations with clients and partners, or via previously executed projects, a direct client requests can be initiated.
Required input: -
Output: Direct Project Initiation.
Responsibility: -

Go/No-go Decision

Description: The Go/No-go decision is the determining factor in terms of project continuation. The outcome of the tender and/or management's decision on project acceptance, in terms of a direct client request, is taken into account in this step. Based on this decision, project initiation or project cancellation is decided.
Required input: A project request.
Output: Go: Project Initiation and an initial project meeting.
No-go: Cancelation of project.
Responsibility: Management team

Initial project meeting

Description: If decided for a Go, the project can be initiated. An initial project meeting is required in order to negotiate about issues related to the scope of the project, project requirements, project planning, project deadlines & milestones and the content of deliverables. Presence of all involved stakeholders is required within this initial meeting, e.g. the project manager, product manager and product owner of SPT, as well as external stakeholders, e.g. representatives of the partner/client organization. A key role is played by the product manager as he will translate and prioritize customer requirements into feasible technical project requirements in order to direct the SPT software development team. The project manager will direct the entire project and will concern oneself with the supporting management tasks involved within the project.
Required input: A Go on Project Implementation.
Output: Project Initiation
Responsibility: Project Manager
Attendance meeting: In this meeting issues concerning Project Initiation (e.g. initial scope, reqs., planning, budget etc.) are discussed. Therefore, involvement of the client, as well as attendance of relevant managers is required;

Project manager
Product manager
Product owner

Project Initiation

Description: This first step covers the start of the project. A project management plan and project charter are developed in order to document essential information and disclose it for all relevant stakeholders. Furthermore, initial contractual agreements between SPT and the client are set up. This in order to provide for a structured approach at start of projects and organized way of project management.

Chapter XXXX, Templates Planning Tool provides a detailed explanation of the abovementioned documents. Furthermore it presents templates and guiding questions on how to apply these documents. This chapter can be consulted in the process of Project Initiation.

Required input: Results of the prior Initial project meeting; a first draft of the project scope, project requirements and project planning etc.
Output: Completion of below mentioned documents:
Contractual Agreements
Project Charter
Project Management Plan
Responsibility: Project Manager

Project Scope & Requirements definition

Description: A first draft of the project scope and requirements is already developed. In this phase, the scope and requirements are finalized. Technical requirements are defined by means of a Product Backlog and associated user stories. A Customer Journey Map is used for exploring the interaction between the customer and the product. Customer requirements and whishes are formulated as a result of this journey map.

Chapter XXXX, Templates Planning Tool provides a detailed explanation and example of a Customer Journey Map. In addition, guiding principle on how to develop a Customer Journey Map are provided.

Required input: Results of the Initial project meeting and Project Initiation step, e.g. initial project scope, project requirements and the project planning.
Output: An initial list of the Product Backlog and a Customer Journey Map.
Responsibility: Product owner: Initial list Product Backlog
Product manager: Customer Journey Map

Project Planning & Scheduling

Description: This activity consists of the planning and scheduling of activities required for successful project completion and management. A Work Breakdown Structure (WBS) is developed in order to divide project components and the project workload in a structured and manageable way. Project activities, deliverables, milestones & deadlines, budget, resources and required personnel (competencies) are addressed in the WBS. A solid planning and schedule supports in resource- and budget allocation, assuring that the right resources and competencies are available at the right time. Moreover, contingencies have to be taken into account.

Chapter XXXX, Templates Planning Tool provides a template with elements that can be part of the WBS. However, alternative elements are optional as each project is unique and requires another approach. This chapter can be consulted in the process of WBS development.

Required input: Insights and understanding of the entire project, e.g. the estimated amount of work, available resources (personnel, budget etc.) lead time of the project etc.

Output: A project specific Work Breakdown Structure.
Responsibility: Project Manager and Operations Manager

Second project meeting

Description: Within this meeting, outcomes of the prior executed phases have to be validated and confirmed. It is of crucial importance that responsible external stakeholders, e.g. clients, partners, financiers etc. are present within this meeting. The developed Project Management Plan, including the project scope & requirements, (interim) deliverables, milestones & deadlines and the project planning, has to be validated. Both parties have to agree upon decisions and actions regarding the Project Management Plan. Only if both parties decide on a Go, Project Implementation can be initiated.
Required input: Output of the prior stages, e.g. Project Management Plan, Work Breakdown Structure, Project Planning etc.

Output:	Go:	Project Implementation
	No-Go:	Revision Project Management Plan, e.g. scope, requirements, planning, budget etc.

Responsibility: Project Manager
Attendance meeting: In this meeting the issues related the project scope, requirements, planning, budget etc. have to be validated and confirmed by both parties. Therefore, involvement of the client, as well as and attendance of relevant managers is required;

Project manager
Product manager
Product owner

Project implementation

Description: This activity covers the execution and implementation of the project. Of crucial importance within project execution, are continuous improvements in terms of project deliverables and project process. This in order to achieve the highest level of customer satisfaction and develop a software solution in line with the requirements and preferences of the client. The implementation of projects is based upon the SCRUM methodology, following a set of recurring sequential steps in order deliver customer satisfaction. By translating customer requirements and preferences into feasible project elements, followed by continuous prioritization into backlog items, a best fitting software solution can be developed. The product owner is responsible for aforementioned activities, ensuring that project progress, deliverables and process are well managed.
Required input: A Go for execution of the project. In addition, the Project Management Plan in order to direct and manage project implementation.
Output: A feasible and viable final software solution that complies with all customer requirements and preferences and fulfills technical, as well as business requirements.
Responsibility: Product Owner

Project monitoring

Description: This activity covers monitoring of the project. By periodically reviewing the project progress in terms of process and deliverables, the project can be controlled and on-time project delivery can be assured. Monitoring of project objectives and performance, as well as project quality and costs of deliverables are part of this process. The project manager has a leading role in this and has to ensure implementation of the Work Breakdown Structure. In addition, a set of measurements (performance indicators and/or critical success factors) and Product quality checklists are required for appropriate project monitoring.

Required input: The Work Breakdown Structure and Product quality checklists.
Output: Project deliverables complying with requirements and preferences of the client.
Responsibility: Project Manger

Project completion

Description: This stage consists of project closure activities and delivery of the final software product(s). The project manager is responsible for appropriate closure of the project and related (administrational) issues. Furthermore, finalizing and completion of project documentation is essential within this phase. This in order to archive and store the documentation in case of future project developments.
Required input: An implemented project.
Output: Completion and delivery of the final product(s) and finalized project documentation.
Responsibility: Project Manager

Meeting Project Evaluation

Description: This project evaluation meeting covers the assessment of all activities involved within the project and is organized to review the entire project from start till closure. All involved internal stakeholders are offered the opportunity to give feedback and points of improvement, as well as key accomplishments and best practices. The quality of deliverables is assessed, as well as lessons learned. All stages of project execution have to be taken into account in order to achieve overall project assessment. Outcomes of this evaluation meeting are used within the bi-annual overall Project Evaluation Meeting. In here, results of the executed projects are addressed and appropriate measures are taken.

Chapter XXXX, Templates Planning Tool provides the template of the Post-project Evaluation Meeting. Focus areas and guiding questions are provided in order to support the evaluation process.

Required input: A finalized and completed project.
Output: A Post-project Evaluation document.
Responsibility: Project Manager
Attendance meeting: As the execution of projects requires cooperation of different SPT expertise's, attendance of involved SPT project team members, as well as the entire management team is required;

Sales manager
Project manager
Operations manager
Portfolio manager
Product manager
Product owner

Project Support

Description: This activity covers the after-sales service of the project. If customers experience problems or difficulties concerning the delivered software, the support team will search for a best fitting solution.
Required input: A finalized and completed project.
Output:
Responsibility: SPT support team

Brainstorm Meeting

Description: In order to foster new opportunities and innovation in project- and product developments, differently themed brainstorm session(s) will be initialized. Participation of internal stakeholders (employees SPT) is desired in these meetings, both technically and strategically skilled. Besides internal stakeholders, external stakeholders as for instance partners, customers and financers, are welcomed as well. A *Brainstorm* project team is assembled and held responsible for the theme definition, e.g. exploration new markets, trends & developments, new technologies etc. Furthermore, they are responsible for guidance of the session(s), development of a plan of action based on the outcomes and implementation this plan. The acquired ideas and opportunities will serve as input for the Strategic Planning, resulting in new insights and opportunities related to New Product Development (NPD).
Required input: Time and effort of participating stakeholders.
Output: Direction(s) for new business/market opportunities, New Product Development (NPD) etc.
Responsibility: Brainstorm Project Team

Appendix 10 - Document Template Planning Tool

Table of Content

Templates Planning Tool

- *Strategic planning*
- *Tactical planning*
- *Operational planning*

Strategic Planning

Development SPT vision, mission and core values.

Below a set of guiding question in order to develop the SPT mission, vision and core values.

What?	Development SPT vision, mission and core values.
Attendance by?	Entire SPT management team
Time required?	± 1 hours
Responsibility?	Portfolio Manager

Guiding questions

Mission
What do we do each day?

For who are we doing that?

What do we want to achieve with it?

Vision
What do we want to achieve for our customers?

What do we find important as an organization?

Ideally, how would SPT look like in for example 10 years?

Core values
Which motives and incentives represent our organization?

Which values describe our organization? e.g. sustainability, innovativeness, credibility etc.

Initial draft of the Sigmax Group Strategic Plan

Sigmax Dream
To capture their core values, mission and vision, Sigmax developed The Sigmax Dream. This dream incorporates what Sigmax stands for and shows how the organizations makes itself visible for their customers, clients and as well as employees.

''Sigmax develops and provides best-in-class ICT solutions for organizations that want to realize their ambitions and achieve their organizational goals. In order to realize this, Sigmax offers talented and passionate people room for development and enables them to work on innovative projects and solutions. The continuously improvement of customer expectations is what Sigmax empowers; market leadership and expansion further into Europe is their ambition.''

Sigmax Vision
Sigmax does not only want to respond to ICT and software expectations of their customers, Sigmax wants to exceed them as well. This requires a more in-depth analysis of the relationship between the customer and Sigmax itself. By anticipating to chancing preferences of specialists at an early stage and only invest from own resources, Sigmax guarantees its continuity. Sigmax guides professionals and organizations in a rapidly and continuously changing environment. Sigmax delivers what is promised, even at European level.

Sigmax Mission
Sigmax is driven by making technology as efficient and pleasant as possible for people to use in their daily working routine. Sigmax provides ICT and creates software with tangible value, they innovate through passion. Software considered number one in its niche, smart and reliable; in The Netherlands, but also in Europe.

Sigmax Core Values
Committed, innovative and motivated, those three core values characterize Sigmax. By means of these core values, Sigmax empowers customers with genuine attention and supports employees in reaching their goals and making their dreams and ambitions come true. Since the start of their activities, Sigmax engages in the visible and invisible needs of their customers, all in order to support them in reaching their organizational goals. Sigmax aims for the development of relevant technologies for their customers, but at the same time want to distinguish from others. In order to reach this goal, a perfect alignment of customers' needs is required. This characterizes Sigmax, as a brand and organization.

Strategy
Sigmax' strategy comprises the development of best-in-class ICT and software solutions with tangible value for organizations that want to realize their ambitions and goals. By well-maintained customer relationships and enabling talented and passionate people to develop high-end software solutions, they can continuously improve on customers' expectations and increase competitive advantage. This enables Sigmax to become market leader and rises possibilities for further expansion into Europe.

Linking Organizational Analyses, Road mapping and Business Model Canvas

In order to guide the process of the abovementioned activities, a Building Process Integration method is applied. The activities of Organizational Analyses performance, Road mapping and Business Model Canvas development are interwoven. This assures coherence between all elements and aligns processes. In the forthcoming sections, a detailed explanation given of all 3 activities.

Organizational analyses SPT - *Internal and external*

In order to explore and define the business environment in which SPT is operating, a selection of differently themed analyses is compiled. The activity is divided into two parts, analyses concerning internal exploration and analyses concerning external exploration. Supporting questions and focus points are presented in order to guide this process of analyses performance.

What?	Analyses performance
Time required?	± x hours
Responsibility?	Product Manager, in collaboration with Marketing department Sigmax Group if desired.

Internal exploration

Insights and understanding of the internal business environment of SPT

- Organization
- Marketing
- Portfolio
- Financials

External exploration

Insights and understanding of the external business environment of SPT

- *Input for strategy development*
  - SWOT analysis
  - Porters Five Forces analysis
- *Insights business environment*
- Market analyses
- Product analyses
- Technology analyses
  - DESTEP

In the next section, supporting questions and focus points are presented in order to guide the external exploration.

Market analysis
What is the size of the market?
What are the main market segments in your industry?
In which market segment(s) is potential growth most likely?
What are potential new market segments?

Industry analysis
Which organizations are operating in your industry?
What are the characteristics of these firms?
What industry trends are emerging?

Competitor analysis
Who are the direct competitors of your industry and what are their characteristics?
Who are the indirect competitors of your industry and what are their characteristics?
What distinguishes your organization of competitors?

Customer analysis
Who are the direct customers of your products?
Who are the indirect customers of your products?
The customer of your customers.
What are the market needs and requirements of your customers?
What are customer motives to purchase products of your organization?
In what way are customer relationships maintained?

Distribution analysis
In what way is distribution of products executed within your organization?

Supplier analysis
Who are the suppliers of your organization?
How would you describe the power-dependency relationship with your suppliers?

Key *trends*
What are the main societal trends that can affect your organization?
What are the main societal trends that can affect buyer behavior?
What are the main socioeconomic trends that can affect your organization?

Definition marketing mix 4P's
Products
Price
Promotion
Place

Product analysis *Shaping product strategy*

For the product analysis questions, consult Toro-Jarrín, Ponce-Jaramillo & Güemes-Castorena, 2016.

Technology analysis *Shaping technology strategy*

For the product analysis questions, consult Toro-Jarrín, Ponce-Jaramillo & Güemes-Castorena, 2016.

Development Business Model Canvas

What?	Business Model Canvas Development
Attendance by?	Entire SPT management team
Time required?	± 1 hour
Responsibility?	Portfolio Manager

For the BMC template and description of the nine building blocks, consult Osterwalder & Pigneur, 2010.

Preparation Scenario-based Roadmap workshop

This section provides guidelines for the execution of the SBRM workshop and is based on different literature concerning road mapping and scenario planning. The T-plan Fast start approach is used as a basis in the Execution phase of the workshop.

What?	Scenario-based Roadmap workshop
Attendance by?	Workshop participants; SPT employees and SPT management
Time required?	± 3 hours
Responsibility?	Project team SBRM

Preparation phase

1. Assignment project team SBRM
Team members, diversity in:

- Member with knowledge of the organization
- Analytical skilled members
- External (or internal) facilitator, expertise in the field of roadmap- and scenario planning

Responsibilities team:

- Definition of scope and layout roadmap
- Definition design and schedule of workshop
- Preparation and guidance of workshop

2. Inviting workshop participants
Preconditions:

- Diversity; both management and SPT employees, e.g. strategic and technical oriented
- Analytical skilled

3. Preparations by participants

- Understanding of the internal environment of SPT
    - Organization
    - Marketing
    - Financials
- Understanding of the external environment of SPT
    - Market
    - Product
    - Technology

Preparations must be made in the form of organizational analyses, as described in Chapter XXXXX. Desk research and personal experiences serves as input for these analyses.

Execution phase *Definition current situation SPT*

1. *Definition and synthesis of current situation of SPT.* This will be based on the following themes:

- Markt
- Product
- Technology

2. *Definition of driving forces* (environmental elements, factors that shape market demand). Application of these driving forces to the public transport industry. An example of forces is presented below.

  - Economic climate
  - Technology transformation
  - Digital transformation
  - Degree of regulation and policies
  - Sustainability
  - …

2. *Examination of these driving forces at different levels:*

- Macro level
- Meso level
- Micro level

Outcome:

- Definition current situation SPT
- List including activities performed by SPT
- Selection of relevant driving forces

Execution phase 2. *Scenario development*

1. Selection of driving forces. These forces will be used as input for scenario development.

Outcome:
Differently themed scenarios, covering all realistic an relevant possibilities in which the future might unfold.

Closing phase *Design and implementation of roadmap SPT*

Design
The design of the roadmap is determined on the basis of below mentioned elements. Within the execution phase, differently themed driving forces and scenarios are formulated. The outcome of these forces and scenarios is taken into account for definition of the roadmap elements.

Roadmap elements

Which **market segments** will we focused on?
Which **customer key requirements** will fit to these market segments?
Which **products** do we want to develop?
Which **capabilities** (e.g. personnel) are required?
Which **technologies(s)** are required?

Implementation

- Distribution of roadmap across entire organization.
- Communication of roadmap towards employees.
- Interim moments of revision and evaluation.
- Continuous updates in roadmap to reflect current situation.

Development SPT Strategy

In order to define and formulate the final SPT business strategy, the Hoshin Kanri Matrix is used. This strategy tool supports in the specification of organizational goals, actions and responsibilities. In addition, communication is eased for internal- as well as external stakeholders.

What?	Development SPT Strategy
Attendance by?	Entire management team
Time required?	± 2 hours
Responsibility?	Portfolio Manager

Guidelines application Hoshin Kanri Matrix

What *Definition long-term objectives*

The first step in the strategy development process covers the definition and formulation of organizational goals and objectives over the long-term. The exact timeframe, e.g. 1 or 5 years, is at discretion of the management team and depends on the industry the organization is operating in, the level of innovativeness of the products etc. It is recommended to use a time frame of 3 till 5 years.

How Far *Definition annual objectives*

The second step in the process covers the translation of long-term organizational goals into more manageable parts. Annual objectives and targets are therefore defined.

How *Definition priorities for improvement*

When these annual objectives are specified and formulated, areas for improvement are defined. These areas will be selected as measurement data. This in order to achieve the defined annual objectives. After definition of the areas of improvement, they will be prioritized.

How Much *Definition targets to improve*

When these priorities for improvement are defined, targets are formulated and a plan of action is developed. The targets in this plan are closely linked to day-to-day activities of the organization, allowing for the assignment of responsibilities to employees.

Who *Assignment of responsibility to employees*

If the targets are defined, assignment of responsibilities is the subsequent step. Individual tasks or points of action are assigned to the appropriate employees. By assigning responsibility to individuals, monitoring the progress of strategy implementation is eased. Employees can be addressed if needed.

Development Long-term Planning

In order to visualize SPT long-term organizational goals and objectives, a graphical long term planning is used. The planning combines people, resources, technologies, milestones and deadlines into one compressible graphical overview.

Tactical Planning

Selection and Application of Portfolio Management Tools

In this section, explanation and guiding questions are provide to support the application of the selected portfolio management tools.

Strategic Buckets

This method combines financial calculations and visualization techniques. In addition, strategic considerations take part in this assessment approach. Strategic buckets are created, each one with a predefined theme and spending limit. Sorting and ranking of projects is based on the degree of alignment with the business strategies of the company. Hereafter, resources are assigned to the projects.

Guidelines application Strategic Buckets

- Define Strategic Plan of the organization, e.g. business strategy and goals, mission, vision and core values.

- Define theme for the buckets.
  e.g. New product
  Product line
  Marketing
  Cost reduction
  …

- Define spending limit for each bucket

- Sort the projects into the buckets

- Rank the projects
  Based on strategic considerations or financial methods (next section).

- Select the projects
  Implementation of those projects that are within spending limit.

Bubble Diagram

This method is used for visualization and comparison of a set of projects or product features. Based on different project characteristics, values for the X-Y plot can be defined. Hereafter, projects are visualized as differently sized bubbles and plotted into the X-Y plot. Based on the quadrant in which projects are categorized, decisions in terms of project prioritization or termination can be made.

Guidelines application Bubble diagram

- Define the characteristics of projects.
  e.g. Profit
  Costs
  Resources required
  Strategic contribution
  Complexity
  …
- Select two values (projects characteristics) for the X-Y plot.
- Visualize the projects by means of differently sized bubbles.
- Plot the projects in the X-Y plot.
- Base decisions on results of the plot, e.g. project prioritization or termination.

Scrum Planning Poker
This assessment method is used by agile teams to estimate the size or effort of product backlog items and product features. By means of numbered cards, team members individually estimate the size or effort of items. By playing the cards face-down, potential bias is reduced. Hereafter, the cards are displayed and discussion among team members is encouraged. Estimates are discussed and if no consensus is reached, the team will estimate again until they find an agreement.

Guidelines application Planning Poker

- Product owner describes feature or user story to team
- Team estimate size or effort feature/story by means of card playing
- Cards are displayed
- Team discusses estimates

Match?	Continue with new issue.
No match?	Team estimates again until they find agreement in estimates.

Financial Calculations

A set of three financial methods is compiled in order to asses projects based on financial characteristics. The calculations are used to rank and rate projects and product features. The profitability and return metrics as below mentioned are popular tools for project evaluation. Results of these methods give hard metrics on which project decisions can be made.

Break-even analysis

Return On Investment

Expected Commercial Value

Portfolio meeting

Project Assessment Criteria Checklist
A set of different questions is composed, questions that require the answer Yes of No. The questions are put in a weighted fashion, e.g. some questions outweigh others. Based on the results of the questionnaire, project continuation, prioritization or termination can be decided. The review questions are based on Project, Partner and Feature level. This gradation in review criteria allows for reviewing on different characteristics, ensuring a complete and overall assessment of the project.

What?	Portfolio Meeting – Project Assessment checklist
Attendance by?	Entire SPT management team
Time required?	± 1 hours
Responsibility?	Portfolio Manager

Project based

Strategic importance
Is it of crucial importance that this project will be executed by SPT? (Strategic point of view)
Does this project contribute to the long-term vision, mission and strategic organizational goals of SPT?

Financial attractiveness
Is it of crucial importance that this project will be executed by SPT? (Financial point of view)
Is this project financially attractive in terms of profitability and return?

Risk
Does execution of this project increase risks in terms of financials?
Does execution of this project increase risks in terms of resources? e.g. personnel, capabilities etc.

Partner based

Commitment
Is SPT strongly committed to this partnership?
Is the partner strongly committed to a long-term relationship with SPT?

Power-Dependence
Is there an alternative to this partnership?
Is it difficult to find a replacement for this partnership?

Mutuality
Does SPT trust this partner?
Would SPT supply another partner at the expense of this partner?
Would this partner collaborate with another supplier at the expense of SPT?

Is doing business with this partner part of a wider relationship and would it enable possible future business opportunities?

Outcome
Is SPT satisfied with the deliverables/outcomes of earlier collaboration with this partner?

Feature based - Determine Business Value

Market value
Does this feature enable SPT to sell more units?
Does this feature enable SPT to charge a higher price?

Risk reduction
Does this feature reduces risks?

Capability
Does this feature motivates employees achieve work related goals?
Does this feature reduce the need for low-value activity?

Operational Planning

Tendering procedure

Elements Tender – Project Approach
Program of requirements (requirements and wishes, technical- and business)
Planning
Functional tests
Installation
Training (for personnel)
Service
Maintenance
Logistics
Contract issues
Costs

Project Initiation

Contractual Agreements

Project Charter

The Project Charter provides both parties with an overview of the information required for successful project completion. It shortly describes the project scope, project purpose and its objectives and milestones. Furthermore, project participants are presented including their responsibilities and contact details. The Project Charter serves as a contract between all involved parties, e.g. key stakeholders, the project manager and the project team.

Project charter	
Project Overview	
Definition Problem Statement and project Purpose	
Definition project Background and Scope	
Definition project Key Deliverables *e.g. products, documents, prototypes etc.*	
1	
2	
3	
4	
5	
Project Planning	
Milestones	*Completion date: :*
1	
2	
3	
4	
5	
Project Management	

Project Name:		*Business Unit:*
Project Manager:		*Customer:*
Name:		Name:
Phone:		Phone:
Email:		Email:
Project team		
Name	*Role*	*Responsibility*
Project duration		
Start date:	Expected end date:	Actual closure date:
Project budget		
€		
Project Benefits *e.g. quality improvement, costs savings etc.*		
Project Risks *e.g. delay, costs, implementation technology etc.*		

Project management Plan

The Project Management Plan is developed in order to document essential information on how to approach and manage a particular project. It addresses all relevant factors involved within management and completion of projects. The plan is based on elements of the Project Charter and the Work Breakdown Structure. Below an overview of the elements that need to be present in the Project Management Plan.

Project Management Plan	
Scope statement	
What is inside the scope of the project?	
What is outside the scope of the project?	
What are the project boundaries?	
1.	
2.	
3.	
4.	
Deliverables	
Which deliverables are part of the project?	
1.	5.
2.	6.
3.	7.
4.	8.
What are the deadlines and milestones for these deliverables?	
Milestone 1 Date:	
Milestone 2 Date:	
Milestone 3 Date:	
Milestone 4 Date:	
Milestone 5 Date:	
Quality	
In what way will the quality of project deliverables be assured?	

Which quality checklist(s) are required?
1.
2.
3.
Planning
What is the planning of project deliverables/milestones/deadlines etc.? Include in the attachment.
Work Breakdown Structure
What are the components of the WBS? e.g. activities, deliverables, resources etc.

Which competences (personnel) are required for successful completion of project activities?
Budget
What is the budget of the entire project? *€*
Who is responsible for the budget and spending's? Name: Phone: Email:
Communication
In what way will communication between SPT and internal and external stakeholders take place? e.g. project team members, customers, government etc.
What type of tool will be used to guide this communication?

Project Scope & Requirements definition

In order to explore the interaction between the customer and the product, a Customer Journey Map is used.

What?	Development Customer Journey Map
Time required?	± 2 hours
Responsibility?	Product Manager

For guidelines in the development of the Customer Journey Map, consult below mentioned link.

Project Planning & Scheduling

The Work Breakdown Structure (WBS) is developed in order to divide project components and the project workload in a structured and manageable way. Project activities, deliverables, milestones & deadlines, budget, resources and required personnel (competencies) are addressed in the WBS. Furthermore, responsibilities are assigned to employees with suitable competences.

Work Breakdown Structure
Activities
Deliverables
Deadlines/milestones
Budget/costs
Resources
Personnel

Meeting Project Evaluation

The Post-project Evaluation is developed in order to structure and manage the evaluation phase. All elements presented in the Project Charter and WBS are addressed in the Post-project Evaluation template. Results and outcomes of the evaluation are taken into account in the Overall Project Evaluation Meeting.

What?	Post-project Evaluation Meeting
Attendance by?	Entire SPT management and involved SPT project team members
Time required?	± 2 hours
Responsibility?	Project Manager

Post-project Evaluation

Post-project Evaluation	
Overall Project Evaluation	
Is positive response received of the customer in terms of project deliverables and process?	***YES/NO***
Is positive response received of the SPT employees in terms of project process, management and motivation?	***YES/NO***
Are key project objectives achieved?	***YES/NO***
Are project milestones and deadlines met?	***YES/NO***
Is the project completed within the assigned time?	***YES/NO***
Is the project completed within the assigned budget?	***YES/NO***
Project Scope	
Is the project completed within the predefined scope? If not, briefly describe why, how, what.	
Deliverables	
Was the customer satisfied with the deliverables and their quality? If not, briefly describe why, how, what.	
Lessons Learned	
Which areas are problematic? e.g. on-time delivery, communication, cost issues etc.	
How could these problems be prevented in the future?	
Key Success factors	
Which areas were successful? e.g. teamwork, quality deliverables, application of technology etc.	
What can we learn from them?	

Best Practices
Were there processes or actions identified as best practices during the project?
If Yes, how can these best practices be formalized?

Appendix 11 - Interview guide Final Design

Opzet Focus group Meeting (+/- 1uur)

1. Overall feedback
    a. Vragen naar algemene feedback m.b.t. de Planning Tool
    b. Vragen op voorhand?

2. BPMN 3 levels bespreken
    a. Per niveau stilstaan bij grove lijnen → vragen om feedback/verbeter punten
    b. Consensus bereiken in feedback! → voor eventuele aanpassingen

3. Input voor Templates Operationele Planning
    a. Project Charter
    b. Project Management Plan
    c. Post-Project Evaluation

1uur totaal
5min
15min
15min
15min
10 min

Appendix 12 - Interview transcripts Final Design

Overall feedback

Gemaakte model dekt de lading. → alles behandeld

Wel een uitgebreid document met veel tekst en afbeeldigen, maar grote opdracht dus begrijpelijk.

Strategic Planning

Vrij weinig op/aanmerkingen mbt deze planning → misschien doordat de participanten wat minder achtergrond hebben in dit strategische gedeelte? Ivm het operationele gedeelte

Strategie bepaling binnen SPT is er gewenst, nu wordt er geleefd naar de waan van de dag → lange termijn moet op gefocust worden!

Positieve geluiden mbt het BMC en bepalen van de SPT buisness dmv missie visie en core values

Hoe heb je nagedacht over de directeur in je verhaal? → benoemen als een van de stakeholders?

Tactical Planning

Behoefte aan de genoemde tools om project selectie en prioritering uit te kunnen voeren.

Scrum poker in dit level? → te hoog niveau → beter toepassen in operationele gedeelte waar scrum ook daadwerkelijk behoort?

Nogmaals goed bekijken scrum poker

Operational Planning

Betrekken Project Support eerder in je process? → nu misschien erg laat?

Naar voren halen al in het tactische gedeelte?

Toevoegen elementen aan de Project Assessment Criteria Checklist, op deze manier al vroegtijdig in een beoordelingsproces van een project bekijken hoe onderhoudbaar support van een project kan zijn

Onderhoudbaarheid bepalen! → goede input

Futureproof adhv:
Technology
Complexiteit
Skills people

Appendix 13 – Implementation Plan

Noortje van Laarhoven
Business Administration - Entrepreneurship, Innovation & Strategy
University of Twente

University of Twente
Matthias de Visser

Sigmax Public Transport
Evert Veldhuizen

Table of Content

Introduction

After development of the planning tool and visualization by means of a digital process model, a plan for implementation is part of the final phase. This implementation plan describes how the planning tool can be realized in practice. It addresses all areas involved in the establishment of a new business culture within SPT. This plan will support SPT in the implementation of new business processes, organizational team roles and routines. New activities, periodic meetings, documents, tools and techniques are part of this. Clear and transparent organizational team roles are highly emphasized and appointment of the right people for activities is of key importance. Furthermore, a change in mindset of the SPT employees is required. All the aforementioned in order to effectively create structure within management processes related to product development.

User Manual & Templates Planning Tool

As a result of the planning tool, a user manual is developed. This manual includes a step-by-step description of all components involved in the tool. It clarifies activities, requirements, documents, responsibilities, inputs and outputs etc. Organizational roles are formulated and differently themed meetings are initialized. Some of the activities and documents require additional information or the application of (predefined) templates. In Templates Planning Tool, this additional information, guiding questions and templates are provided.

Initiation of (new) Organizational Roles

In order to execute and implement activities as presented in the planning tool, different team roles are assigned to the activities. Besides to some already existing roles within SPT, additional ones are introduced. The next section provides a detailed explanation of these different organizational roles.

Roles management

Project manager

The project manager is responsible for management of all projects involved within the SPT business. He facilitates and supports the project team in successful completion of projects. The project manager is responsible for project preparations, establishment, guidance and closure. Monitoring of budget, planning and progress are as well part of his job responsibilities. Moreover, the project manager contacts with customers and reports progress.

Operations manager

The manager operations is responsible for all activities related to personnel of SPT. He is involved in the appropriate allocation of work-related tasks among employees and divides client and project requests among available employees. Personnel planning and division of labour are part of his job responsibilities. The manager of operations fulfills a more facilitating role towards project management, but is however not involved in the technical part.

Sales manager

A sales manager is responsible for the sale of SPT software products and related issues. He is business oriented and commercially positioned. A sales manager is point of contact for clients of SPT and is responsible for maintenance of all client- and business relationships. He is present in business meetings and prepares sales pitches. Moreover, he collaborates with the Product manager in search of new market- and sales opportunities.

Portfolio manager

A portfolio manager is responsible for management of the portfolio, in other words: strategic management. The portfolio manager is involved in all activities related to the achievement of long-term organizational goals, objectives and strategies. Strategy development, implementation and monitoring of the business strategy are part of his job responsibilities. Furthermore, a portfolio manager monitors the interrelation between different projects in the business portfolio and aligns organizational goals.

Product manager

A product manager is responsible for the entire life-cycle of a product. He is involved in product development, marketing, logistics and implementation. Furthermore, he translates and prioritize customer requirements and preferences into feasible product requirements in order to direct the SPT software team. In contrast to a product owner, a product manager is more business oriented. He is point of contact for clients of SPT and collaborates with the Marketing & Communication department of SPT for marketing and product related strategies.

Product owner (or technical manager)

The product owner is responsible for the technical development and implementation of software products. He and his project team operate by the agile way of working and the scrum methodology is embedded within their approach of projects. Furthermore, the product owner sets directions for the team, guides them if necessary and monitors the project.

Other roles

Management team

The management team includes all managers as described above. This team manages and directs the entire SPT department, each manager responsible for his own field of expertise. As a team collectively, they set directions for SPT and pursue predefined long-term organizational goals and objectives.

Project team

The project team includes SPT employees involved within a particular project. Employees with different backgrounds and expertise are involved, e.g. software architects, software developers and software testers. Management expertise is part of the team as it supports in managing and directing the project.

Initiation New Meetings

New meetings are initialized in order set interim moments of reflection and timely direction of strategy and activities. The next section provides a detailed explanation of the differently themed meetings.

Evaluation Meeting

This project evaluation meeting covers the assessment of all activities involved within the project and is organized to review the entire project from start till closure. All involved internal stakeholders are offered the opportunity to give feedback and points of improvement, as well as key accomplishments and best practices. The quality of deliverables is assessed, as well as lessons learned. All stages of project execution have to be taken into account in order to achieve overall project assessment. Outcomes of this evaluation meeting are used within the bi-annual overall Project Evaluation Meeting. In here, results of the executed projects are addressed and appropriate measures are taken.

What? *Evaluation meeting*
Who? *Project Manager and involved SPT project team*
When? *After completion each project*

Overall Project Evaluation Meeting

In order to evaluate on each project after completion and allow for a moment of feedback and improvement, the aforementioned project evaluation meeting is one of the final steps in the Operational Planning. In here, the project is evaluated in terms of process, quality, costs, planning, deliverables etc. Results of these meetings are gathered. In biannual overall project evaluation meetings, the results, best practices and lessons learned are evaluated and taken into account in the Tactical Planning. By biannually discussing and assessing all project evaluations, decisions in terms of project prioritization and termination can be kept up-to-date.

What? *Overall project evaluation meeting*
Who? *Management team*
When? *Biannually*

Portfolio Meeting

In quarterly scheduled portfolio meetings, ongoing projects will be assessed based on their progress and process. The Project Assessment Criteria Checklist will be use to assess projects on project-, partner- and feature level. Entire management team has to be involved in completion of this assessment. Furthermore, the results of the application of portfolio tools will serve as input for this meeting. Projects that require attention will be presented, as well as projects in line for potential prioritization. These results are of key importance in decisions concerning project prioritization, continuation or termination. Essential within these meetings is a centralized focus on prioritization of projects and resource allocation.

What? *Portfolio meeting*
Who? *Management team*
When? *Quarterly*

Tactical Meeting

In the Tactical Planning, projects are reviewed and assessed upon a set of portfolio metrics as mentioned above. Each project in the SPT portfolio will be evaluated quarterly. Hereafter, results and outcomes, in terms of project continuation, prioritization or termination, are gathered. In annually scheduled tactical meetings, these results are discussed. The feedback and results of these meetings will give the opportunity to review and redirect the SPT strategy and update if necessary.

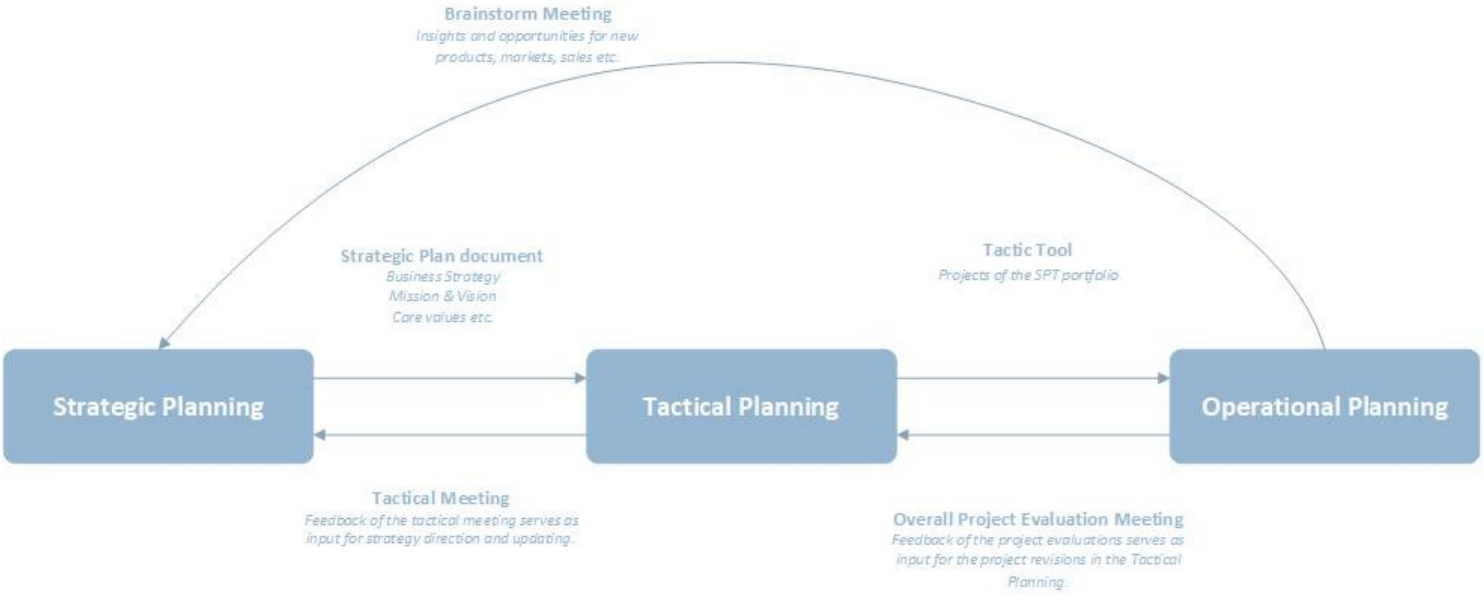
What? *Tactical meeting*
Who? *Management team*
When? *Annually*

Brainstorm Meeting

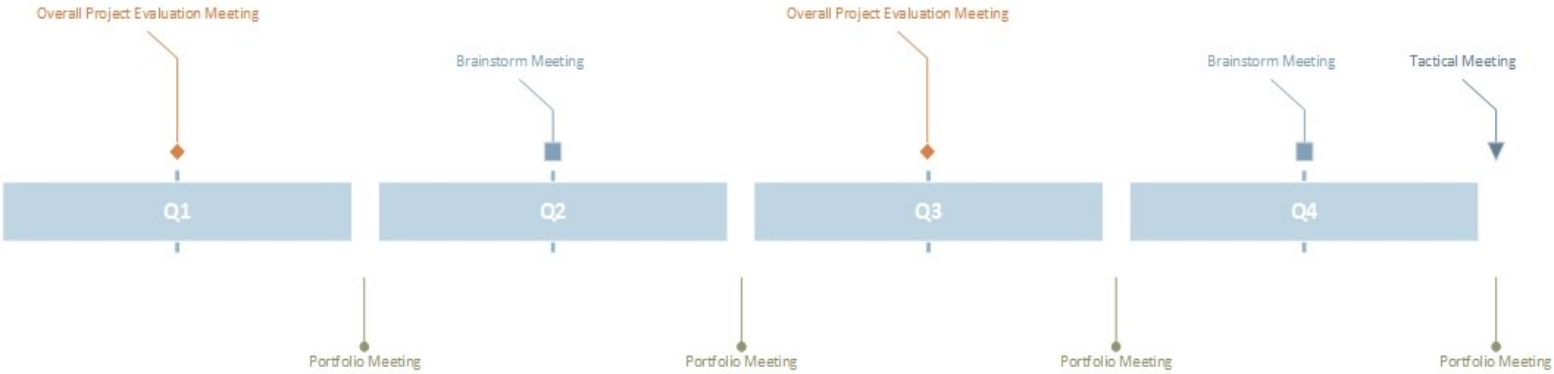
In order to foster new opportunities and innovation in project- and product developments, differently themed brainstorm session(s) will be initialized. Participation of internal stakeholders (employees SPT) is desired in these meetings, both technically and strategically skilled. Besides internal stakeholders, external stakeholders as for instance partners, customers and financers, are welcomed as well. This brainstorm session will be scheduled biannually. A *Brainstorm* project team is assembled and held responsible for the theme definition, e.g. exploration new markets, trends & developments, new technologies etc. Furthermore, they are responsible for guidance of the session(s), development of a plan of action based on the outcomes and implementation this plan. The acquired ideas and opportunities will serve as input for the Strategic Planning, resulting in new insights and opportunities related to New Product Development (NPD).

What? *Brainstorm meeting*
Who? *Internal- and external stakeholders*
When? *Biannually*

Interrelation Planning levels



Overview Annual Meetings



Implementation within ERP software

In order to take initial steps in the implementation of the tool, the appropriate elements will be prepared for application within ERP software. ERP is short for Enterprise Resource Planning, a software system supporting organizations in the automation of their business processes. This information- and management system bundles processes related to payroll, finance, ordering, CRM, HRM etc. The application of ERP software makes administrative-, logistical and financial business processes more effective, efficient and productive. Furthermore, it enhances the ability to monitor business processes, costs are reduced and customer satisfaction is increased.

Implementation AFAS

Sigmax uses AFAS software as their ERP system. AFAS offers one overall standard solution that supports Sigmax in the automation of their business processes. Processes that are of the repetitive type and require central documentation are highly suitable for implementation in AFAS. Different elements within the planning tool comply with these requirements, particularly templates of the Operational Planning. The developed templates are used at start or closure of every project, ideally repetitive and require central storing. Below an overview of planning tool elements suitable for implementation within AFAS. On the next page, a selection of implemented templates is presented.

Tactical Planning

- Portfolio Management Tools
    - Bubble Diagram
    - Strategic Buckets
    - Financial Calculations
- Project Assessment Checklist

Operational Planning

- Project Charter
- Project Management Plan
- Post-Project Evaluation

Marketing related activities

Product & Partner Landscape

In order to bring more structure in the SPT product portfolio and address areas as proposition management and product categorization, identification of SPT products, partners and customers is desired. In collaboration with the SPT sales- and operations manager, an initial draft of a Product & Partner Landscape is developed. In here, the various SPT products, partners and customers are discussed and visualized.

Appendix XX presents the initial draft of the Product & Partner Landscape.

Product Groups

In addition to the above mentioned, the development of SPT product groups is desired for the transition of a project-driven organization into a product-driven organization. An initial draft of SPT product groups is therefore required. Each product group requires a theme in order to promote the right business proposition of SPT. Moreover, the addressed themes can be used to express the SPT business and their products to external stakeholders and potential customers.

Marketing

In order to take initial steps in the process of marketing and related activities, the appointment of a Product Manager and Marketer are of key importance. Exploratory conversations with a Sigmax Marketer already took place. In here, possible SPT marketing opportunities were discussed as well as a possible job responsibilities. A job description and related responsibilities are prepared for the appointment of the marketer as well as the product manager. The developed job responsibilities and guidelines are based on different elements of the Strategic Planning, guiding them in their introduction phase within SPT. The next section provides these job responsibilities and guidelines.

Job responsibilities – Product Manager

Internal exploration

Insights and understanding of the internal business environment of SPT

- Organization
- Marketing
- Portfolio
- Financials

External exploration - OVPocket

Insights and understanding of the external business environment of SPT

- Market
- Product
- Technology

Preparation & Execution Scenario-based Roadmap workshop (SBRM)

Preparation phase

1. Assignment project team SBRM
2. Inviting workshop participants
3. Preparations by participants

Execution phase ***Definition current situation SPT & driving forces***

1. Definition and synthesis of current situation SPT
2. Definition of driving forces (environmental elements, factors that shape market demand)
3. Examination driving forces at different levels

Execution phase ***Scenario development***

1. Selection of driving forces
2. Development differently themed scenarios

Closing phase ***Design and implementation of SPT roadmap***

1. Design
2. Roadmap elements
   - Which **market segments** will we focused on?
   - Which **customer key requirements** will fit to these market segments?
   - Which **products** do we want to develop?
   - Which **capabilities** (e.g. personnel) are required?
   - Which **technologies(s)** are required?
3. Implementation

Job responsibilities – Marketer

Internal exploration

Insights and understanding of the internal business environment of SPT

- Organization
- Marketing
- Portfolio
- Financials

External exploration

Insights and understanding of the external business environment of SPT

- Input for strategy development
  - SWOT analysis
  - Porters Five Forces analysis
- Insights business environment
- Market analyses
- Product analyses
- Technology analyses
  - DESTEP

The next page provides a detailed description of the abovementioned analyses.

SPT Marketing Mix Definition

- Products
- Price
- Promotion
- Place

Development Marketing Strategy

How to apply marketing within SPT?

- Online digital strategy
  - Social media marketing
  - E-mail marketing etc.
- Offline
  - Client/customer events
  - Visiting fairs etc.

Supporting role towards Product Management