

MASTER

Risks in the post-implementation phase of enterprise system implementations qualitative, inductive, multiple case study research

van Dijk, N.J.

Award date:
2013

[Link to publication](#)

Disclaimer

This document contains a student thesis (bachelor's or master's), as authored by a student at Eindhoven University of Technology. Student theses are made available in the TU/e repository upon obtaining the required degree. The grade received is not published on the document as presented in the repository. The required complexity or quality of research of student theses may vary by program, and the required minimum study period may vary in duration.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain

Eindhoven, November 2013

Risks in the post-implementation phase of enterprise system implementations

Qualitative, inductive, multiple case study research

Master's thesis
N.J. van Dijk

BSc Industrial Engineering & Management Science
Student identity number 0629302

in partial fulfilment of the requirements for the degree of

Master of Science
in Operations Management and Logistics

Supervisors

Prof.dr.ir. H.A. Reijers, Eindhoven University of Technology
Dr.ir. I.T.P Vanderfeesten, Eindhoven University of Technology
Ir. G.M. Nugteren, Deloitte Consulting B.V.
Drs. J. Tressel, Deloitte Consulting B.V.

TUE. School of Industrial Engineering.
Series Master Theses Operations Management and Logistics

Subject headings: enterprise systems, post-implementation, risk management, risk framework, mitigations, continuous improvement, onward and upward

Preface

Nes aan de Amstel, November 2013

It is miraculous to be able to present to you the result of my graduation project, which is also the result of a six year period, fulfilling my bachelor's and master's degree at the faculty of Industrial Engineering at the TU/e.

I would like to thank my university supervisors Hajo Reijers and Irene Vanderfeesten for their great support. My journey with Hajo started already at the end of 2011, aiding me in my course selection and application for what would be an amazing exchange semester. Hajo, your support during the final project was exactly what I needed. Thank you for first asking in every meeting 'How are you, Nienke?', answering my 23:30 e-mails at 23:45, and confirming my ideas and thinking along with me. Irene complemented Hajo perfectly. Irene, thank you so much for sharing your own experiences, your valuable feedback, and stimulating me in the tough times of this period.

Deloitte provided an inspiring environment to conduct this thesis in, with all the resources I could have wished for. I would like to thank René Theunissen for providing me with this wonderful opportunity at the Enterprise Architecture service line. I would also really like to give thanks to Thijs Nugteren and Jurriaan Tressel, who supervised my graduation project, even though the subject shifted away from their area of expertise in the first weeks. Thijs, your intelligent remarks and detailed feedback were really helpful. Furthermore, I feel blessed having all of the Deloitte colleagues who helped me in establishing company contacts, who took time for thinking along with me, who participated in the validation workshop, and who provided individual feedback on my final deliverables. Thank you to you all. A special thanks to Bart Smulders for being an inspiring brainstorm partner, with much expertise in this field. Finally, I would like to thank my graduation intern colleagues for the coffee moments, in which we shared our worries and joys.

However, this project would have been nothing without my interview results. Therefore, I would like to thank all the people who took the time to share their experiences and insights with me. With this, I include all of the interviewees within AMC, Damen Shipyards and Rabobank, but also the additional interviews and the validation case study interviews.

Last, but not least, I want to thank my parents, my family, my church, and all my friends. You were there for me during this period, with whatever support I needed, whether it be a listening ear, prayer, trust, distraction, or a glass of wine. Erik and my sister, Aukje, I am really thankful to you for providing me housing in the beautiful village of Nes aan de Amstel, within cycle distance from the Deloitte office. In conclusion, I would like to thank everyone who believed in me and my project, especially when I did not. You helped me through this period and helped me to perform this project to the best of my abilities.

Nienke van Dijk

“For God, who said, ‘Let light shine out of darkness’, made his light shine in our hearts to give us the light of the knowledge of God’s glory displayed in the face of Christ.”

2 Corinthians 4:6 (New International Version Bible)

Abstract

This thesis focuses on risks that organizations face in the post-implementation phase of enterprise systems implementations, which is also called the continuous improvement or onward and upward phase. In this phase, it is up to the organization to continue the activities concerning management and usage of the application. This is contrary to the implementation phase, where system integrators and vendors usually support organizations. Many organizations experience difficulties during the post-implementation phase, which prevent them from realising the full benefits of the enterprise system. By conducting inductive multiple case study research, focused on issues that organizations encountered in the post-implementation phase, qualitative data has been gathered as input for a risk framework. As a result, this thesis presents the Sunshine Framework, including a risk framework, a list with definitions and a roadmap with preventive actions and mitigations. This Sunshine Framework will help organizations to actively perform post-implementation risk management and, thus, to better anticipate and act on issues in the post-implementation phase. The risk framework is structured according to stakeholders in the organization, i.e. the people and organizational perspective is central, and is new in its kind. Besides being useful for practitioners, the results of this research address a gap in literature regarding post-implementation aspects.

Management summary

Deloitte Consulting, amongst other things, supports organizations during enterprise system (ES) implementations. However, Deloitte Consulting, like many other system integrators, is usually involved in the program until a few months after the ‘go live’ of the ES. After this moment it is up to the organization to continue the activities concerning management and usage of the application. Many organizations experience difficulties during this phase, which prevent them from achieving the full benefits of the ES. However, preparation for the post-implementation phase often does not receive a companies’ focus during the implementation project. Literature also lacks a focus on post-implementation aspects, contrary to the abundant amount of studies focusing on implementation aspects (i.e. critical success factors and methodologies). Therefore, this thesis is focused on issues, risks and mitigations in the post-implementation phase of ES implementations.

To ensure a common understanding of the central concept in this research project, the post-implementation phase is defined as the phase after the implementation of an ES, when the system is in operational use, when the responsibilities for application management have been shifted from the project team to the standing organization and when normal operations can be executed repeatedly without critical issues (such as failing functionalities, lacking performance, login issues). In other words, it starts when the post-implementation dip has been passed. It endures until the system will be decommissioned or the responsibilities for application management shift back to a project team (due to a major change). The phase includes activities in the field of maintenance, improvement, user support and extension.

Qualitative, inductive, multiple case study research has been conducted at three large (multinational) organizations in The Netherlands (in different sectors and regarding different ESs), to gather data about issues that these organizations encountered during the post-implementation phase. In total 23 interviews were held, resulting in 115 pages of text data after transcription. This data has been analysed by conducting open coding. At first, each case study was analysed separately, in within-case analyses, and the results were verified with the group of interviewees. Secondly, an across-case analysis was conducted to generalize issues that were mentioned by different interviewees in different organizations. This resulted in a list of 61 generalized issues. During the validation, this list was evaluated by conducting four other small case studies (again in different sectors and regarding different ESs) and by checking the issues with ten experts in the field on completeness, correctness and clarity.

The issues imply risks for other ESs in the post-implementation phase. Therefore, this list provided input for the design of the Sunshine Framework, shown in Figure 1. It includes a risk framework, definitions and a roadmap with preventive actions and mitigations.

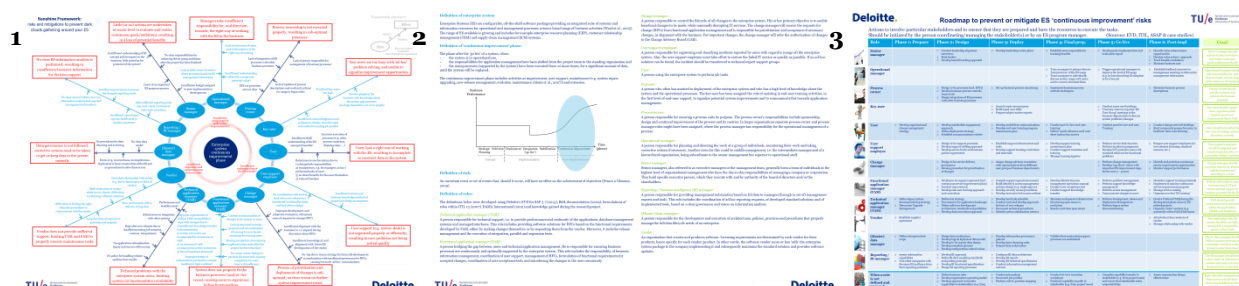


Figure 1: Screenshots of the Sunshine Framework, the result of the research project (page 31-33)

The first part of the Sunshine Framework shows risks that organizations face in the post-implementation phase. Risks are structured according to roles (i.e. stakeholders) in the organization to emphasize the importance of the people and organizational aspect during the implementation. Risks were linked to the role that has 'influence' on the risk or by which the risk is 'caused'. Besides, three general risks were defined that affect all roles. The roles are defined in the second part of the framework, to ensure a common understanding.

The risks in the framework can be summarized as follows:

- In the business: Insufficient understanding of, and responsibility taken for, a correct way of working with the ES
- In IT service management: Insufficient knowledge and capabilities to provide user support, to initiate improvements and extensions, and to maintain the ES
- In information management: No clear vision, governance or procedures for managing ES data and management information

Besides, important general risks concerning all stakeholders in the organization are:

- Insufficient understanding of the ES concept
- Unclear assignment of tasks/roles/ responsibilities
- Insufficient alignment and communication between roles

The third part of the Sunshine Framework is a roadmap containing preventive actions and mitigations to the identified risks. In fact, many issues during the ES post-implementation phase are caused by prioritization of actions and decisions taken during the implementation project. Usually implementations are restricted by time and budget, resulting in procedures being followed less strictly and testing occurring less comprehensively. Therefore, to develop the roadmap, three well-known and widely accepted implementation methodologies were studied (ASAP, EVD and ITIL). Actions in these methodologies were mapped to the post-implementation risks if they imply preventive actions or mitigations. However, there seemed to be a gap in the methodologies concerning 10 of the 49 risks. This gap included lacking actions regarding involvement of operational managers, relationship management with the vendor, establishment of procedures for prioritizing ES changes, maintenance of process descriptions and integration of ES processes with other business processes. The gaps were filled with lessons learned from the case studies, as well as with self-developed actions.

The resulting roadmap contains actions that should not be missed during an implementation project, or that still should be initiated if the organization is already facing certain risks, if one wants to achieve the presented goals that contribute to a successful post-implementation phase. Two specific recommendations can be made. First, it is recommended to initiate a 'concept driven' (post-)implementation project, in which the 'concept' gives meaning to all stakeholders and their tasks. In other words, the concept should indicate the required outcomes and benefits of system and structure changes. Second, it is important to organise IT service management in a proper and efficient way. Stakeholders should be assigned, aligned and prepared to solve occurring issues quickly, before accumulation and escalation of issues. The design of a support governance approach, staffing approach and training approach are especially important. The stakeholders should be aligned to work on continuous improvement of the enterprise system and support the usage of the system in the business.

The total Sunshine Framework should be used to actively perform 'post-implementation risk management' by (post-) implementation ES program managers, budget holders or coordinators/ managers of the stakeholder(s). It will be most useful when used periodically.

Contents

1	Introduction.....	1
1.1	Thesis motivation	1
1.2	Research goal and research questions.....	2
1.3	Research methodology	3
1.4	Thesis outline.....	5
2	Definition.....	6
2.1	Enterprise system implementation models.....	6
2.2	Synthesis of post-implementation phase definition.....	8
3	Fieldwork.....	10
3.1	Case study selection.....	10
3.2	Case study approach and execution	14
4	Analysis.....	16
4.1	Rationale.....	16
4.2	Analysis of case study data	17
5	Design	20
5.1	Design of framework	20
5.2	Design of action plan	25
6	Literature unfoldment.....	34
6.1	General enterprise systems research.....	34
6.2	Post-implementation research	36
6.3	Conclusion	39
7	Validation.....	40
7.1	Theoretical validation.....	40
7.2	Practical validation.....	43
8	Conclusion	50
8.1	Research questions	50
8.2	Research contributions.....	52
8.3	Limitations	53
8.4	Suggestions for further research	53
	Bibliography.....	54
A	Abbreviations.....	58
B	Full case study descriptions.....	59

B.1 AMC	59
B.2 Damen Shipyards Gorinchem	61
B.3 Rabobank	63
C Interview protocol.....	67
D Across-case analysis results	68
E Literature frameworks	71
E.1 Model for ERP post-project management.....	71
E.1 Risk in ERP post-implementation ontology.....	72
E.3 General ERP maintenance risks taxonomy.....	73
F Input for roadmap design	74
F.1 EVD gap analysis	74
F.2 ASAP gap analysis	76
F.3 Case study mitigation analysis	79
F.4 Final risk - action mapping	82
G Theoretical validation	91
G.1 Comparison of framework with literature.....	91
G.2 Comparison of roadmap with literature	91
H Expert validation.....	94
H.1 Workshop results	94
H.2 Sample expert validation form	97
I Company validation	102
I.1 Validation interview protocol	102
I.2 Interview results Erasmus University Rotterdam	103
I.3 Interview results IHC Merwede	105
I.4 Interview results MSD Animal Health.....	106
I.5 Interview results European MSO.....	109
I.6 Sample company validation form	111
J Confidential appendix.....	116
J.1 All interview results	116
J.2 Within-case analyses	116
J.3 Confidential across case analysis.....	116
J.4 Conversion table	116
J.5 Mitigation analysis	116

1 Introduction

This thesis presents the result of a graduation research project on the topic of ‘risks in the post-implementation phase of enterprise system (ES) implementations’ conducted at Deloitte Consulting. Deloitte is, amongst many other things, a partner for supporting ES implementations at many different types of organizations. This is inseparably accompanied by (some sort of) organizational transformation. Deloitte is usually involved in the program until a few months after the ‘go live’ of the enterprise system. After this moment it is up to the organization to continue the activities concerning management and usage of the application. However, many organizations experience difficulties during this phase, which prevents them from realising the full benefits of the enterprise system. Therefore, this thesis focuses on risks in the post-implementation phase of enterprise system implementations and aims to guide organizations to better anticipate and act on issues in the post-implementation phase.

In the remainder of this chapter, the motivation for this research project will be explained in more detail in Section 1.1. Secondly, in Section 1.2, the research goal and the research questions will be presented concisely. Next, the research methodology will be presented in Section 1.3. Finally, the chapter concludes in Section 1.4 with an outline of the remainder of the thesis.

1.1 Thesis motivation

Enterprise resource planning (ERP) systems remain the application that many firms will spend the most money on, as well as being one of the most complex and time-consuming to implement and support (Forrester, 2013). According to research carried out by Panorama Consulting (2013) the average cost of an ERP implementation in the past four years has been above \$7 million dollars and the average duration above 16 months.

An ERP system is one type of enterprise system. The range of enterprise systems (ES) is growing and includes, for example, also customer relationship management (CRM) and supply chain management (SCM) systems. Enterprise systems, recently also called ‘enterprise-spanning business applications’ or ‘business application suites’, are configurable, off-the-shelf software packages that provide an integrated suite of systems and information resources for operational and management processes across a broad range of business activities (Ward et al., 2005). These systems allow managers to make decisions based on information that truly reflects the current state of their business (Davenport et al., 2004). The implementation is typically performed by a project team that combines IT and business representatives of the implementing organization, with external experts from vendors (e.g. SAP, Oracle, Salesforce.com) and system integrators (e.g. Deloitte) supporting the change.

In addition to the fact that enterprise system implementations are risky and complex, many firms experience difficulties to achieve the expected benefits (Davenport et al., 2004) (Gartner, 2012a). Panorama Consulting (2013) reports that in 2012 60% of the respondent organizations received less than 50-percent of the measurable benefits they anticipated from their ERP software initiatives. The major problems that organizations must overcome are how to fully integrate all components of the enterprise system, how to improve and optimize

the business processes and how to increase the automation of decision-making analysis (Davenport et al., 2004). This is an on-going process. When firms stop directly after the implementation of the enterprise system, the full potential benefits of the enterprise system will not be achieved. Regarding this, Willis and Willis-Brown (2002) state that 'going live' with the new system is 'not the end of the ERP journey, but the beginning'. Full benefits can only be realized with continued effort and focus after the system is in operation.

However, many organizations still view the start-up of an enterprise system as the final goal instead of a milestone (McGinnis & Huang, 2007). Gartner (2012b) describes that once the enterprise system is in place, often the project team is dissolved and the business users that have been seconded to the project return to their regular jobs or move on to the next project. Zhu et al. (2010) mention similarly: "Few leaders have realized the importance of their roles at the post-implementation stage because most of them deem that all activities after implementation are the duties of the IT department." As a result, focus and business involvement is lacking in the on-going management of the system.

The lack of focus on the on-going management of enterprise systems also exists in scientific literature. The majority of enterprise systems research focuses on critical success factors of the implementation and on implementation methodologies, but seldom addresses post-implementation issues (Botta-Genoulaz et al., 2005) (McGinnis & Huang, 2007)(Grabski et al., 2011). Law et al. (2010) conclude: "Post-implementation issues are as important as matters concerning adoption, yet they are often under-researched". Peng and Nunes (2009) even more emphasize this: "There is a scarcity of studies focusing on ERP post-implementation, in contrast with an over-abundance of studies focusing on implementation and project management aspects." Finally, Dey et al. (2013) state: "We call for extending the risk management practices to the post-implementation period. This will help to ensure the sustainability of enterprise information systems."

In fact, the majority of issues that companies face in the post-implementation phase are caused by unresolved or unrecognized problems from earlier (pre-)implementation phases, while the organization no longer has control over these past deficiencies, errors or misjudgements (Pan et al., 2011)(Markus et al., 2000). Nonetheless, organizations need to devise mitigation and contingency plans to deal with the emergence of such issues. Furthermore, identifying post-implementation issues will help to manage risks in a future implementation. As Markus et al. (2000) mention, 'preventing and resolving onward and upward phase problems must occur well before the project phase even begins'. Thus, despite a close link existing between some pre- and post-implementation issues, research that is focused specifically on post-implementation risks and mitigations will be useful and will address a gap in literature.

1.2 Research goal and research questions

To structure the research project, a research goal and four research questions were defined.

Research goal:

To develop a framework that identifies risks that organizations face in the post-implementation phase of enterprise system implementations, and to develop an action plan to prevent or mitigate these risks.

Research questions:

1. *What is the post-implementation phase of an enterprise system implementation?*
2. *What are issues (IT & non-IT oriented) that organizations encounter in the post-implementation phase of enterprise system implementations?*
3. *How can these issues be generalized and structured in a risk framework?*
4. *How can the identified risks be prevented or mitigated?*

As described in motivation for this thesis, the results of this research project will not only be practically useful for organizations implementing or using an enterprise system, but will also fill the gap regarding post-implementation aspects in academic literature.

1.3 Research methodology

This graduation research project has a business problem solving (BPS) focus, in combination with a research focus. In other words, it is a project aiming to solve a performance problem and endeavours to develop knowledge that is generally applicable. Therefore, two research methodologies will be combined. First, the problem solving process is structured using the regulative cycle by Van Aken et al. (2007). The approach consists of the following phases:

1. *Problem definition:* The initial business problem will be defined and a research design will be made.
 - Enabler: research proposal
2. *Diagnosis and analysis:* The analysis and diagnosis should result in specific knowledge in the context and nature of the problem.
 - Enabler: qualitative, inductive, multiple case study research, resulting in a post-implementation risk framework
3. *Plan of action:* This includes the design of the solution for the defined problem and a change plan to implement this solution.
 - Enabler: analysing ES implementation methodologies and practical tips from case studies, and designing a roadmap with preventive actions and mitigations
4. *Evaluation:* Steps in this phase are the identification of the achieved results, orientation and learning for future problems, building scientific knowledge and development for involved employees and professionals.
 - Enabler: expert validation form and interviews combined with company validation forms and interviews, culminating in the writing of the final thesis

In the original regulative cycle by Van Aken et al. (2007), an extra phase of implementation is identified before the evaluation. It aims to apply the plan of action for the business to achieve performance improvement. However, Van Aken et al. (2007) describe that within a graduation project there is often not enough time available to perform the implementation. This is also the case for this project and therefore this phase of implementation is not included in the research methodology. Instead, the design of a plan of action results in a roadmap to practically use the knowledge accumulated during this research.

Of the four phases presented above, most of the emphasis in the project is on the phase of diagnosis and analysis, where the aim is to gather specific knowledge about post-implementation risks and to develop a framework that describes these risks. In order to achieve this goal, qualitative inductive research has been performed by means of multiple case studies. Since confusion often surrounds the distinction between qualitative data, inductive logic and case study research (Eisenhardt, 1989), the definitions, features and benefits of the three types of research combined in this project are given in Table 1.

Table 1: Explanation of the characteristics of this research project

	Qualitative research	Inductive research	Case study research
Definition	A nonmathematical process of interpretation, carried out for the purpose of discovering concepts and relationships in raw data and then organizing these into a theoretical explanatory scheme (Strauss & Corbin, 1998).	A process in which the researcher begins with an area of study and allows the theory to emerge from the data. Data collection, analysis and eventual theory stand in close relationship to one another (Strauss & Corbin, 1998).	An empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident (Yin, 2003).
Features	Most analysis is done with words, e.g. by assembling, sub clustering, breaking into semiotic segments, and the researcher is essentially the main 'measurement device' in the study (Miles & Huberman, 1994).	A researcher does not begin the project with a preconceived theory in mind, unless his or her purpose is to elaborate and extend existing theory (Strauss & Corbin, 1998).	Case studies typically combine data collection methods such as archives, interviews, questionnaires, and observations (Eisenhardt, 1989).
Benefits	Qualitative data focuses on naturally occurring, ordinary events in natural settings, so that we have a strong handle on what 'real life' is like. Other benefits are richness and holism, with strong potential for revealing complexity, since the gathered data provides descriptions that are vivid, nested in a real context and imply a truth with strong impact on the reader (Miles & Huberman, 1994).	Theory derived from data is more likely to resemble the reality, than theory derived by putting together a series of concepts based on literature, experience or through speculation. In other words, because they are drawn from data, inductive theories are likely to offer insight, enhance understanding, and provide a meaningful guide to action (Strauss & Corbin, 1998).	The influences of the local context are not stripped away, but are taken into account. The possibility for understanding latent, underlying or nonobvious issues is strong (Miles & Huberman, 1994). Case studies are the preferred strategy when the investigator has little control over events and when the focus is on a contemporary phenomenon within real-life context (Yin, 2003).
Opposite	Quantitative research	Deductive research	Experimental research, theoretical research

The benefits describe why each type of research is useful and powerful for this research project. They are particularly relevant as this project is focused on post-implementation risks which are 'phenomena that happen in an organization' (benefit case study research) and that are 'naturally occurring, ordinary events in natural settings' (benefit qualitative research). Furthermore, it aligns well with the research objective to 'enhance understanding, offer insight and provide a meaningful guide to action' on these risks (benefit inductive research).

Besides confusion regarding the distinctions of the three characteristics discussed above, there is often a lack of clarity about the process of actually building theory from cases (Eisenhardt, 1989). Often, it is performed a sloppy and unsystematic manner (Yin, 2003). Therefore, in this graduation project a roadmap developed by Eisenhardt (1989) is closely followed to systematically approach this part of the research project. The phases in the

inductive process include the selection of cases, development and usage of case study protocols, execution of case studies, analysis of data, comparison with literature and finally the closure, having a theory (i.e. the framework in this project). In Figure 2 the complete research design is visualized, demonstrating that the approach for projects with a business problem solving focus by Van Aken et al. (2007) is combined with the approach for qualitative inductive case study research by Eisenhardt (1989). In the corresponding chapters of this thesis report, the approach used in particular phases will be explained in more detail.

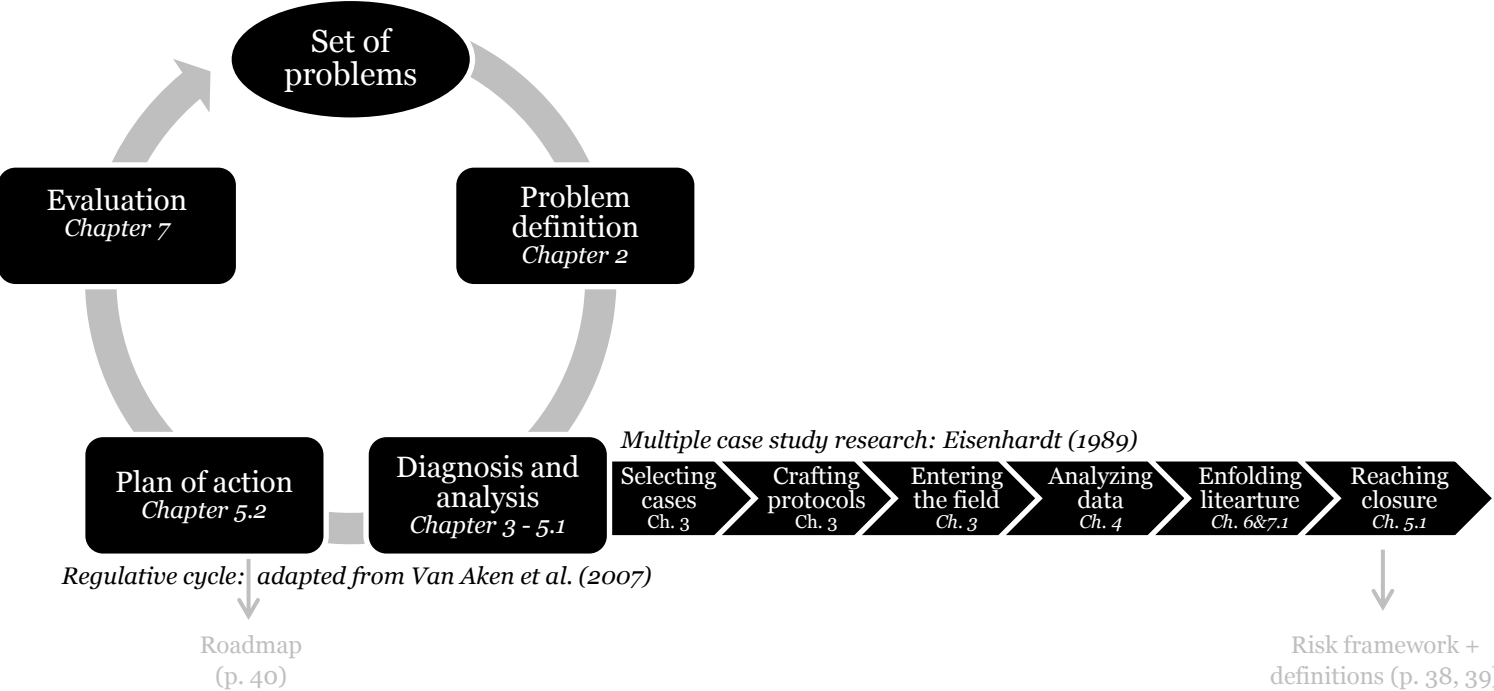


Figure 2: Research methodology

1.4 Thesis outline

The remainder of the thesis is structured according to the research methodology, as indicated by the chapter numbers in Figure 2. In Chapter 2, a more detailed description will be given of the post-implementation phase and a definition will be presented. Next, the first three steps of the diagnosis and analysis phase (selecting cases until entering the field) will be described in Chapter 3, Fieldwork. In Chapter 4, the process and results of the analysis of the data gathered during the fieldwork will be described. Subsequently, Chapter 5.1 describes the result of the diagnosis and analysis phase, a post-implementation risk framework. Chapter 5.2 describes the result of the plan of action phase, a roadmap with preventive actions and mitigations to these risks.

After presenting the design, in Chapter 6 a literature overview is given, such that results of the case study research can be compared with emerging theories. The need of this theoretical validation is emphasized by the ‘enfolding literature’ step of Eisenhardt (1989). Therefore, as subsequent evaluation steps, Chapter 7 first compares the deliverables of the research project with the presented literature and, secondly, evaluates the quality of the deliverables of the research project by assessing four different validation aspects. Finally, the thesis is concluded in Chapter 8 with the main conclusions, contributions and directions for further research.

2 Definition

This chapter presents a definition of the post-implementation phase, to ensure a common understanding of the central concept in this research project. First, in Section 2.1, general ES implementation models and phases are discussed and, subsequently, the post-implementation phase in particular, the final phase of implementation models. Section 2.2 contains a synthesis and presents the post-implementation phase definition used in this research, resulting in an answer to the first research question.

2.1 Enterprise system implementation models

Davenport et al. (2004) describe an enterprise system implementation as ‘one of the most ambitious information system projects in a company’s history’. As a response to problems that occurred during these projects, several researchers have developed models for successful ERP implementations. Three well-known and widely cited models of ERP implementations are the ‘five stages in the ERP journey’ presented by Ross and Vitale (2000), the ‘project phase model (PPM) of ERP implementation’ developed by Parr and Shanks (2000) and the ‘enterprise system experience cycle’ as presented by Markus and Tanis (2000), given in Figure 3, Figure 4 and Figure 5 respectively.

Recently, there has been increasing attention for the fact that ERP implementations are not finite projects, but that ‘ERP requires a full lifecycle perspective to be taken by adopting companies’ (Law et al., 2010). Figure 6 shows a recent model developed by Gartner (2012c), where different phases are presented in a cycle. They explain that ‘complex business application suites such as ERP follow life cycles that must be managed if full value is to be derived from their use’ and recommend to expand the attention beyond the current phase.

Though all using different names, in essence all four models present similar phases. They start with a planning phase, including the selection of a system and a project team, in which the project scope and implementation approach will be determined. Secondly, they contain a project implementation phase, which includes deployment, the ‘go live’ of the system and a period of ‘shakedown’ or ‘stabilization’ where the project team needs to act on serious problems that occurred after the ‘go live’. Finally, the models present a post-implementation phase in which maintenance, improvement and extension initiatives are key activities.

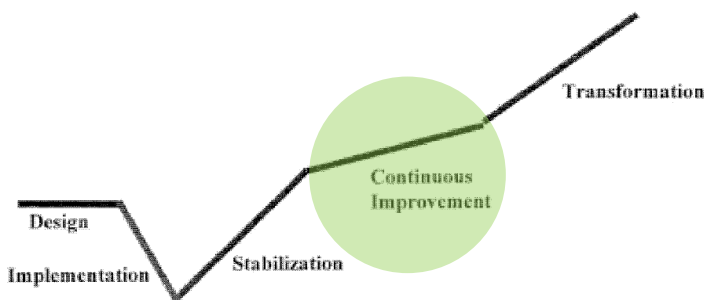


Figure 3: Stages in the ERP journey (Ross & Vitale, 2000)

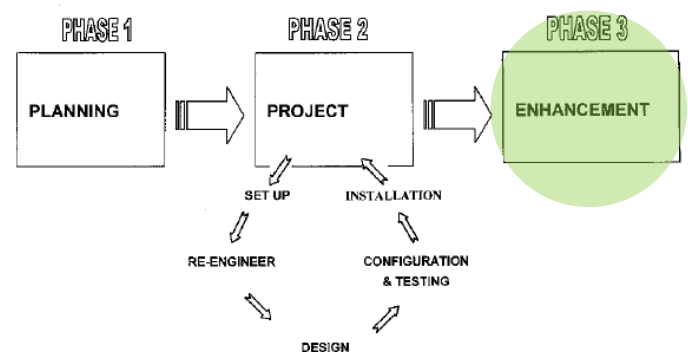


Figure 4: The PPM model of ERP implementation (Parr & Shanks, 2000)

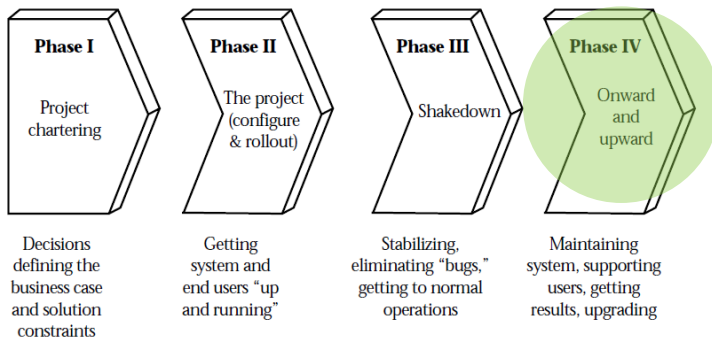


Figure 5: Enterprise System Experience Cycle (Markus & Tanis, 2000)

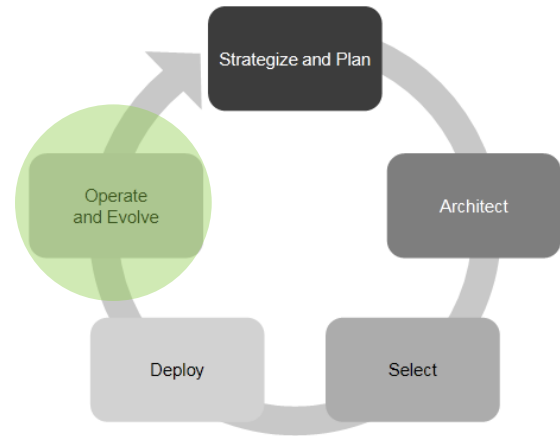


Figure 6: The Five phases of the ERP life cycle (Gartner, 2012c)

As a response to these different models, Aloini et al. (2007) re-adapted and aggregated a model that corresponds to this categorization, given in Figure 7.

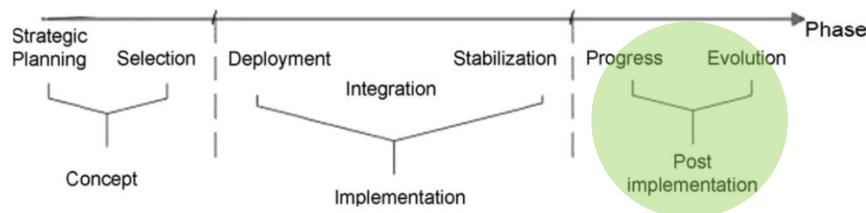


Figure 7: ERP life cycle (Aloini et al., 2007)

As can be seen in the presented models, different names and explanations are given for the phase after the implementation of the enterprise system. These names of the post-implementation phase, indicated green in the presented figures, and explanations are:

- *Continuous improvement*: "A stage in which firms were adding functionality through new modules or bolt-ons from third-party vendors. (...) they were also starting to engage in process redesign to implement new structures and roles to leverage the system." (Ross & Vitale, 2000)
- *Enhancement*: "The enhancement phase may extend over several years and includes the stages of system repair, extension and transformation." (Parr & Shanks, 2000)
- *Onward and upward*: "Continues from normal operation until the system is replaced with an upgrade or a different system. (...) Characteristic activities of this phase include continuous business improvement, additional user skill building and post-implementation benefit assessment." (Markus & Tanis, 2000).
- *Operate and evolve*: "This phase is all about how the organization uses ERP, and how it will need to change to meet the organization's ever-changing requirements." (Gartner, 2012c)
- *Post-implementation*: "Includes maintenance activities: upgrading, new-release management and evolution maintenance." (Aloini et al., 2007)

Yet, while all of the above models acknowledge a phase after the 'go live' of the system, nearly none of them explain in more detail what this phase includes. Especially the traditional models developed in 2000 all focus on the actual project implementation phase. Only Markus and Tanis (2000) and Gartner (2012c) provide a list of activities included in this phase. To give a practical impression of the activities in the post-implantation phase, this list is given in Figure 8. Kurupparachchi et al. (2002) explain the under-emphasis as follows: "Post-implementation activities are critical for the acceptance of IT systems. Post-

implementation strategies are, however, not emphasized in other projects, because conventional project management methodologies consider that a project is over when the system or facility is operating.”

Markus & Tanis (2000)	Gartner (2012c)
<ul style="list-style-type: none"> • Ongoing operation and use of system and business process after the shakedown phase • Planning for upgrades and migration to later releases/versions of hardware and ERP software • Adoption of additional modules/packages and integration with ERP • Business decision making based on data provided by the ERP system • Continuous improvement of users' IT skills • Continuous business process improvement in order to achieve better business results • Reconfiguration of current release/version 	<ul style="list-style-type: none"> • Manage and monitor the ERP • Improve the quality of processes, talents, skills, software, methods and tools • Measure performance • Monitor use and compliance • Refine governance processes • Conduct post-implementation reviews • Revisit the business case to determine benefits realization • Evaluate application portfolio performance • Review alignment with business strategy • Support business-IT alignment and user-centricity • Ensure that ERP is included in the application portfolio management process • Evaluate opportunities for innovation

Figure 8: List of activities in the post-implementation phase

2.2 Synthesis of post-implementation phase definition

Since literature lacks a clear and common definition of the post-implementation phase, a definition has been developed by synthesizing the literature presented above and by executing short interviews with experts. This definition of the post-implementation phase is:

The phase after the implementation of a system, when:

- *the system is in operational use,*
- *the responsibilities for application management have been shifted from the project team to the standing organization, and,*
- *normal operations can be executed repeatedly without critical issues (such as failing functionalities, lacking performance, login issues), in other words when the post-implementation dip has been passed,*
- *until the system will be decommissioned or the responsibilities for application management shift back to a project team (due to a major change).*

According to the definition above, the post-implementation starts after the post-implementation dip, when the first and important hick-ups are solved and the main functionalities perform sufficiently. This moment will vary per system, per process and per organization. For example, regarding a system that supports the monthly HR payroll, it could be the case that during the first round of salary payments the HR employees were unable to process the payments at the right time (but two days later) and that in the second round of payments the system was still not able to add correct payment descriptions. It could be that normal operations could only be executed repeatedly without critical issues after three rounds of salary payments were made. In this example, the post-implementation phase starts three months after the implementation of the system, if the responsibilities for application management also have been shifted to the standing organization at that time. Usually the

stabilization period or post-implementation dip takes a couple of months (e.g. 3 – 6 months) after the implementation. However, again, this varies per system, process and organization. Furthermore, note that in some cases a ‘phased approach’ (versus a ‘big bang approach’) is used for the ES implementation project. In these cases, after a first ‘go live’ with basic functionalities, the project continues with the implementation of additional ES modules. This can result in the post-implementation phase starting at different times for different modules.

The post-implementation phase ends when the system will be decommissioned or when a new project team is established due to a major change to the system. In the latter, the responsibilities for application management shift back to a project team and the ES is in the implementation phase again.

This definition implies that the post-implementation phase includes activities of maintenance, improvement, user support and extension. The total post-implementation cost of the ES could be as high as 70 per cent of the total cost (Law et al., 2010), indicating these activities being very important to ESs. It also shows that the post-implementation phase contains more than a post-implementation review. Unfortunately, some of the earlier ERP literature mainly mentions the post-implementation review when it comes to the post-implementation phase. For example Parr and Shanks (2000) conclude that no significant enhancement phase in the case study companies was executed, which they explain by stating that ‘there has been no post-implementation review’. Moreover, Nicolaou (2004) concludes: “ERP post-implementation success could be defined by determining the extent to which an organization carries out a planned set of review/evaluation activities’. However, contrary to passive and retrospective execution of review activities, good post-implementation management requires (pro-)active acting on multiple dimensions (Law et al., 2010).

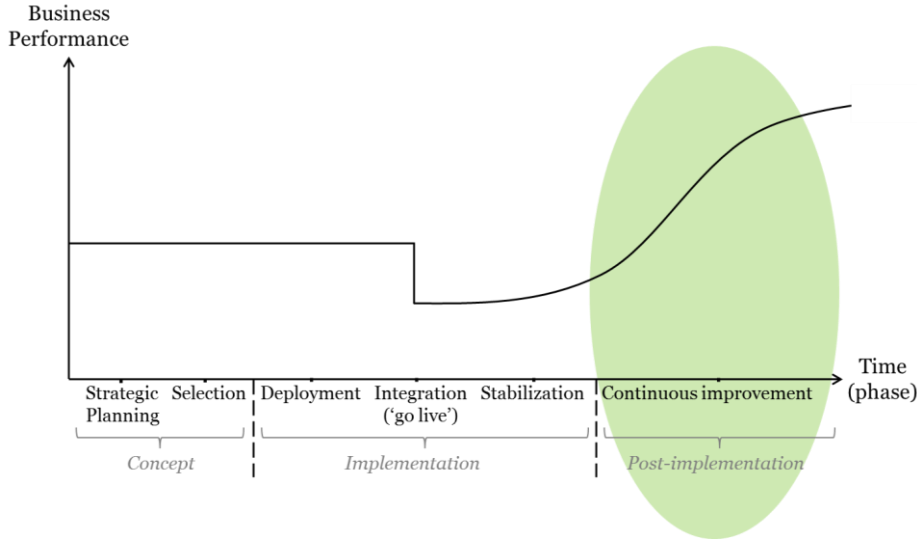


Figure 9: Different phases of an ES implementation (post-implementation phase emphasized)

In conclusion, the focus of this research project is on the post-implementation (or continuous improvement) phase after a phase of stabilization. This is visualized in Figure 9, where business performance was visualized as in Ross and Vitale (2000), representing a drop in business performance after the ‘go live’ and a slow start of enhancement afterwards. The purpose of this research project is to help organizations to achieve enhanced business performance faster (i.e. a steeper slope) during the post-implementation phase. Presumably, when they start to prevent and control the risks already during the concept and implementation phases, this will also result in a smaller post-implementation dip.

3 Fieldwork

As described in Section 1.3 Research methodology, the phase of diagnosis and analysis starts with selecting cases, crafting instruments and protocols and entering the field (Eisenhardt, 1989). This chapter describes these steps as performed during the fieldwork. First, Section 3.1 describes which cases have been selected. Next, Section 3.2 discusses how data is gathered.

3.1 Case study selection

Multiple case studies were conducted in this research project, since the evidence from multiple cases is considered more compelling and the overall study is regarded as being more robust (Yin, 2003). In order to achieve this, ‘replication’ logic should be followed. This means, according to Yin (2003), that ‘upon uncovering a significant finding from a single experiment, the immediate research goal would be to replicate this finding by conducting a second, third, and even more experiments’. However, the conduct of a multiple case study can require extensive resources and time, beyond the means of a single student or independent research investigator. The simplest multiple-case design is then the selection of two or more cases where one believes that replications can be found. Therefore, the choice has been made to select three case studies in this research project.

Random selection of these three cases is neither necessary, nor even preferable, in case study research. In case study research, the cases may be chosen to fill theoretical categories (Eisenhardt, 1989). Therefore, first multiple organizations were approached to participate in the research project by using contacts of Deloitte consultants or connections in the network of the researcher. Then, in order to build a risk framework that is applicable across organizational types and across enterprise system types, three diverse organizations and three different systems within those organizations were purposefully selected for the in-depth case study research. Besides diversity, other criteria were that the selected organizations are of significant size (i.e. turnover > €0.5 billion) and have a head office in The Netherlands, to enable holding interviews with different IT and business people within the organization. The final case study selection is given in Table 2. These case studies will be briefly described below and a full case description can be found in Appendix B.

Table 2: Selected organizations

Company name	Sector	Enterprise system	Type
Academic Medical Centre (AMC)	Healthcare	SAP	ERP
Damen Shipyards	Manufacturing	IFS	ERP
Rabobank	Financial services	Siebel	CRM

In addition to the three in-depth case studies, five interviews were held at companies in different sectors with experts in IT management or enterprise architecture. These interviewees showed interest to participate in the research after the first request. Therefore, their experiences and insights were gathered as input for the research. However, their organization was not chosen as one of the three in-depth case studies, due to the diversity criteria or since it was difficult to establish further contact within the organization.

Before describing the case studies, describing the data gathering process and presenting the results, a note should be made regarding these case studies. The research question causes

that the focus in the fieldwork is on issues, i.e. things that went wrong after the implementation of an ES, resulting in a 'negative' report. However, many aspects of the implementations were successful as well. Damen Shipyards has never built so many ships in a year as in 2012, while this most probably would not have been able with the old system. AMC is very content with the system performance and has made many steps towards more professional and optimized business processes. Finally, Rabobank won the CRM-award in 2008 for the CRM implementation and currently has the biggest CRM Siebel environment in the world. Thus, even though the case studies were focused on problems that occurred, many aspects of the implementations were successful as well.

3.1.1 Case description Damen Shipyards

Damen Shipyards is a global operating company with a leading position in shipbuilding. In 1969 the company was founded in The Netherlands, when the original Damen company was split and the current owner continued with 10 employees and 2 yards. During the last 44 years, Damen Shipyards has grown into a multinational company with an annual turnover of €1.7 billion, 38 yards worldwide, 8000 employees worldwide and around 160 annual deliveries of vessels¹. The vessels that Damen builds are used for a wide range of activities, e.g. for maritime operations in harbours, offshore, shipping, public transport, yachting, dredging and fishing. Besides shipbuilding, Damen offers customer support and after-sales services covering the complete vessel's lifecycle (through the start-up and deployment phases, to the second life or disposal phase).

Until 2011, Damen used the system Mars for material management and drawing management, a software package developed in the nineties. This software was highly customized to suit the company's specific processes. Therefore, updating to a newer release, to make use of new developments in ICT, was nearly impossible. This high degree of customization also caused that maturing and changing business processes of Damen could not be fully supported. Around 2008, the business and IT drivers began to accumulate to replace the outdated system by a system that facilitates more flexible and internationally orientated data sharing. The main driver was the continuing growth in sales, due to which capacity became limited and a closer link between sales and operations was necessary. Therefore, in the beginning of 2008, the instruction was given to select and implement a software system (or system landscape), that should replace the Mars system. The initial scope of this project was the group of processes of Damen Shipyards Gorinchem (not of the sister yards) and the project was called 'DAWN'. The aim was to achieve more insight in, and influence on, the total shipbuilding process, including engineering, project management, work preparation, supply chain and logistics.

In 2008, Involvation was chosen as implementation partner, who also provided an internal project leader for the selection and implementation phases. After a phase of exploration, in the summer of 2009 a choice was made for the ERP software package IFS due to usability, functional fit and price. Subsequently, the deployment phase started and the following stages of 'go live' were realized:

1. *November 2010*: finance, services and HR
2. *May 2011*: purchasing and logistics
3. *February 2012*: sales and proposals
4. *2012 - (...)*: engineering

¹ <http://www.damen.com/en/about/our-key-figures>

Currently, all functionalities of the IFS implementation at Damen Shipyards Gorinchem can be considered as being in the post-implementation phase. The only exception is engineering, since the full implementation of this module requires that all shipbuilding plans will be re-designed. This is a large amount of work and is still in progress.

3.1.2 Case description Rabobank

The Rabobank Group is an international financial services provider, offering retail banking, wholesale banking, asset management, leasing and real estate services. The organization has about 60.000 employees in 44 countries. It operates on the basis of cooperative principles. Therefore it is comprised of independent local Rabobanks in The Netherlands plus Rabobank Nederland, their central organization, and (internationally based) subsidiaries. The 139 independent local Rabobanks in The Netherlands have a staff base of about 27.300 employees (in FTE) and serve 7.6 million Dutch private individuals and corporate clients. The profit of the Rabobank was €2.1 billion in 2012².

Around 2000, local managers signaled the rapidly changing needs of customers. Besides, competition raised in the financial sector and banks needed to focus on keeping and increasing customers, contrary to the past where customers needed to be glad with every delivered service from a bank. Furthermore, managers wanted the organization to better use the opportunities of new ICT developments. The IT landscape at that time was very complex. For almost every channel and product a different system existed (53 selling systems), which interrupted fluent work processes for the employees. The landscape needed to be reduced, to facilitate the employees with a simple way of accessing the relevant data during customer contact moments. Furthermore, the customer and his perception needed to become central in thinking and acting of employees, instead of the financial product itself, to be able to distinguish Rabobank from its competitors. All contact with customers needed to be tracked, to enable seamlessly proceeding contact after customers switched between different channels (e.g. e-mail, telephone, face to face). The customer data system at that time, OLI, did not facilitate this. As a response to these trends and observations, the executive board started a CRM program in 2001, with an integral focus on change of culture, structure and systems.

The purpose of this CRM program was to build a multichannel bank, to simplify the IT landscape and to improve the customer service. To achieve this, the decision was made to implement the system Siebel. The CRM program consisted of different phases:

1. *2001 – 2002*: Pilot at four local banks to test the feasibility of the implementation of a basic version of Siebel as central information system, in combination with actions in the area of culture change. The basic functionalities included filling in and maintaining client data, registration of contact and registration of products. The data needed to be actively complemented with what happened in other (selling) systems.
2. *2003 – 2005*: Implementation of Siebel at all, at that time 152, local banks.
3. *2005 – 2010*: Reduction of IT landscape and further development of Siebel towards a multichannel system. The program continued to couple the different selling systems with Siebel, and making them accessible only through Siebel. Besides, many initiatives were undertaken to change the way of thinking and working of local directors and employees.
4. *2010 – (...)*: Continuous improvement and extension. Once Siebel is used as central information system, all new functionalities need to be connected with Siebel.

² http://www.rabobank.nl/particulieren/servicemenu/english_pages/rabobankprofile/

In March 2005, Siebel was implemented at the final (large) local banks Rotterdam and Eindhoven. Much new functionality was introduced afterwards, during a continuous period of improvements and extensions. However, one can say that the post-implementation stage already started in the end of 2005.

3.1.3 Case description AMC

AMC is an academic medical centre in the Netherlands. AMC's three main processes are providing care, performing research and providing education. AMC has 1000 clinical beds to provide care and on a yearly basis around 1.6 million patients are being treated and 2500 students following education. The annual turnover is €0.8 billion, with around 8000 employees working in AMC³. The organization of AMC is decentralized and consists of 17 units (10 care divisions and 7 support services), led by the executive board.

In 1972 the hospital started to use their first organization-wide information system to support the care processes and the support processes, called ZIS. However, during the years the organization decentralized more and more, causing the effect that divisions built and managed all sorts of self-developed applications. Currently, the IT landscape of AMC contains more than 1200 applications (including small applications in MS Access or Excel). Therefore, the AMC started five years ago the transition to a more robust and simple IT landscape, consisting of two large systems, an hospital information system for the primary care processes and an ERP system for the support processes (e.g. financial administration, human resource management, ICT services). The program for the implementation of the new ERP system is called TOP, a Dutch abbreviation for 'future of support processes', and is subject for this case study. The purpose of the program TOP was to implement the ERP system and simultaneously improve the support processes in a way they become more efficient (e.g. little or no administrative layers) and client centred.

After a process of tendering and selection, in 2010 the choice was made for the system CareCTRL (SAP with a pre-configuration for Dutch care processes) from the vendor PinkRoccade and the implementation partner Deloitte. Subsequently, in 2011 the preparation for the implementation started. In 2012 was the 'go live' for the basic version of the system, after which a period of improvement and release of extra functionalities started:

1. *1 January 2012*: purchasing, logistics, finances, housing and a part of HR
2. *1 January 2013*: HR payroll and improvement of modules of stage 1
3. *June 2013*: HR employee self-service and recruitment, plus improvement of modules of stage 1 and 2 and closing the program organization

At the time this case study was conducted, the system could be considered as being in the post-implementation phase for the first two stages, i.e. the basic functionalities of CareCTRL and the HR payroll functionality.

3.1.4 Description additional interviews

In addition to the three in-depth case studies described above, five interviews were held at companies in different sectors with experts in IT management or enterprise architecture. These interviews were about the post-implementation phase of (one or more) enterprise systems in their organization. The interviews were conducted with:

³ <http://www.amc.nl/web/Het-AMC/Organisatie/Kerngegevens/Archief-jaarverslagen.htm>

- Former IT manager in banking industry
- Former IT project manager in banking industry
- Enterprise architect at dredging and marine expert company
- Enterprise architect at semi-public institution
- Manager operation excellence in banking industry

3.2 Case study approach and execution

After selecting the cases, the next steps in the research project are to determine the approach for gathering data, to define protocols (e.g. interview questions, questionnaires) and to enter the field. Therefore, this paragraph describes the case study approach and execution.

The purpose of the case studies was to answer the second research question, i.e. to find out what issues (IT & non-IT oriented) organizations encounter(ed) in the post-implementation phase of enterprise system implementations. As described in the research design, these are naturally occurring phenomena and usually not documented. Therefore, the main data collection method used in this case study research was the execution of interviews. The interviews were conducted on-site and face to face, to enlarge the understanding of the things said by the interviewee, to be able to record the interviews and to benefit from potential ‘ad hoc’ introductions to other relevant persons in the company.

For the purpose of triangulation and to get a holistic view on the issues in the case study organizations, multiple persons were interviewed per organization. Furthermore, the purpose of the research is to get insight in the IT and non-IT oriented issues. Therefore, the intention was to select interviewees from the business side (e.g. key-users, operational managers), from the IT side of the organisation (e.g. enterprise architects, application managers) and from the intersection of business and IT (e.g. functional application managers, solution managers, support managers). After searching for job titles usually used in organizations, an interviewee set-up was made as presented in Figure 10.

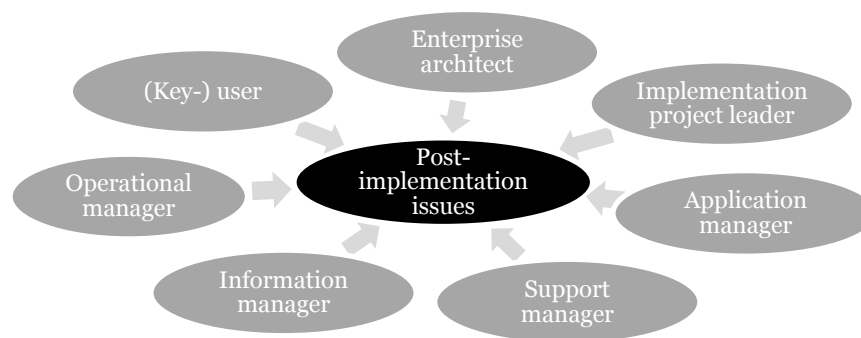


Figure 10: Interviewee set-up

First, enterprise architects were approached to participate in the research project. Subsequently, after a first interview, the enterprise architects were asked to introduce the researcher to other persons in the organization, according to the interviewee set-up. This resulted into a final selection of interviewees as presented in Table 3. In total 23 interviews were executed, accounting for 25.5 hours of interview time. The average interview time was 70 minutes (the shortest interview was 35 minutes, the longest 97 minutes). Semi-structured interviews were held to enable focussing on core questions regarding the research goal, but also allowing deviations (e.g. supplementary questions to understand the meaning of certain comments). Appendix C shows an example of a semi-structured interview protocol.

Table 3: Final selection of interviewees

Company	Damen Shipyards	Rabobank	AMC	Additional interviews
Role of interviewee	Enterprise architect	Lead business architect	Lead architect	Enterprise architect KvK
	Implementation project leader	Implementation project leader	Implementation project leader	Manager operational excellence ING
	Application manager	Application manager	Application manager	Enterprise architect Boskalis
	Solution architect	Functional application manager	Functional application manager	(Ex) IT manager Royal Bank of Scotland
	Key-user	Key-user	Operational manager	(Ex) IT manager Delta Lloyd
	Information manager	Support manager	(Member of executive board) ⁴	
<i>Total interview time (hours)</i>	6	8.5	6.5	4.5

In essence, the structure of every interview was:

1. Personal introduction of the interviewer and the interviewee
2. Introduction of the research project and purpose of the interview
3. Context questions about the implementation project
4. Context questions about the role of the interviewee (with regard to the ES)
5. Main question of the interview: What are issues that you and/or the organization encountered in the post-implementation phase of the enterprise system?
 - a. With the most impact?
 - b. Most frequently?
 - b. Currently?
 - c. Previously?
6. Request for other available documentation

Besides, to ensure that the objective of the research (to focus on IT and non-IT oriented issues) would be achieved and to provide a direction of thinking for the interviewees, question 3 was supported by an example of categorization of different issues: ‘People, change and learning’, ‘Process stability and compliance’, ‘Systems stability and uptake’, ‘Business intelligence and data quality’ and ‘Readiness for benefit realisation’.

During the interview sessions it became clear that interviewees could not make the distinction between issues with the most impact and with the highest frequency. However, regardless of this distinction, the main question could be answered properly for different types of issues. This data was gathered as input for analysis. Additionally, in some cases extra documentation about the implementation project itself was available. However, in none of the cases documentation was available of post-implementation issues.

For all interviews, the following processing procedure was followed (Reijers, 2006):

1. The interview was recorded
2. The interview was transcribed
3. The notes were presented to the interviewee for review
4. Remarks were processed into final interview results
5. Recordings were erased once the case studies were completed

On average an interview resulted in a report of five pages. This transcription was done as soon as possible after the interview (i.e. the day itself or the day after the interview), to be able to present the report to the interviewee when the conversation was still fresh in the interviewer’s mind. This resulted in a high response rate of reviews of the interview reports by the interviewees (15/23). The responses were mainly very positive and provided few useful corrections. In total the fieldwork phase resulted in 115 pages of transcribed interview results.

⁴ This interview was unplanned and encompassed five minutes.

4 Analysis

Once the research has been set up and data has been gathered, the strengths of qualitative data rest very centrally on the competence with which their analysis is carried out (Miles & Huberman, 1994). However, especially this part of case study research is one of the least developed and most difficult aspects of performing case studies (Yin, 2003). Therefore, this chapter explains the process of analysing the interviews in detail. It starts with the rationale behind the analysis of qualitative case study data. Next, in Section 4.2, the approach and execution of the analysis process is explained.

4.1 Rationale

The main point to keep in mind is that qualitative data analysis is a continuous and iterative process. As Miles and Huberman (1994, p. 56) describe: “Words are fatter than numbers and usually have multiple meanings. This makes them harder to move around and work with. (...) Most words are meaningless unless you look backward or forward to other words.” All phases of analyses are an interaction between the analyst and the data (Strauss & Corbin, 1998). Before describing a particular way to analyse qualitative data, it is necessary to realize that analysis consists of three concurrent flows of activities (Miles & Huberman, 1994):

- *Data reduction*: the process of selecting, focusing, simplifying, abstracting and transforming the data that appears in written-up field notes or transcriptions. This occurs continuously. It starts with the research design and continues with writing summaries, coding, brainstorming about themes, until a final report is completed.
- *Data display*: an organized, compressed assembly of information that permits conclusion drawing and action. The most frequent form of data display for qualitative data is extended text. However, displays can also include matrices, graphs and charts.
- *Conclusion drawing and verification*: from the start of data collection, one begins to decide what things mean (e.g. noting regularities, patterns, explanations). The conclusions are first hold lightly, maintaining openness and scepticism, but later they become increasingly explicit and grounded. In the end of the analysis process conclusions are also verified in going back to the field notes, review among colleagues or replicating findings in another data set.

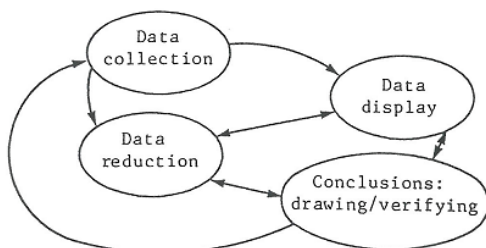


Figure 11: Components of data analysis: interactive model (Miles & Huberman, 1994)

Figure 11 illustrates these streams of activities with the interactions. The qualitative analysis is an on-going process that occurs over time. In other words, this did not happen overnight, although one might have a sudden ‘insight’ (Strauss & Corbin, 1998). According to Strauss and Corbin (1998, p.13): “Analysis is the interplay between researchers and data. It is both science and art.”

4.2 Analysis of case study data

The purpose of the analysis is to identify post-implementation issues out of the 115 pages of interview data, and to find patterns and structure within these. In this process, two types of analyses were performed. First, within-case analyses were performed to become familiar with each case as a separate entity (Eisenhardt, 1989). In other words, the results of the five to seven interviews were analysed separately for AMC, Damen Shipyards and Rabobank, to understand the context of each case study and to compare comments of interviewees within the same organization. Next, the results of all cases were analysed by conducting an across-case analysis. The purpose was to partially answer the third research question (e.g. ‘Can similar issues be found at different organizations? Can structure be found in the issues?’).

To perform these analyses, data needs to be fractured, conceptualized and integrated to form theory. Coding and categorizing are the most prominent ways of analysing data if the data results from interviews, focus groups and observations (Flick, 2008). Strauss and Corbin (1998) present open coding as a set of guidelines and techniques to perform this inductive process. Therefore, open coding was chosen as analysis method, consisting of two main steps:

1. *Conceptualizing*: data is broken down into discrete incidents, ideas, events, and acts and are then given a name that represents these. Continuing the analysis, if one comes across another object sharing common characteristics (through comparative analysis), then the same name will be assigned.
2. *Categorizing*: once concepts begin to accumulate, the analyst should begin the process of grouping them or categorizing them under more abstract explanatory terms, i.e. categories.

Therefore, in this research a combined approach of Strauss and Corbin (1998) and Eisenhardt (1989) was used to analyse the data, given in Figure 12.

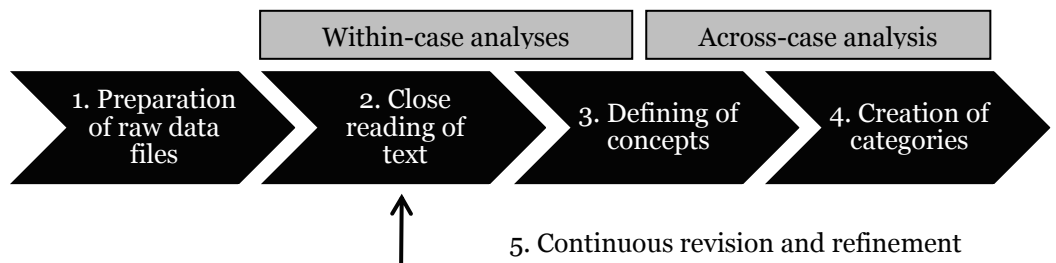


Figure 12: The analysis process, adapted from Corbin and Strauss (1998) and Eisenhardt (1989)

First the raw data files were set in a common format and a backup of each raw data file was made. All files were printed, since it was chosen to perform the traditional way of open coding by writing down concepts in the margins of the files. Newer methods include more complex computer programs that allow the analyst to move from text, to concepts, to integrating concepts, memos, diagrams and so on. However, according to Strauss and Corbin (1998): “Each person must find the system that works best for him or her.” The result of this step can be found in the ‘Confidential appendix J.1 - All Interview results’.

Second, the approximately 30 pages of interview data per case study were closely read and within-case analyses were performed. These analyses helped to understand case study specific issues. For example, one interviewee of Damen Shipyards explained why the engineering module of the ERP system was not fully implemented yet, which helped to

understand related comments of other interviewees. Then, once the text and the meaning of the text were understood, names were assigned to concepts in the data that represent a post-implementation issue. A way of coding was used of analysing sentences or paragraphs, contrary to coding per word or per line (Miles & Huberman, 1994). Coding names were chosen by the analyst and assigned to the post-implementation issues in the text, in a way they represent the concept when examined comparatively and in context. Similar names were given to post-implementation issues that were found to be conceptually similar. Table 4 gives an example of the process of attaching code names to comments of the interviewees.

Table 4: Example of the within-case analysis coding processes

Comments of different interviewees within the same case study	Within-case analysis code
“An underlying problem is how these users are managed. Many managers lacked the capability of directing users. Instead of saying ‘your target was 10, your realisation is 2, that is wrong’, it is better to say ‘your target was 10, your realisation is 2, why did this happen?’ Also managers experienced it annoying to talk to the users about their system usage.”	Too less direction by managers on users who do not use the system correctly <i>(after across-case analysis generalized as risk 5)</i>
“Attitude and behaviour of managers is also still a ‘painful area’. They often also lack knowledge about the system and the functionalities, while they are the ones that should stimulate the users and correct their behaviour. If no one clearly says ‘this is how you should do it, I will control that and you will eventually be questioned about it’, then it gives a licence to people to use the system as they think it is correct.”	
“Local managers should pay more attention to correct usage of the system.”	

The within-case analyses resulted in a list of around 50 post-implementation issues for each case study, with explanations as given by the interviewees. The list of issues per case study was roughly divided in preliminary categories and for each issue it was described which interviewees mentioned the issue. Around half of the issues were mentioned by more than one person in the organization, increasing the internal validation. The result of this step is given in ‘Confidential appendix J.2 - Within-case analyses’ and forms an answer to the second research question.

Next, the results of all cases were analysed by conducting the across-case analysis. Thus, the issues gathered from the individual case studies needed to be generalized. In order to do so, the concepts (issues) from different case studies were grouped into the preliminary categories and were compared. When they were found conceptually similar, a generalized name was given to that issue. This was the case for many of the issues, which indicated that those problems are general risks for organizations having enterprise systems in the post-implementation phase. An example of this across-case analysis process is given in Table 5. The result of this step can be found in ‘Confidential appendix J.3 - Across case analysis’. For transparency and tracing purposes, it was presented in bullet points below the generalized issue which interviewees in which case studies mentioned the issue.

Table 5: Example of the across-case analysis coding processes

Within-case analysis codes in different case studies	Across-case analysis code
<i>Users insufficiently understand the consequences of their actions for other users, chain thinking is insufficiently present.</i> “The concept of an ERP system with a closed flow of money and goods is not yet internalized in the operations of the peoples themselves (‘when I do something different or incorrect, this has consequences for others’). Many people still understand the changed idea insufficiently, this is still a struggle.”	20. Insufficient (full) understanding of the ES concept & benefits
<i>Users do not have a conceptual/fundamental understanding of the system, but apply ‘tricks’.</i> + <i>Users have incomprehension about the implementation of the system.</i> “There still is incomprehension at users about the implementation of the system. Users often do not have understanding of the process (from beginning till the end), causing that they execute their task in that process as a ‘trick’.	

Currently, 1.5 years after 'go live', 75% of the organization is at the point that they understand the system, accept it and work with it. However, still 25% do not understand it, or do not want to understand it."	
<i>The idea behind the system package is insufficiently present at users. "The focus on the concept behind the system came only after the system was implemented, causing that this still lacks at some parts of the business. Users did not understand the idea behind the implementation of the system and the benefits of using it, resulting in low user adoption. It is important that the system is implemented together with the reasoning behind it. The system is a solution and not a purpose for itself."</i>	

Finally, the issues were categorized, which was intertwined with the process of designing the risk framework. Therefore, the rationale behind the final categorization (in organizational roles and in cause/effects) will be discussed in the design Chapter 5 of this thesis. The result of the analysis phase is a categorized list of issues, given in Appendix D with a preview in Table 6. In this final list of issues, only issues are included which were mentioned by more than one organization and/or by more than one interviewee. The list includes a frequency analysis, which indicates how many interviewees in different case study organizations mentioned each issue (case study organization names were anonymized due to confidentiality considerations). By means of a conversion table in 'Confidential appendix J.4 – Conversion table', it can be traced how the issues in the list in Appendix D are actually mentioned by the interviewees as presented in 'Confidential appendix J.3 - Across case analysis'.

Table 6: Preview of frequency table with final list of issues (Appendix D)

Nr.	Role (blue)	Issues (organized in cause=black/effect=green)	Case studies			
			C1	C2	C3	Add.
52	Reporting managers / BI	No clear ES information analysis is performed, resulting in insufficient/incorrect information for decision support				
53		No clear vision ('holistic view') on information analysis and required management information	1	2		
54		Insufficient governance to process the changed reporting needs	1	1		1
55		Insufficient operational reports/dashboards to monitor processes	2	3	3	2
56		Many different reporting tools (op./tact./strat.), but lack of unity and consistency	2	2	2	

Note that the analysis results were continuously revised and refined, by going back to the raw text files, to improve the categories and check for comprehensiveness and comprehensibility (Thomas, 2006). An example of this tightening of the coding process is given in Table 7.

Table 7: Example of tightening the coding processes

Trigger to tighten the coding process	Additional code
During validation with experts (as will be described in Chapter 7), the experts mentioned they missed exogenous issues regarding the leave of an important IT person. After again analyzing the interview data, this concept was found in two different case studies:	60. Leave of an important ES program sponsor
"After three years, when the system was reasonably stable, the program leader explicitly made the switch to a focus on the ideas and concepts behind the system. But after a leave of this program leader, is this idea and concept again moved to the background.."	
"During the 'go live' of the first part of the system, one of the implementation leaders moved to another position within the organization. He was one of the spiritual fathers of the implemented concept, causing that this was an enormous loss of the project. Especially regarding the communication of the concept to the business."	

It was executed exactly like Strauss and Corbin (1998, p.58) mention about the coding process: "Rather, it is a free-flowing and creative one in which analysts move quickly back and forth between types of coding, using analytic techniques and procedures freely and in response to the analytic task before analysts."

5 Design

The goal of inductive case study research is to derive a theory from emerging insights in the data. Therefore, after explaining the analysis process, this chapter presents and discusses the design of the results of the graduation project. The first section, Section 5.1, describes the design of the risk framework, based on generalized post-implementation issues. This framework is the result of the ‘diagnosis and analysis’ phase of this research project and provides an answer to the second and third research questions. Secondly, Section 5.2 describes the design of a roadmap with preventive actions and mitigations to these post-implementation risks. This roadmap is the result of the ‘plan of action’ phase and provides an answer to the fourth research question. On the final three pages of this chapter, the framework, definitions and the roadmap are presented⁵.

5.1 Design of framework

The designed framework is called ‘Sunshine Framework – risks and mitigations to prevent dark clouds gathering around your ES’. It presents risks that organizations face in the post-implementation (i.e. ‘continuous improvement’ or ‘onward and upward’) phase of their enterprise system implementation.

First, to explain the reasoning behind the design, in Section 5.1.1 and Section 5.1.2, the input for this framework and the structure of the framework are discussed. Next, in Section 5.1.3 the most important elements of the framework are discussed. Section 5.1.4 explains the purpose of the framework. Finally, the framework itself is shown on page 31 of this thesis.

5.1.1 Input

Input for the risk framework was the list of issues, resulting from the analysis of the inductive qualitative case study research. The difference between a risk and an issue can be considered as follows (according to Prince2 definitions, 2009):

- *Issue*: A relevant event that *has happened*, which was not planned, and requires management action. It can be any concern, query, request for change, suggestion or off-specification raised.
- *Risk*: An uncertain event or set of events that, *should it occur*, will have an effect on the achievement of objectives.

In other words, issues that case study organizations encountered in the post-implementation phase imply risks for other organizations that are currently in the (post-)implementation phase. This is grounded, since the issues were generalized and only issues were included in the final list that were mentioned two or more times during the case study research.

5.1.2 Structure

In the framework, risks are structured around 12 roles (i.e. stakeholders) in the organization using the enterprise system. Risks are placed by a role that has ‘influence’ on the risk or by

⁵ The deliverables were designed on A3 format. Hence, the presentation in this report is suboptimal.

which the risk is 'caused'. In other words, the people aspect is chosen to be central in the risk framework, not to the process or the technology aspect. This is visualized in Figure 13.

This decision has been made since many of the issues in the case studies arose because of improper assignment of these roles. For example, FAM was not organized at central level in any of the case studies, causing many issues concerning user support and system fit in the business. To avoid that this point (e.g. the need of bridging IT and business by FAM) would be overlooked, a structure was chosen in which this role was not fragmented. Another reason for the structure according to roles is recognisability and applicability for practitioners. In the chosen structure, practitioners immediately can identify themselves and colleagues, which will trigger them and make the framework more useful for practitioners.

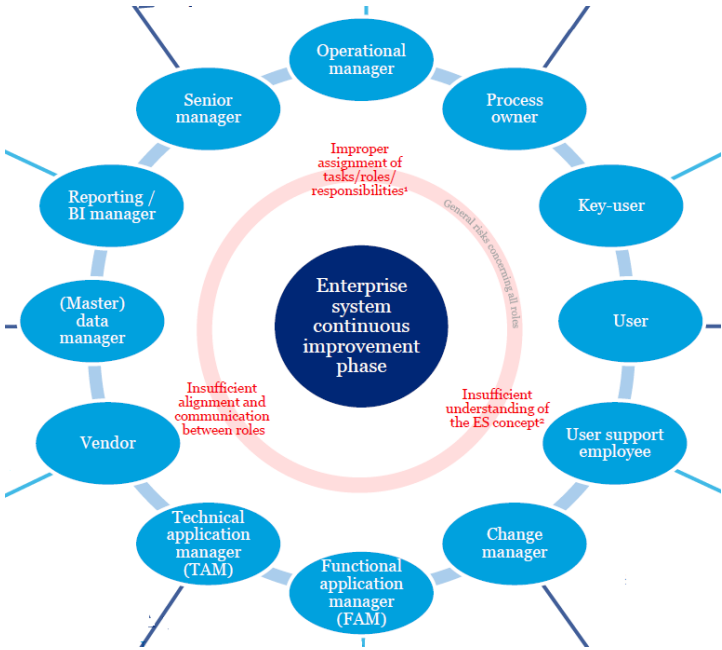


Figure 13: Centre of the risk framework

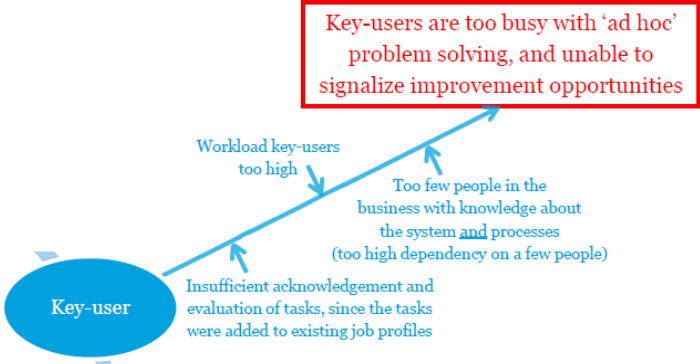


Figure 14: One branch of the risk framework

The framework is structured around roles and not around functions. These roles carry responsibilities or tasks that should be performed in the post-implementation phase of the enterprise system. Different organizations will have assigned these roles differently (with different names). Therefore, the second page of the 'Sunshine framework' (see page 32) provides short definitions of these roles. Note that two roles in the framework can form one function within organizations. For example, in smaller organizations the role of process owner and operational manager could be assigned to the same person. A final note with regard to the roles is that the client of the organization is not included in the framework, since a client does not have 'influence on' or does not 'cause' any post-implementation risks. In fact, the client is in the end 'victim' of occurring effects.

In the centre of the framework, three general risks are positioned around the post-implementation phase of ES implementations, since those risks relate to all different roles. This can be seen in the pink circle in Figure 13. For example, a general risk is that tasks/roles/responsibilities are assigned improperly. Obviously this risk exists for each role.

Subsequently, risks concerning a certain role are structured in a 'cause/effect' diagram. One example concerning key-users is given in Figure 14. The 'effects' are presented in red boxes, which contain a phrase of what is happening in the organization concerning that role (like a

‘photo’: key-users are too busy with ad hoc problem solving) and contain a phrase of the negative result of those things (‘why is this bad’: they are unable to signalize improvement opportunities and to communicate this to FAM, while they are the people who know very much about the business processes and the system).

Next, ‘causes’ are related to this effect, if these risks were found to be an occurring issue in the case study research, if it concerns the corresponding role and if it forms a cause to the mentioned effect. Regarding the key-user example, causes are that 1) too few people in the business have in-depth knowledge about the system and the processes, 2) the workload of key-users is too high and 3) insufficient acknowledgement is given to the key-users and tasks are insufficiently evaluated, since the tasks are usually added to existing job profiles. This can be seen in Figure 14. In this ‘cause/effect’ way of representing the data, structure is given to the list of 61 issues in Appendix D resulting from the case study research.

5.1.3 Discussion

The framework contains much information concerning different roles and different aspects of the implementation. The main risks presented in the framework can be summarized in three statements, according to different roles in the framework, and are presented in Table 8, Table 9 and Table 10. In these tables also the effects of the corresponding parts of the framework are presented to give a better idea of what is included in the statement. Furthermore, in the final column some interview quotes are presented that led to certain causes accompanying these effects, to give more feeling of how the interview data relates to the final framework.

Table 8: Summary statement 1 of the risk framework

Summary	
1. Not enough understanding of, and responsibility taken for, a correct way of working with the system in the business	
Effect	Example of an interviewee quote
<i>Senior manager:</i> little (or no) actions are undertaken at senior level to evaluate and realize continuous goals/ambitions, resulting in a loss of potential benefits. (Risk 57)	“The question is whether the system implementation also led to business benefits, or what needs to be done to realize these benefits. This question is underemphasized. Initiatives to evaluate this seem to lack.” (Led to risk 60, cause of risk 57)
<i>Operational manager:</i> managers take insufficient responsibility for, and direction towards, the right way of working with the ES in the business. (Risk 4)	“Attitude and behaviour of managers is also still a ‘painful area’. They often also lack knowledge about the system and the functionalities, while they are the ones that should stimulate the users and correct their behaviour.” (Led to risk 5, cause of risk 4)
<i>Process owners:</i> process ownership is not executed properly, resulting in sub-optimal processes. (Risk 8)	“Issues occurred in certain processes (or were caused by). However, it turned out that nobody was responsible for these processes within the organization.” (Led to risk 9, cause of risk 8)
<i>Key-user:</i> key-users are too busy with ‘ad hoc’ problem solving, and unable to signalize improvement opportunities. (Risk 13)	“Some departments have assigned key-users, but these have too much weight on their shoulders. Besides their own tasks, all these issues are shoved on to them.” (Led to risk 15, cause of risk 13)
<i>User:</i> Users lack a right way of working with the ES, resulting in incomplete or incorrect data in the system. (Risk 17)	“Users do not understand sufficiently what the consequences are of their actions for other users. There is too less knowledge of the end-to-end process and thinking of chains lacks, resulting in mistakes.” (Led to risk 20, cause of risk 17)

Table 8 shows that many risks in the framework have to do with organizational aspects, which are mainly caused by a distance between the (ideas of the) implementation project team and the people in the organization that are going to use and manage the enterprise system. This is similar to the key finding mentioned by Gartner (2012a) that the list of enterprise system problems or failures are more often attributed to organizational factors, while business often blames these problems on the implemented software.

Table 9: Summary statement 2 of the risk framework

Summary	
2. Insufficient knowledge and capabilities to provide user support, to initiate improvements and extensions, and to maintain the enterprise system	
Effect	Example of an interviewee quote
<i>User support employee:</i> User support (e.g. service desk) is not organized properly or efficiently, resulting in user problems not being solved quickly. (Risk 21)	“Previously, new releases were insufficiently geared with service desk operations. This caused insufficient knowledge and capacity to handle the increased amount of issues” (Led to risk 23, cause of risk 21)
<i>Change manager:</i> Process of prioritization and deployment of changes is sub-optimal; no clear vision on further system improvement exists. (Risk 24)	“Decisions about request for change (RFC) are sometimes done in insufficiently consultant with the business. Consequences of RFC’s (‘when I press here, where will the pain be in the process execution?’) should be considered better and geared better with the different business departments.” (Led to risk 27, cause of risk 24)
<i>Functional application manager (FAM):</i> System does not properly fit the business processes (and/or vice versa), causing users to experience failing functionalities. (Risk 29)	“After every release, a package with information is sent to the business departments (release note, user manual, presentation, etc.). However, business managers do not communicate this in the same way to the users. Often users get only an e-mail, which will not be red, after which the users experience failing functionalities.” (Led to risk 34, cause of risk 29)
<i>Technical application manager (TAM):</i> Technical problems with the enterprise system occur, limiting system (or functionalities) availability. (Risk 36)	“The ES implementation put different demands on the ICT support. However, the level of knowledge of system management was not sufficient after the ‘go live’. They needed to discover the ES and simultaneously support it.” (Led to risk 35, cause of risk 36)
<i>Vendor:</i> Vendor does not provide sufficient support, limiting TAM and FAM to properly execute maintenance tasks. (Risk 42)	“Contact with the supplier is tough going. When we ask a question, it takes a long time before they answer it. Or no answer is given at all.” (Led to risk 44, cause of risk 42)

Table 9 shows the importance of a good organization of what also is called ‘IT service management’. For example, all cases struggled with the level of knowledge and capabilities of the FAM and TAM teams. Furthermore, an example regarding user support is that in all cases a structural training program for new hires lacked, as well as refresher courses for existing users. This causes that people are using the system as they think is correct, but which is maybe not the correct way of working with the system. As a solution, for example, some local Rabobanks started to provide ‘quick reference cards’ and in-depth ES trainings for new hires in the fifth week after they joined Rabobank.

Table 10: Summary statement 3 of the risk framework

Summary	
3. No clear vision, governance and procedures for managing data and management information	
Effect	Example of an interviewee quote
<i>(Master) data manager:</i> Data governance is not followed, corrective actions need to be taken to get or keep data in the system correctly. (Risk 48)	“There is no consensus about the data model, every time there is still debate about what is leading. Many systems use the ES data, but they all treat the data in a different way.” (Led to risk 51, cause of risk 48)
<i>Reporting/BI manager:</i> No clear ES information analysis is performed, resulting in insufficient/incorrect information for decision support. (Risk 52)	“The BI environment for management information is in development. There is ‘here and there’ little information, but still no integrated story.” (Led to risk 53, cause of risk 52)

Table 10 shows that in all cases insight in (correct) ES data turned out to be a very difficult point, while better management information was one of the motivations for implementing an ES. Often it starts with the fact that upfront the organization has not (or not sufficiently) thought about the data and information that is necessary to gain a clear insight into the executed processes. Only when the system is implemented, business intelligence (BI) questions and issues receive attention, while this is often too late to organize this smoothly.

Next to the risks structured according to roles, as summarized above, three important general risks concerning all roles could be distinguished:

1. Unclear assignment of tasks/roles/responsibilities
2. Insufficient understanding of the ES concept
3. Insufficient alignment and communication between roles

One specific example of the first general risk is the insufficient organization of functional application management (FAM). In all three case study organizations, FAM was improperly organized at central level after the 'go-live' of the system. For example, Damen Shipyards initiated 1.5 years after the implementation a department focusing on FAM tasks. Rabobank has organized FAM as central department into the business for only 3 years now. Furthermore, FAM is sometimes positioned within application management in IT department, while it, in fact, needs to bridge the gap between users and IT (Maes, 2003).

The second general risk is especially high when the organization had a 'system driven implementation'. Gustavsen et al. (1996) describe different implementation approaches, i.e. an expert driven change, system driven change, design driven change and communication driven change. However they conclude with the statement that a 'concept driven change' turns out to be most successful. In a concept driven change the 'concept' gives meaning to all stakeholders and their tasks and indicates the required outcomes of system or structure changes. This was endorsed during the case studies. For example, Rabobank focussed on concept driven change during their improvement period (2005-2010) resulting in increased user adoption, while Damen Shipyards was led by a system driven change and experienced many issues regarding users (and managers) adoption.

An example of the third general risk is present in the case of Rabobank, where the FAM and TAM teams are located in a different geographical location. This physical distance caused communication difficulties and makes it more difficult to align, while FAM and TAM need to cooperate closely together. To conclude, the three general risks together with the risks structured per organizational role, are presented together in the Sunshine Framework to provide a comprehensive and comprehensible overview of post-implementation risks.

5.1.4 Purpose

The purpose of the developed framework is to provide insight in post-implementation risks, such that awareness of these risks will rise and organizations can initiate actions to prevent, control and/or mitigate the post-implementation risks. These risks should be minimized to prevent serious issues to occur that retain organizations of achieving the full ES benefits.

This purpose of usefulness for can be split into two, according to different target groups. The first target group are ES program managers and budget holders in organizations who are implementing an ES. They should become more aware of the risks they face and use the framework to anticipate on post-implementation risks (i.e. to better prepare for the post-implementation phase by taking decisions and making prioritizations more consciously). The second target group are coordinators or managers of stakeholder(s) in organizations who are in the post-implementation phase already. They should use the framework to gain awareness of the causes of certain effects and to get an overview of the issues they are encountering, to increase the ability to develop a structured action plan to mitigate these risks.

5.2 Design of action plan

The framework discussed in the previous section is descriptive in nature. Therefore, the next step in the research project was to turn the gained knowledge into a plan of action, in order to help organizations to prevent or mitigate the identified post-implementation risks. This section describes the design of a roadmap. The roadmap contains actions that organizations should undertake to prevent or mitigate the post-implementation risks.

In Section 5.2.1, the input for the roadmap and the process of design is explained. Next, Section 5.2.2 describes the structure of the final design of the roadmap. In Section 5.2.3 the most important elements and implications are discussed. Section 5.2.4 explains the purpose of the roadmap. Finally, the roadmap itself is shown on page 33 of this thesis.

5.2.1 Input

To develop actions to prevent or mitigate the post-implementation risks, it should be revealed what the reasons are that these risks occur. Looking, for example, at projects in which airplanes are being built, it can be seen that serious issues impacting the actual usage and success of the product do not occur. The reason for this is that procedures are followed extremely strictly and that everything is ultimately tested to prevent any problems to occur after the implementation. However, with regard to an ES implementation, implementation procedures are often followed less strictly and testing occurs less comprehensively. This results in the fact that the ‘go live’ is often the ultimate test. While exogenous factors (e.g. the leave of an important ES program sponsor) can still occur, a perfect implementation should ideally not lead to many of the identified issues and risks. However, every implementation is restricted by time and budget, causing that decisions have to be taken and prioritizations have to be made during the implementation project. These decisions, prioritizations and actions cause many of the post-implementation risks. Markus et al. (2000) support this reasoning and mention that the post-implementation phase reveals the unresolved or unrecognized problems of earlier phases.

This reasoning has two important implications regarding the design of the roadmap. First, the words ‘prevent’ and ‘mitigate’ should be used both. When a company is going to start an ES implementation project, actions should be performed concerning the root cause of a risk, to prevent arising of the risk. On the other hand, when a company is already facing certain risks in the post-implementation phase, the same actions should still be performed to develop a sustainable solution to the occurred issues (which, then, is a mitigation). The second implication of the above reasoning is that most preventive actions and mitigations for the post-implementation risks can be found in implementation methodologies.

Three well-known methodologies for implementing enterprise systems are:

- *Accelerated SAP (ASAP)*, a roadmap for implementing SAP solutions developed by SAP⁶
- *Enterprise Value Delivery (EVD)*, a methodology for implementing different enterprise systems (e.g. Oracle, SAP, salesforce.com) developed by Deloitte⁷
- *Information Technology Infrastructure Library (ITIL)*, a widely accepted and applied set of practices for IT service management, developed by OCG⁸ (Hochstein et al., 2005)

⁶ <http://scn.sap.com/community/asap-methodology>

⁷ http://www.deloitte.com/view/en_us/us/de015c038b2fb110VgnVCM100000ba42f00aRCRD.htm

⁸ Office of Government Commerce (OGC), an administrative body of the Government of Great Britain

In order to develop the roadmap, these three methodologies are analysed subsequently. Tasks in the methodologies were mapped to specific risks in the Sunshine Framework, when a task implies a preventive action/mitigation for that risk. Figure 15 visualizes this process.

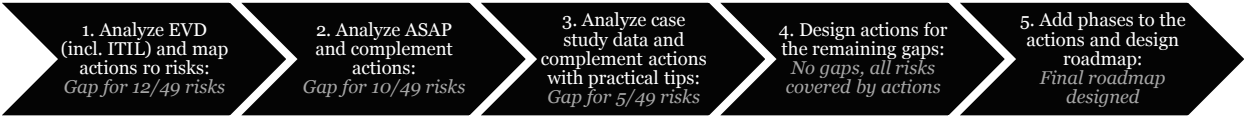


Figure 15: Process of designing the roadmap

First, the entire EVD for SAP 3.7 methodology (1000 tasks) and the EVD for AMS 2.3 methodology (70 extra tasks) were analysed. The latter, EVD for AMS, captures the ITIL methodology. Table 11 shows examples of the mapping of tasks of EVD (incl. ITIL) to risks.

Table 11: Example of risk/action mapping after analysing EVD and ITIL

Risk	Tasks in EVD/ITIL (to prevent/mitigate the risk)
38. No application rationalization, legacy systems are still running	<ul style="list-style-type: none"> - Document To-Be Application Landscape - Define legacy system decommissioning strategy - Perform legacy system decommissioning
59. No clear responsibilities for achieving the on-going ambitions after the project has been finalized	<ul style="list-style-type: none"> - Develop Benefits Tracking Approach - Establish Benefits Tracking Team - Identify Value Enhancement Opportunities - Develop Value Enhancement Approach - Track Benefits Realization

However, for several risks it seemed that EVD in combination with ITIL did not provide preventative actions and mitigations. These are positioned as ‘possible gaps in EVD’ and presented in Appendix F.1. An example includes the lack of updates of process descriptions and work instructions (risk 8). EVD does contain tasks describing that it is important to make process descriptions. However, no task is included which describes that one should ‘maintain process descriptions’ (while this is desirable as input for training, corrective actions, or for system extensions).

Therefore, as a second step in the design of the roadmap, the ASAP methodology (for Standard SAP Projects, version 8) was analysed on the areas of the risks that seemed to be a gap in EVD. The objective was to analyse whether the risk/action mapping are could be complemented by tasks from the ASAP methodology, or whether the ASAP methodology also contain possible gaps. The result of this ‘ASAP gap analysis’ can be found in Appendix F.2. For two risks ASAP does provide preventive tasks or mitigations where EVD does not. This included risk 32 about remaining implementation tasks after the project has been finalized (ASAP does contain the tasks ‘Monitoring Open Issues to Resolution’ and ‘Resolve and close open issues’, EVD does not) and risk 49 about procedures for data cleansing and archiving (ASAP does contain the tasks ‘Prepare Data Archive Plan’ and ‘Conduct Data Archive Implementation Test’, EVD does not). However, still for 10 risks no preventive actions or mitigations could be derived from EVD, ITIL and ASAP together. This implies an important conclusion that provides opportunities to enrich the methodologies, which will be presented in the discussion of the roadmap (Section 5.2.3).

Regarding the design of the roadmap, actions should be developed to ensure that the roadmap does not contain gaps for important risks. Therefore, as a third step the qualitative data from the case study research was analysed again. Open coding was used to extract concepts in which the interviewees mentioned an action that was performed to overcome

certain post-implementation issues (i.e. a lesson learned) and concepts in which interviewees mentioned something what ‘should have been done’ or ‘should be done’. ‘Confidential appendix J.5 - Mitigation analysis’ shows an intermediate result of this analysis and Appendix F.3 in this thesis shows the final result. In fact, only the lessons learned provide a grounded basis of a solution (since they have proven itself), contrary to the ‘should be done’ phrases (which can be subjective). Therefore, the lessons learned were used to enrich the action plan. Fortunately, for 5 of the 10 gaps, the lessons learned imply practical tips that can contribute to prevent or mitigate the particular risk.

For the remaining ‘gaps’, i.e. the risks for which no (or insufficient) preventive actions or mitigations could be formed yet, actions have been designed on basis of knowledge gained during the whole research project. Table 12 shows these risks and the designed actions.

Table 12: Self-developed actions

Risk	Self-developed action
10. Lack of integration of ES processes with other business processes	- Design integration of ES processes with other business processes
11. Lack of updates of process descriptions and work instructions	- Maintain business process descriptions and work instructions
28. Improper development, and subjective evaluation, of business cases of requests for change (RFC)	- Develop a clear procedure for prioritization of changes
43. Difficulties in finding the right channels/procedures to communicate with the vendor; 44. Long duration of response to questions and requests; 26. Insufficient knowledge of, and alignment with, future ES developments of the vendor;	- Manage relationship with vendor
3. Insufficient alignment and communication between roles	- Continuous alignment, coordination and communication between roles

Appendix F.4 presents the result of the process of mapping and developing actions, which was the input for the roadmap. As a final step in the design of the action plan, phases were added to the actions (according to the phases in the EVD, ASAP or ITIL methodology or based on knowledge of the researcher) and a roadmap was designed out of this list of actions. To conclude, actions to prevent or mitigate the risks in the Sunshine Framework have been developed by analysing EVD, ITIL, ASAP and the qualitative case study data, complemented by five actions that have been designed based on knowledge gained during the research project. The roadmap is presented at page 33 and further explained in the next sections.

5.2.2 Structure

In the rows of the roadmap, actions are structured according to roles in the organization (as presented in the framework). Actions are presented that should be performed to ensure that these roles are assigned to persons in the organization and that these persons are prepared, have the resources and take their responsibilities to carry out the corresponding tasks⁹. An example of this is given in Table 13 and will be explained later. The goal of the actions regarding these stakeholders, presented in the final column of the corresponding row, is to achieve the inverses of the risk ‘effects’ that were presented in the Sunshine Framework. The actions should be initiated by an ES program team, when this (still) exists, or by the manager or coordinator of the corresponding stakeholders. In the columns, the roadmap is structured

⁹ Besides consistency with the Sunshine Framework and emphasis on the people aspect, another reason for structuring actions according to organizational roles is because of intellectual property of EVD. Further details of tasks and the structure of tasks are intellectual property of Deloitte. Hence, (program) managers/ coordinators should further structure the actions themselves in an organization specific roadmap, which usually already exists.

according to different phases of the implementation project, in which these actions should be performed ideally. The names of the phases are chosen according to ASAP, the most well-known implementation methodology. Note that the sixth phase, called ‘operate’ in ASAP, implies the post-implementation phase as defined in this thesis.

However, as stated before, if an organization is already in phase 6 and facing certain issues, then still the actions in the previous phases should be performed first, to provide a sustainable (root cause) solution. In other words, the actions in the different phases are dependent of each other (like in the methodologies) and should be performed sequentially.

An example is given in Table 13. To ensure the goal that the users internalize the new ‘way of working’ and use the ES correctly, actions should be initiated as presented in the columns. To begin with, the ES project team should define an organizational change management strategy about how to change the way of working of the users and how to explain the ES concept and benefits to them. Next, in phase 2, a more specific approach should be defined how to engage the users. In the third phase, the project team should start with developing and delivering communications according to this approach, etc. However, it can also occur that an organization is already in the post-implementation phase and that they are facing the risk that users lack a right way of working with the ES (resulting in incomplete or incorrect data in the system). Then, still a (new) organizational change management strategy needs to be defined and communication needs to be developed and delivered etc., to achieve the goal. This needs to be initiated by a person coordinating/managing the stakeholder(s).

Table 13: Example of the row ‘users’ in the roadmap (see page 33)

Role	Phase 1: Prepare	Phase 2: Design	Phase 3: Deploy	Phase 4: Final prep.	Phase 5: Go live	Phase 6: Operate	Goal
User	- Develop organizational change management strategy	- Define deployment strategy - Develop stakeholder engagement approach - Establish communications website	- Develop and deliver communications - Develop end-user training program maintenance plan	- Conduct pre Go-Live end-user training - Deliver ‘quick reference card’ and short instruction movies	- Conduct post Go-Live end-user Training	- Conduct change network briefings - Start community groups for users, to facilitate ‘inter-user learning’	Users should internalize the new ‘way of working’ and use the system correctly

Besides actions regarding specific organization roles, also actions were developed to prevent/mitigate the general risks. Actions to prevent/mitigate the general risk ‘1. Not enough understanding of the ES concept’ are included in the row of users (see Table 13), which will be explained below. However, actions to prevent/mitigate the risk ‘2. Unclear assignment of tasks/roles/responsibilities’ and ‘3. Insufficient alignment and communication between roles’ are not included in the first 12 columns of the roadmap. Therefore, in the bottom of the roadmap an extra row is included that shows actions that need to be performed if a role is not properly assigned and aligned with other roles.

An important note to be made is that actions are placed once in the roadmap, also when they should be executed for involvement of different stakeholders and/or in different phases. The actions are placed at the stakeholder for whom this action is most important. This choice is made due to readability (and thus usefulness) of the roadmap. If the same task is presented at many places in the roadmap, usually attention is lost while reading the tasks and people start to scan the remainder of the information. Furthermore, only the most important actions

of Appendix F.4 are placed in the roadmap, to enable presenting the roadmap comprehensively and comprehensible. To give an example, not for every task a monitor and control action is presented in the framework. These two notes imply that the roadmap should not be read per line or per column alone, but always in dependency with other actions in the roadmap. However, since program managers or managers of the stakeholders should initiate the actions, they will likely be interested in the roadmap as a whole (not only in one row).

5.2.3 Discussion

The actions in the roadmap can be summarized as following: it are actions to assign roles and responsibilities to people in the organization, to ensure that they understand the ES concept and benefits, and to ensure that these persons are prepared, have the resources and take their responsibilities to carry out the corresponding tasks. The question is not whether organizations will encounter issues after the implementation of an enterprise system (since every implementation is imperfect and exogenous issues can occur). However, the question is how the organization is structured and prepared to deal with these problems. When no one is responsible for solving a problem, then a real problem arises. However, when people are responsible for picking up certain issues, and when they are prepared and have the resources to do so, then the problems can be solved. Then accumulation of post-implementation issues can be prevented and more ES benefits can be achieved.

Two specific recommendations can be made for organizations implementing or using an ES. First, it is recommended to initiate a 'concept driven' (post-)implementation project, in which the 'concept' gives meaning to all stakeholders and their tasks. In other words, the concept should indicate the required outcomes and benefits of system and structure changes. This is essential. The purpose of an ES is to optimize process chains. However, for users it usually does not make their work more attractive, since it often includes extra tasks that have no direct benefits for the users themselves (rather for users in other departments). Besides, the department often used solutions before that were highly customized to the department specific processes and the ES solutions are usually less customized. Therefore, it is essential to show positive successes to users (e.g. better functionalities or improved performance) to outweigh the negative experiences with the ES. Senior and operational managers need to focus on stimulating people to use the system in the right way. However, they are only able to do this if they believe in the ES concept themselves and understand it sufficiently.

Second, it is important to organise IT service management in a proper and efficient way. In other words, user support employees, change managers, functional application managers and technical application managers should be prepared and aligned to constantly work on continuous improvement of the enterprise system itself and support of the usage of the system in the business. Unfortunately, in many implementation projects proper organization of IT service management is neglected up to or until the preparation for the go-live of the system. Especially important in the organisation of IT service management are the design of the overall support governance approach, the staffing approach and the training approach.

Besides, an important conclusion for companies supporting ES implementations (e.g. system integrators and vendors) follows from the analysis of EVD, ITIL and ASAP. For 10 of the 49 risks (cause only) in the Sunshine Framework, preventive actions or mitigations are not explicitly covered in these three very well-known and widely accepted methodologies. Table 14 presents and explains these gaps. The largest gap seems to be at the level of operational managers (middle managers). These managers are critical for the success of the ES, since

their responsibility is to correct users and stimulate them to perform the correct way of working. However, none of the methodologies seem to focus on involving this group of stakeholders. The findings in Table 14 provide opportunities to enrich the methodologies.

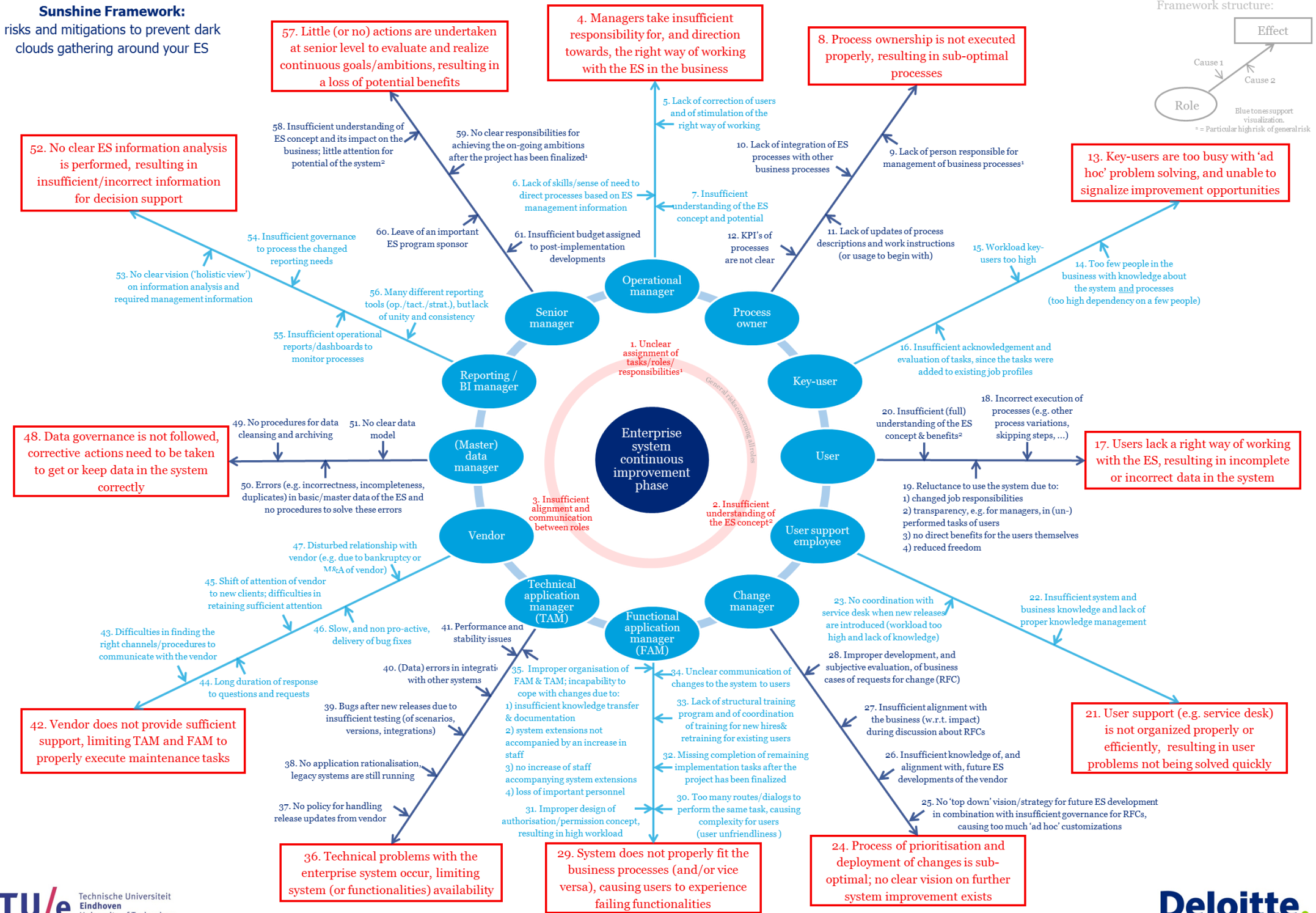
Table 14: Identified gaps in EVD/ITIL/ASAP methodologies

Role	Actions regarding risk:	Explanation
Operational manager	<i>5. Lack of correction of users and of stimulation of the right way of working</i>	Surprisingly, EVD (and ASAP even less) does not explicitly cover the risks concerning operational managers. ASAP and EVD do contain general change management tasks like ‘Develop Organizational Change Management Strategy’ and ‘Develop Stakeholder Engagement Approach’. Furthermore, EVD mentions explicit actions to engage users, key-users and senior management. However, no explicit (training and alignment) actions are presented to trigger operational managers for taking their responsibility for good usage of the system in their business department.
	<i>6. Lack of skills/sense of need to direct processes based on ES management information</i>	
Process owner	<i>10. Lack of integration of ES processes with other business processes</i>	Both EVD and ASAP focus on the development of to-be processes that should be supported by the enterprise system. However, the need of mapping of the intersection/integration with processes of other (legacy) applications is not mentioned explicitly in the methodologies.
	<i>11. Lack of updates of process descriptions and work instructions</i>	Both EVD and ASAP contain tasks in the ‘business process management’ discipline that describe the importance of making process descriptions. However, no task is included which describes that one should maintain the process descriptions after the ‘go live’ of the ES. This is desirable as it is input for training, corrective actions, system extensions, etc.
Change manager	<i>27. Insufficient alignment with the business (w.r.t. impact) during discussion about RFCs</i>	Actions regarding management of RFC’s concern the area of IT service management. Therefore, EVD for AMS (ITIL) contains the task ‘Perform Change Management’. However, contrary to other levels of detail in the methodology, no further details are given here (focusing on important elements of the change management processes).
	<i>28. Improper development, and subjective evaluation, of business cases of RFCs</i>	
	<i>26. Insufficient knowledge of, and alignment with, future ES developments of the vendor</i>	For these issues concerning (contact with) the vendor, ASAP does not mention any task at all, since ASAP assumes that SAP will be the supporting vendor and that this will proceed smoothly. EVD does contain the task ‘Establish Supplier Agreement’ in the beginning of the implementation, in which also agreements should be included about service delivery by the vendor after the ‘go live’. However, no tasks later on in the project explicitly mention that the client needs to manage the relationship with the vendor (e.g. by attending client days). Surprisingly, ITIL does not contain any procedure for the contact with the vendor either.
Vendor	<i>43. Difficulties in finding the right channels/procedures to communicate with the vendor</i>	For these issues concerning (contact with) the vendor, ASAP does not mention any task at all, since ASAP assumes that SAP will be the supporting vendor and that this will proceed smoothly. EVD does contain the task ‘Establish Supplier Agreement’ in the beginning of the implementation, in which also agreements should be included about service delivery by the vendor after the ‘go live’. However, no tasks later on in the project explicitly mention that the client needs to manage the relationship with the vendor (e.g. by attending client days). Surprisingly, ITIL does not contain any procedure for the contact with the vendor either.
	<i>44. Long duration of response to questions and requests</i>	
General risk	<i>3. Insufficient alignment and communication between roles</i>	EVD contains organizational alignment tasks, including for example ‘Develop Organization Operating Model’, ‘Develop Detailed Organization Design’ and ‘Assess Organization Design Effectiveness’ after the ‘go live’. However, no specific task during the (preparation for) ‘go live’ emphasizes the importance of alignment, coordination and communication between the different stakeholders in the organization. ASAP even contains less organizational alignment actions than EVD.

5.2.4 Purpose

The roadmap presents important actions that should not be missed during an implementation project, or that should be initiated if the organization is already facing certain risks, if one wants to achieve the presented goals that contribute to a successful and sustainable post-implementation phase. The purpose of the roadmap is, thus, to trigger (post-)implementation program managers or managers/coordinators of the stakeholder(s) to initiate these actions. They should use the roadmap to periodically check whether their project plan addresses these actions, and complement it where necessary.

Sunshine Framework:
risks and mitigations to prevent dark clouds gathering around your ES



Definition of enterprise system:

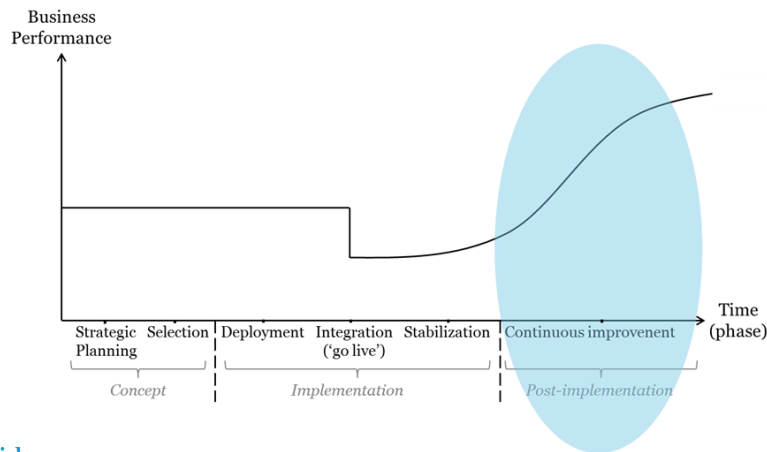
Enterprise Systems (ES) are configurable, off-the-shelf software packages providing an integrated suite of systems and information resources for operational and management processes across a broad range of business activities (Ward et al., 2005). The range of ES available is growing and includes for example enterprise resource planning (ERP), customer relationship management (CRM) and supply chain management (SCM) systems.

Definition of 'continuous improvement' phase:

The phase after the implementation of an enterprise system, when:

- the system is in operational use,
- the responsibilities for application management have been shifted from the project team to the standing organization and normal operations can be executed repeatedly without critical issues (such as failing functionalities, lacking performance, login issues), in other words when the post-implementation dip has been passed,
- until the system will be decommissioned or the responsibilities for application management shift back to a project team (due to a major change).

The continuous improvement phase includes activities as improvement, user support, maintenance (e.g. system repair, upgrading, new-release management, evolution maintenance (Aloini et al., 2007)) and extension.



Definition of risk:

An uncertain event or set of events that, should it occur, will have an effect on the achievement of objectives (Prince 2 Glossary, 2009).

Definition of roles:

The definitions below were developed using Deloitte's EVD for SAP 3.7 (2013), BiSL documentation (2009), formulations of roles within ITIL v3 (2007), DAMA International (2012) and knowledge gained during the research project.

Technical application manager (TAM):

A person responsible for technical support, i.e. to provide performance and continuity of the applications, database management systems and managed interfaces. This role includes providing software solutions for RFCs based on the functional requirements developed by FAM, either by making changes themselves or by requesting them from the vendor. Moreover, it includes release management and the execution of integration, parallel and regression tests.

Functional application manager (FAM):

A person bridging the gap between users and technical application management. He is responsible for ensuring business processes are continuously and optimally supported by the enterprise system. This role includes the responsibility of business information management, coordination of user support, management of RFCs, formulation of functional requirements for accepted changes, coordination of user acceptance tests and introducing the changes to the user community.

Change manager:

A person responsible to control the lifecycle of all changes to the enterprise system. His or her primary objective is to enable beneficial changes to be made, while minimally disrupting IT services. The change manager will receive the requests for change (RFCs) from functional application management and is responsible for prioritization and acceptance of necessary changes, in alignment with the business. For important changes, the change manager will refer the authorization of changes to the Change Advisory Board (CAB).

User support employee:

A person responsible for registering and classifying incidents reported by users with regard to (usage of) the enterprise system. Also, the user support employee must take effort to restore the failed IT service as quickly as possible. If no ad-hoc solution can be found, the incident should be transferred to technical expert support groups.

User:

A person using the enterprise system to perform job tasks.

Key-user:

A person who often has assisted in deployment of the enterprise system and who has a high level of knowledge about the system and the operational processes. The key-user has been assigned the role of assisting in end-user training activities, in the first level of end-user support, to signalize potential system improvements and to communicate this towards application management.

Process owner:

A person responsible for ensuring a process suits its purpose. The process owner's responsibilities include sponsorship, design and continual improvement of the process and its metrics. In larger organizations separate process owner and process manager roles might have been assigned, where the process manager has responsibility for the operational management of a process.

Operational manager:

A person responsible for planning and directing the work of a group of individuals, monitoring their work and taking corrective actions if necessary. Another term for this could be middle management, i.e. the intermediate management of a hierarchical organization, being subordinate to the senior management but superior to operational staff.

Senior manager:

Senior managers, also referred to as executive managers or the management team, generally form a team of individuals at the highest level of organizational management who have the day-to-day responsibilities of managing a company or corporation. They hold specific executive powers, which they execute with and by authority of the board of directors and/or the shareholders.

Reporting / business intelligence (BI) manager:

A person responsible for providing management information based on ES data to managers through (a set of) management reports and tools. This role includes the coordination of ad hoc reporting requests, of developed standard solutions and of implemented tools, based on a clear governance and vision on information analysis.

(Master) data manager:

A person responsible for the development and execution of architectures, policies, practices and procedures that properly manage the full data lifecycle needs of an enterprise.

Vendor:

An organization that creates and produces software. Licensing requirements are determined by each vendor for their products, hence specific for each vendor/product. In other words, the software vendor more or less 'sells' the enterprise system package to the company implementing it and subsequently maintains the standard solution and provides software updates.

Actions to involve particular stakeholders and to ensure that they are prepared and have the resources to execute the tasks.

Should be initiated by someone coordinating/managing the stakeholder(s) or by an ES program manager.

(Sources: EVD, ITIL, ASAP & case studies)

Role	Phase 1: Prepare	Phase 2: Design	Phase 3: Deploy	Phase 4: Final prep.	Phase 5: Go live	Phase 6: Operate	Goal
Senior manager		<ul style="list-style-type: none"> Conduct leadership alignment interviews Brief leaders Develop benefit tracking approach 	<ul style="list-style-type: none"> Develop leadership action plans 	<ul style="list-style-type: none"> Establish team responsible for tracking benefits 	<ul style="list-style-type: none"> Develop post-implementation and evaluation report 	<ul style="list-style-type: none"> Identify value enhancement opportunities Develop value enhanc. approach Track benefits realization Maintain business case 	Senior managers should initiate actions to evaluate and realize continuous goals/ambitions of the ES
Operational manager				<ul style="list-style-type: none"> Train managers to plenary discuss 'best practices' of the ES usage Train managers to individually discuss system usage with users, and to correct/stimulate them 	<ul style="list-style-type: none"> Trigger operational managers to improve the level of ES usage (e.g. by benchmarking ES adoption or by a bonus) 	<ul style="list-style-type: none"> Establish feedback moments in management meetings to discuss the management information 	Operational managers should take responsibility for, and direct towards, correct usage of the system in the business
Process owner		<ul style="list-style-type: none"> Design to-be processes (incl. KPI's) Develop business process controls framework Design integration of ES processes with other business processes 	<ul style="list-style-type: none"> Set-up business process monitoring 	<ul style="list-style-type: none"> Implement business process controls techniques 		<ul style="list-style-type: none"> Maintain business process descriptions 	Process owners should actively maintain and optimize the business processes
Key-user			<ul style="list-style-type: none"> Launch super user program Build super user skills Prepare subject matter experts 		<ul style="list-style-type: none"> Conduct super user briefings Train key-users to organize 'ES User Group' meetings in the business departments to discuss system problems/changes 		Key-users should support users, signalize system improvements and communicate this to FAM
User	<ul style="list-style-type: none"> Develop organizational change management strategy 	<ul style="list-style-type: none"> Develop stakeholder engagement approach Define deployment strategy Establish communications website 	<ul style="list-style-type: none"> Develop and deliver communications Develop end-user training program maintenance plan 	<ul style="list-style-type: none"> Conduct pre Go-Live end-user training Deliver 'quick reference card' and short instruction movies 	<ul style="list-style-type: none"> Conduct post Go-Live end-user Training 	<ul style="list-style-type: none"> Conduct change network briefings Start community groups for users, to facilitate 'inter-user learning' 	Users should internalize the new 'way of working' and use the system correctly
User support employee		<ul style="list-style-type: none"> Design to-be support processes Develop support staffing approach Develop service levels and business partner agreements 	<ul style="list-style-type: none"> Establish support infrastructure and tools Develop support training curriculum and materials 	<ul style="list-style-type: none"> Develop support training maintenance plan Conduct support transition and training Manage training logistics 	<ul style="list-style-type: none"> Perform service desk function Perform incident management Develop ICT portal for users with standard solutions for functional problems 	<ul style="list-style-type: none"> Prepare user support employees for new releases (training, standard answers, etc.) 	User support employees should be prepared and trained to quickly solve, or accurately redirect, incidents
Change manager		<ul style="list-style-type: none"> Design to-be service delivery governance Develop a procedure for prioritization of changes 	<ul style="list-style-type: none"> Assign change advisory committee with representatives from different user groups of business departments 		<ul style="list-style-type: none"> Perform change management Develop 'top-down' vision with important ES improvement steps for the next 3 – 5 years 	<ul style="list-style-type: none"> Identify and prioritize continuous service improvement opportunities Monitor support performance 	Change managers should prioritize objectively, aligned with the business and according to a vision
Functional application manager (FAM)		<ul style="list-style-type: none"> Develop to-be support approach (incl. continuous service improvement plan) Conduct user research Develop end-user training approach and curriculum 	<ul style="list-style-type: none"> Compile support operations manual Build identity & access management solution design (e.g. single sign on) Develop security access procedures Develop instructor-led course outlines 	<ul style="list-style-type: none"> Develop identity & access management operations manual Conduct user-acceptance test Conduct support knowledge transfer 	<ul style="list-style-type: none"> Perform problem management Perform support knowledge management Perform access management Communicate changes to users 	<ul style="list-style-type: none"> Maintain support training materials Implement & monitor continuous service improvement program Manage service catalog Organize new hire 'ES training' 	FAM should bridge the gap between users & IT and ensure optimal support of business processes by the ES
Technical application manager (TAM)	<ul style="list-style-type: none"> Define legacy system decommissioning strategy Determine Upgrade Management 	<ul style="list-style-type: none"> Define test strategy Document to-be application landscape Define software development architecture, standards and guidelines Develop data conversion approach 	<ul style="list-style-type: none"> Develop batch job schedule Conduct tests and develop approach for tests of new releases Document technical procedures Identify system stabilization metrics 	<ul style="list-style-type: none"> Maintain and operate infrastructure Monitoring open issues to resolution Resolve and close open issues 	<ul style="list-style-type: none"> Perform development, release and deployment Management Perform legacy system decommissioning 	<ul style="list-style-type: none"> Involve FAM and TAM during the development phase of (new) ES related projects Organize 'vision' sessions (e.g. quarterly) within FAM, TAM teams 	TAM should provide performance and continuity within the applications, DBMSs and interfaces
Vendor	<ul style="list-style-type: none"> Establish supplier agreement 					<ul style="list-style-type: none"> Attend client days/sessions of vendor Manage relationship with vendor 	The relationship with the vendor should be carefully managed by a responsible person within TAM
(Master) data manager	<ul style="list-style-type: none"> Define enterprise data scope 	<ul style="list-style-type: none"> Design data architecture Develop logical & physical data model Develop to-be master data design Develop metadata glossary Develop configuration control values 	<ul style="list-style-type: none"> Develop information governance policies Develop data cleansing rules Prepare data archive plan 	<ul style="list-style-type: none"> Validate that master data support processes are established 			Master data manager should follow/improve governance and initiate corrective actions to keep (master) data clean
Reporting / BI manager	<ul style="list-style-type: none"> Assess information capabilities Visit other companies with the same ES and learn from their reporting solutions 	<ul style="list-style-type: none"> Develop BI approach Define BI data modeling standards and guiding principle Develop BI functional specifications Design BI reporting processes 	<ul style="list-style-type: none"> Configure BI data architecture Develop BI reports Develop BI technical specifications Conduct information management unit test 				The BI manager should have a clear vision on information analysis and make sure that the governance is executed
When a role is not defined and assigned:		<ul style="list-style-type: none"> Define business roles Develop organization operating model Develop approach to transfer capabilities to stakeholders (e.g. from project team to standing organization) 	<ul style="list-style-type: none"> Conduct job analysis Document job profiles Perform role-to-position mapping 	<ul style="list-style-type: none"> Conduct Go-Live transition workshops Facilitate capability transfer to stakeholder (e.g. from project team) 	<ul style="list-style-type: none"> Complete capability transfer to stakeholder (e.g. from project team) and ensure that stakeholder takes responsibilities 	<ul style="list-style-type: none"> Assess organization design effectiveness Continuous alignment, coordination and communication between roles 	Roles should be assigned and these persons should know their responsibilities and be prepared to execute them

6 Literature enfoldment

In inductive case study research, there is no need to review all of the literature in the field beforehand, as is frequently done by analysts using other research approaches. Reasons are that it is impossible to know prior to the investigation what the salient problems will be or what theoretical concepts will emerge, and that the review of literature can hinder creativity (Strauss & Corbin, 1998). However, after analysing the data gathered in the case study research, comparison of findings with emergent concepts, theory, or hypotheses in the existent literature is essential in the process of theory building (Eisenhardt, 1989). Therefore, this chapter describes an overview of the literature available about the post-implementation phase, as input for a theoretical validation.

First, Section 6.1 provides a short overview of the main findings in general enterprise systems research. Secondly, Section 6.2 zooms in on the post-implementation phase and describes what is present in literature about critical success factors, issues and risks in this phase specifically. Finally, the literature section ends with a conclusion of the current state of research on this topic. By means of the overview presented in this chapter, findings of the research project can be compared with existing emerging theories afterwards, in Chapter 7.

6.1 General enterprise systems research

As stated in the introduction, the majority of enterprise systems research focuses on critical success factors (CSFs) and implementation methodologies, but seldom addresses post-implementation issues (Botta-Genoulaz et al., 2005) (McGinnis & Huang, 2007)(Grabski et al., 2011). Botta-Genoulaz et al. (2005) mention that ‘nearly all literature on ERP was focused on ERP project and ERP implementation’. Furthermore, Law et al. (2010) conclude: “There is a need to step up research efforts on post-implementation issues”. To explain these statements, in the sections below first a brief overview will be given of the available ERP literature about CSFs and, secondly, the nature of the results will be compared with emerging research of different enterprise systems (e.g. CRM).

6.1.1 ERP critical success factors

In the studies about critical success factors a CSF is defined as a ‘reference to any condition or element that was deemed necessary in order for the ERP implementation to occur successfully’ (Finney & Corbett, 2007). A true success can, in fact, only be measured when the system is successful in the phase of usage by the employees. However, in studies about CSFs the focus is mainly on (pre-) implementation aspects. For example, an extensive compilation and analysis of ERP CSFs by Finney and Corbett (2007) showed that the most cited CSFs are top management commitment and support, change management, a balanced project team, project visioning and planning, a project champion, which are all factors that concern the implementation approach and team (corresponding to the explanations by the researchers).

However, awareness of the importance of post-implementation is growing (Peng & Nunes, 2009). More recently, Gartner (2012a) published a report which addressed eight key factors for successful ERP implementations. In this report, the explanation of the CSFs starts to

touch more post-implementation related aspects. The CSFs distinguished by Gartner (2012a), including some explanations that concern post-implementation related aspects, are:

1. *Scope ERP properly*: the scope of ERP should not be limited to traditional ERP modules, but should also give thought to master data management, business process management and business intelligence and analytics. Hence, otherwise the implementation will result in limitations in the post-implementation phase.
2. *Obtain, retain and maintain executive management support*: top management support should be sustained and visible throughout the enterprise systems life cycle.
3. *Understand ERP costs and budget accordingly*: sustainment costs should be planned over at least a seven-year period, since organizations are frequently surprised at the on-going commitment costs of feeding and maintaining their system.
4. *Address change management and training requirements thoroughly*: many enterprises perform only one round of training and change management, while, in fact, this should be on-going initiatives. They are crucial for on-going ERP success. An example is consistent and high-quality training for new hires.
5. *Build an enthusiastic project team led by an experienced project manager*: train also for post-implementation support. Many projects fail as seconded staff return to their departments.
6. *Select an appropriate system integrator*: (this is the only CSF where nothing explicitly is related to the post-implementation phase in the explanation).
7. *Minimize modifications*: modifications reduce the potential benefits of the new system and increase the complexity of upgrades.
8. *Carefully design all ERP infrastructure*: to prevent performance problems and unacceptable response times of their user interfaces.

The key finding of this list is that problems or failures are more often attributable to organizational factors, while business often blames ERP problems on the implemented software (Gartner, 2012a). This is consistent with another report where the key finding is that 'leading enterprises plan for the post-implementation support organization earlier in the project life cycle' (Gartner, 2012b). While not explicitly mentioning post-implementation factors, the explanation of the CSFs shows that awareness is growing of the importance to anticipate on post-implementation risks.

6.1.2 Other enterprise system critical success factors

While the main stream of literature of enterprise systems is focussed on ERP systems specifically, some examples can be found of CSF or risk studies of other type of enterprise systems. The ERP studies have been followed, for example, by CRM CSF studies (King & Burgess, 2008)(Almotairi, 2009) and enterprise portal CSF studies (Remus, 2007).

Almotairi (2009) analysed 15 CRM CSF studies and compiled a list of the ten most important CSFs. Looking at the nature of the CSFs of ERP and CRM literature, one can see many similarities. King and Burgess (2008) argue that CRM and ERP CSFs show significant differences, due to different emphasis placed on the competence and management of the project team in ERP, and importance of knowledge management and technological readiness in CRM findings. However, the knowledge management aspect is extensively addressed for ERP by McGinnis and Huang (2007) and the technological readiness is recognizable in the ERP CSF factor 'legacy systems considerations' by Finney and Corbett (2007). Furthermore, the project management factors are also acknowledged in the CRM literature to be important

for CRM projects (Da Silva & Rahimi, 2007). In the same way, CSFs for implementing enterprise portals are to a large extent comparable with ERP CSFs (Remus, 2007). One can conclude that many similarities exist in CSFs of different enterprise system implementations.

Another example of similarity in the nature of factors influencing different enterprise system implementations can be found in the area of risk management¹⁰. Corner and Hinton (2002) aimed to develop an understanding of the risks associated with the implementation of CRM systems. Of the 29 risks that were identified, they concluded that 23 risks are not specific for CRM. However, this research was, again, focused on the implementation project itself.

6.2 Post-implementation research

The previous section provided a brief overview of CSFs of enterprise system implementations. This section will zoom in and focus on what is present in literature about critical success factors, issues and risks in the post-implementation phase specifically.

Upfront a clear distinction needs to be made between success factors considered as critical in the post-implementation phase, and success factors considered as critical for post-implementation performance. The latter category has become a focus of current ERP research (Zhu et al., 2010)(Ram et al., 2013)(Infedo et al., 2010) and aims to show which CSFs not only contribute to implementation success, but also contribute to improved organizational performance. The result of research in this direction is the acknowledgement of general factors, i.e. important CSFs during the whole journey of an enterprise system implementation, that result to post-implementation success in terms of operational and managerial performance (Zhu et al., 2010). For example, researchers show that project management, system configuration, leadership involvement and organizational fit contribute to post-implementation success (Zhu et al., 2010), as well as training and education and system integration (Ram et al., 2013). However, to gain a deeper understanding of the post-implementation phase itself, complementary to these general factors, the aim of the subsections below is to focus on CSFs, issues and risks in the post-implementation phase.

6.2.1 Critical success factors

Not much research distinguishes CSFs for specific implementation phases. However, Somers and Nelson (2001) distinguish 6 important CSFs during the stages of ‘routinization’ and ‘infusion’ (to be considered as post-implementation stages) and Norton et al. (2013) distinguish 5 CSFs during the ‘onward and upward phase’, given in Figure 16. Indeed, a different focus appears in comparison to general CSFs, namely on inter-departmental communication, user support and contact with the vendor.

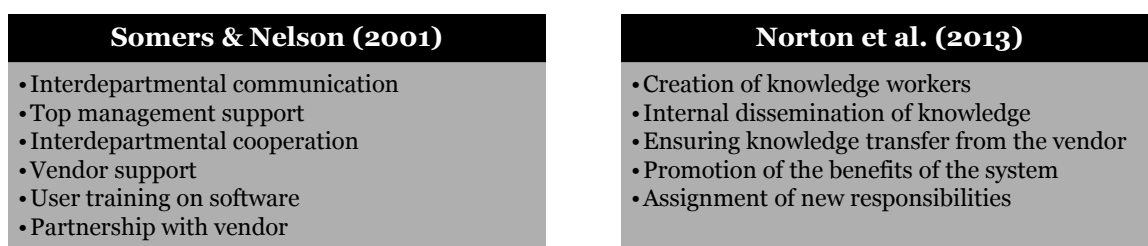


Figure 16: CSFs in the post-implementation phase

¹⁰ Note that the concept of identifying risk factors is closely related to the concept of identifying critical success factors, since both aim to identify obstacles in the journey towards enterprise system success.

Furthermore, Law et al. (2010) developed eight specific maintenance and support (M&S) CSFs for ERP systems, since ‘poor planning and management of M&S services can peril the normal operations of an ERP system and the daily activities of a business’. These 8 CSFs are:

1. *Minimal customization*, only with strong justification and senior management approval
2. *Formalization of the M&S practice*, clearly defined roles and responsibilities and manifested in organizational structures
3. *Alignment with vendor's services* and its product strategies and practice
4. *Support and participation* from personnel at all levels
5. *Use of multiple sources of ERP expertise* to safeguard against turnover
6. *Interdepartmental communication and coordination*
7. *M&S strategy*
8. *Implementation outcome*, the quality of the implementation

CSF 1 shows, not only from an implementation perspective, but also from maintenance and support perspectives, that it is desirable to minimize the amount of customizations made to the software. According to Law et al. (2010): “Customization creates hurdles for on-going maintenance and support of an ERP system”. Customization makes it more difficult to migrate to a newer release and it is costly to retain customizations that were created in the past. Furthermore, Law et al. (2010) emphasize by CSF 2 that good organization of the M&S practice is very important. The on-going upgrade, maintenance and support of ERP systems differ significantly from traditional software systems, but that many companies have underestimated this. Thirdly, alignment with the vendor is crucial at this point, since the company is dependent of the vendor in maintenance of the system (CSF 3). Often this includes technical support services, distribution of software patches and minor and major software releases (Law et al., 2010). However, the power relationships and dynamics between vendors and companies during the post-implementation phases are ‘a fertile area of research’ (Grabski et al., 2011). Furthermore, CSFs 4 until 8 show similarly to Figure 16 the importance of knowledge at the M&S practice and interdepartmental communication and coordination.

Similar recommendations can be found in research by Françoise et al. (2009). They studied CSFs in the existing literature, but tried to extend the usefulness of these factors by translating them into practical actions. Out of the list of 103 actions (according to 12 CSFs), around 8 are relevant for the post-implementation phase. This includes, amongst other things, retaining top management support in the project follow-up activities, identify and communicate the link between the ERP and the company’s strategy, making executives accountable for the achievement of organizational goals, creating a competent technical support team, and formally identifying the limits of reengineering and customization of the application before starting the configuration activities. However, while Françoise et al. (2009) mention important aspects for the post-implementation phase, these activities are hidden in a long list with activities that is mainly focused on (pre-)implementation aspects.

Finally, more recently Chandra and Givindaraju (2012) propose a model for ERP post-project management, since they also concluded that previous studies ‘have not provided a comprehensive recommendation for the ERP management during the post-project phase’. The model consists of 22 activities that are recommended to execute in the post-implementation phase in order to improve the success in ERP benefits realization, given in Appendix E.1. However, neither are the activities explained in content and choice, nor it is

clear which activities are critical and thus most probably lead to problems or risks in post-implementation if omitted.

6.2.2 Issues

Nearly no article in literature describes actual issues that organizations encountered in the post-implementation phase. However, early case study research that is performed to validate enterprise system implementation models, gives a first impression of problems in the post-implementation phase. The issues they mention are:

Case study research by Markus et al. (2000):

- Turnover of experienced users and support personnel
- User skill with system remains low
- Data quality remains low
- System not used in managerial decision making (inadequate management reporting)
- Planned improvements not achieved
- Insufficient plans for on-going system support and business improvement
- Business improvements were not sought as part of ERP implementation

Case study research by Ross and Vitale (2000):

- Failing to establish performance metrics
- Resourcing the post-implementation stage inadequately
- Failing to translate increased availability of data into management information
- Addressing resistance to change slowly or not at all

In the above list, one can see that most problems concern organizational aspects. Gartner (2012b) reports in the same way: “Many enterprises that implement application suites such as ERP, SCM and CRM, don’t realize until after ‘go live’ that the historical IT organization structure is ill-suited for the high level of end-user involvement that is a critical component of overall application success”.

6.2.3 Risks

In the past years some work has been done in the direction of risk management for the post-implementation phase. Peng and Nunes (2009a) did a first attempt to develop and propose a risk identification checklist to support decision making for strategic risk planning and management in the ERP post-implementation phase. They concluded that ‘a thorough search and review of the literature cannot identify any other such models’, neither in the ERP literature nor in the IS/IT literature. The risk ontology contains 40 risks, categorized in operational, analytical, organisation-wide and technical risks, given in Appendix E.2. Post-implementation risks were defined as ‘the occurrence of any event that has consequences or impacts on the use, maintenance and enhancement of the implemented ERP systems’. In follow-up research by the same researchers (a majority of) the framework was validated using questionnaires based on the list of risks (Peng & Nunes, 2009b)(Pan et al., 2011).

Secondly, Salmeron and Lopez (2010) developed a risk taxonomy for ERP maintenance. They identified 30 risks and categorized them in different stages of the maintenance activities (problem identification, analysis, design, implementation, testing and delivery), given in Appendix E.3. However, they focused on maintenance only, i.e. ‘neither the risks associated with ERP upgrading nor system configuration options are evaluated’. This makes the scope of

the framework by Salmeron and Lopez (2010) narrower than the framework by Peng and Nunes (2009).

Both groups of authors point out that their research is pioneering and further improvement is necessary:

- Peng and Nunes (2009): “The literature-based risk ontology also provides a starting point and foundation for IS researchers to carry out further research in these increasingly important research areas. (...) It is hoped that this ontology can undergo a process of continuous examination and evolution through practice.”
- Salmeron and Lopez (2010): “For academics, this paper provides groundwork for further studies because it is the first time that risks have been gathered together in each ERP maintenance phase”

Furthermore, while both of above frameworks focus on post-implementation specifically, they also focus on ERP systems specifically. Research that focuses on post-implementation risks of CRM or enterprise systems in general cannot be found in literature so far.

6.3 Conclusion

In current research many scientists acknowledge the under-researched field of the enterprise system’s post-implementation phase, since the main focus of enterprise systems literature has been on the selection and implementation phases. Similarly, in practice the preparation for the post-implementation phase is often overlooked in rush to production, resulting in maintenance and support problems and less realized benefits from the enterprise system implementation. According to Gartner (2012d): “Post-implementation often is seen as the last gate to pass, as if signalling the end of the effort, rather than indicating a change in emphasis from start-up to production operation.”

Few researchers tried to fill this gap and carried out research to address post-implementation risks and critical success factors. This research shows that inter-departmental communication, on-going change management and training, a good relationship with the vendor, minimal modifications to the system and a strong maintenance and support practice in the organization are very important in the post-implementation phase. However, the authors acknowledge that they provide a first attempt that needs continuous improvement and practical validation. Moreover, they all focus specifically on ERP systems and not on enterprise systems in general, while earlier research that focused on implementation phases has shown many similarities between ERP, CRM and other ES implementations. Finally, the attempts to provide a framework for post-implementation risks are all carried out by deductive research, based on a review of already published literature that was not specifically focused on the post-implementation phase.

Therefore, the result of the current inductive research project is still unique and provides a comprehensive and comprehensible view of post-implementation risks of enterprise system implementations in general. It fills a practical and a research gap. Such a framework does not exist in literature and could help practitioners to better prepare for, and anticipate on, the challenges occurring after the ‘go live’ of their enterprise system. Nevertheless, above given overview of literature provides a basis for a theoretical validation, since it implies useful input and material for comparison of research findings.

7 Validation

In this chapter, the inductive qualitative case study research performed in this research project is evaluated to assess the quality of the developed deliverables. First, in Section 7.1 the findings will be compared with literature in a theoretical validation. Secondly, in Section 7.2, a practical validation of the results will be described according to four tests of evaluating case study research.

7.1 Theoretical validation

As presented in the research methodology and described in Chapter 6, it is essential in the process of theory building to compare findings with emergent concepts, theory, or hypotheses in the existent literature. This enhances the internal validity, generalizability, and theoretical level of the conclusions resulting from the inductive research (Eisenhardt, 1989).

Therefore, in Section 7.1.1 the designed post-implementation risk framework will be compared with the findings in literature presented in Section 6.2.2 (issues) and Section 6.2.3 (risks). In Section 7.1.2, the designed roadmap with actions will be compared with the findings in literature presented in Section 6.2.1 (critical success factors).

7.1.1 Comparison of risk framework with literature

The issues that were mentioned by Markus et al. (2000) and Ross and Vitale (2000), presented in Section 6.2.2, all correspond to risks in the Sunshine Framework. Table 15 shows an example of this comparison and the full comparison is given in Appendix G.1.

Table 15: Example of comparison of risk framework with literature

Authors	Issues mentioned in literature	Risk(s) in Sunshine Framework
Markus et al. (2000)	<i>Data quality remains low</i>	50. Errors (e.g. wrong information, duplicates, incompleteness) in basic/master data of the enterprise system and no procedures to solve these errors.
	<i>Inadequate management reporting</i>	53. Insufficient operational reports/ dashboards to monitor processes
Ross and Vitale (2000)	<i>Addressing resistance to change slowly or not at all</i>	5. Lack of correction of users and of stimulation of the right way of working
	<i>Resourcing the post-implementation stage inadequately</i>	1. Unclear assignment of tasks/roles/ responsibilities & 61. Insufficient budget assigned for post-implementation developments.

This comparison shows that all issues that were found in literature are included as risks in the Sunshine Framework, increasing the internal validity and generalizability of these risks. However, the framework shows many more risks. Therefore, the risk framework as a whole was compared with the post-implementation risk frameworks by Peng and Nunes (2009) and Salmeron and Lopez (2010). This comparison is presented in the last two columns in Appendix D. It shows that two-fifth of the risks are supported by the findings of these researchers, which again increases the internal validity and generalizability of these risks. For the other risks, no comparison could be made with literature. Therefore, Section 7.2 describes an extensive practical validation of the Sunshine Framework as a whole. As a result, the

Sunshine Framework reveals many more issues than currently presented in literature. This will help organizations to prepare for the post-implementation phase, which increases the value and usefulness of this framework.

Besides the content of the framework, the structure of the risk framework can be compared with the three post-implementation (risk) frameworks in Appendix E. The first framework by Chandra and Govindaraju (2012) is structured according to the categories process, technology, human resource, organization structure and management. However, these categories are, in fact, aspects to see one issue from multiple dimensions. For example, the risk ‘Processes are executed wrongly by the users’, arises when ‘human resources’ execute wrong ‘processes’ supported by a certain ‘technology’ while not being corrected by ‘management’. Therefore, the structure of the Sunshine Framework is chosen differently. The second framework by Peng and Nunes (2009) uses the categories operational, analytical, organisation wide and technical risks to structure the post-implementation risks. However, these categories do not seem to be mutually exclusive, which can be seen in duplicates in the framework (e.g. OR 1.1 & OWR 4.2 and OWR 2.1 & TR 3.3), neither do they sound logical. The third framework by Salmeron and Lopez (2010) is structured around different stages of maintenance activities, which seems to be more mutually exclusive. However, it is not useful for the purpose of this research project, since they focused on maintenance only and not on user support or system upgrading activities. The conclusion can be made that the structure of the Sunshine Framework, according to organizational roles, is new in its kind.

7.1.2 Comparison of roadmap with literature

The critical success factors presented in Section 6.2.2 are all included in the roadmap by means of corresponding actions. Table 16 shows an example of this comparison and the full comparison is given in Appendix G.2. It shows that the roadmap contains many actions that not only were derived from well-known methodologies, but also are supported by literature.

Table 16: Example of comparison of roadmap with literature

Authors	CSFs mentioned in literature	Action(s) in roadmap
Norton et al. (2013)	<i>Creation of knowledge workers</i>	<ul style="list-style-type: none"> - Build super user skills - Prepare subject matter experts - Develop support staffing approach - (& other learning actions)
Somers and Nelson (2001)	<i>User training on software</i>	<ul style="list-style-type: none"> - Develop end-user training program maintenance plan - Conduct post ‘go-live’ end-user training - Train key-users to organize ‘ES user group’ meetings in the business departments to discuss system changes
Law et al. (2010)	<i>Alignment with the vendor</i>	<ul style="list-style-type: none"> - Establish supplier agreement - Attend client days/sessions of vendor - Manage relationship with vendor

Another example is that the need of clear assignment of tasks/roles/responsibilities also was emphasized by Norton et al. (2013). Three out of the five CSFs that they distinguish for the post-implementation phase concern this aspect (‘assignment of new responsibilities’, ‘creation of knowledge workers’ and ‘internal dissemination of knowledge workers’).

The two recommendations presented in Section 5.2.3 are also supported by literature. First, the need of focussing on understanding of the ES concept and benefits of all stakeholders in the organisation is emphasized by Gustavsen et al. (1996) and Norton et al. (2013). Gustavsen

et al. (1996) conclude that a ‘concept driven change’ turns out to be most successful and recommend initiating a concept driven change. Norton et al. (2013) distinguish ‘promotion of the benefits of the system’ as CSF for the post-implementation stage. Furthermore, the second recommendation, to organize IT service management in a proper and efficient way in early phases of the implementation project, is supported by Law et al. (2010) and Gartner (2012a). They mention that CSFs in the post-implementation phase are a clear maintenance and support strategy, formalization of the maintenance and support practice and a focus on minimal customization (i.e. clear strategy on system improvement).

Regarding the identified gaps, presented in Table 14, the most important conclusion also is supported by literature. Françoise et al. (2009) mention that support of opinion leaders and mid-level managers is too often neglected in (post-) implementation change management initiatives, while this is critical for successful usage of the system. Besides, Law et al. (2010) mention specifically: “Support and participation from personnel at all levels is necessary, both in the implementation and post-implementation phases.” Actions regarding one other identified gap were also mentioned in literature. This concerns the need of actions regarding vendor relationship management. Somers and Nelson (2001) acknowledge ‘vendor support’ and partnership with the vendor’ as CSFs and Law et al. (2010) mentions ‘alignment with vendor’s services and product strategies’ as CSF.

Finally, the actions that were self-developed after identifying gaps in implementation methodologies could be compared with CSFs or other literature. This is given in Table 17, showing internal validity and generalizability of these actions.

Table 17: Comparison of self-developed actions with literature

Self-developed actions	Support of literature
<i>Maintain business process descriptions and work instructions</i>	Osterweil (1987) describes that ‘one significant danger is that the process itself is a dynamic entity and the process description is a static entity’. Furthermore, Braganza and Lambert (2000) mention this risk and they address this by presenting a process governance framework. They indeed conclude that governance at the level of the business processes should be followed to enable organizations to be managed in ways that enable changes to be effectuated quickly and appropriately.
<i>Design process relations with processes that are not supported by the ES</i>	Gartner (2012a) mentions that the scope of ERP should not be limited to traditional ERP modules, but should also pay attention to business process management in a broader way.
<i>Develop a clear procedure for prioritization of changes</i>	Berander and Andrews (2005) mention that prioritization is a crucial step towards making good decisions regarding product planning for single and multiple releases. A clear procedure should be followed by considering various aspects of functionality, such as importance, risk, etc. Therefore, they present an overview of techniques for prioritization of requirements for software products.
<i>Manage relationship with vendor</i>	Somers and Nelson (2001) distinguish ‘partnership with the vendor’ as CSF, Norton et al. (2013) mention ‘ensuring knowledge transfer from the vendor’ and Law et al. (2010) distinguish ‘alignment with the vendor’ as CSF.
<i>Continuous alignment, coordination and communication between roles</i>	Somers and Nelson (2001) and Law et al. (2010) distinguish the CSF of interdepartmental communication and coordination. Furthermore, Semler (1997) describes that the ‘concept of alignment lends itself to the creation of high-performance work systems by explaining how the independent elements of the organization can achieve greater individual and collective efficiency and effectiveness’. Misalignment of an organization’s internal guidance systems causes inefficiency in its attempts to achieve its goals. (Semler, 1997). To remove barriers for good cooperation and performance, organizations should be well-aligned.

To conclude, all main conclusions drawn from the design of the roadmap, including the self-designed actions, are supported by literature. Furthermore, while several authors mention similar conclusions as certain actions presented in the roadmap, this research project is the first that presents a full roadmap focusing on preventing and mitigating post-implementation

risks. The actions presented in the columns of phase 5 ('go-live') and 6 ('operate') show in a comprehensible way the actions being important after the 'go live' of the system. Besides, the actions presented in the columns of phase 1 through 4 (implementation phases), show what should not be missed during an implementation project or what should still be performed afterwards if it was not performed, if one wants to act smoothly and successfully during the post-implementation phase.

7.2 Practical validation

Besides theoretical validation, it is important to assess the quality of the developed deliverables in practice, i.e. with experts, in validation case studies and by evaluating the research methods. To structure this process of practical evaluation of the framework, four tests defined by Yin (2003) for evaluating the quality of case study research are used:

- *Construct validity* – establishing correct operational measures for the concepts being studied
- *Internal validity* – establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships
- *External validity* – establishing the generalizability of findings
- *Reliability* – ensuring that a later researcher following the same procedures and conducting the same case studies would arrive at the same findings and conclusions

These four tests are applied to the developed risk framework and discussed in Sections 7.2.1 through 7.2.4 respectively. Finally, in Section 7.2.5 the validity of the roadmap is discussed.

7.2.1 Construct validity of framework

The construct validation dimension questions whether the data represents the truth (i.e. are the things measured correctly?). According to Yin (2003), three tactics are available to increase construct validity: use multiple sources of evidence, establish a chain of evidence and have the draft case study report reviewed by key informants.

Regarding the first tactic, multiple people were interviewed per case study organization and interviewees were asked for additional documentation at the end of each interview. The latter was valuable especially regarding the case study description. With regard to the post-implementation issues, only issues that were mentioned by more than one organization and/or more than one interviewee were included, increasing the construct validity. As mentioned before, the frequency analysis increased the insight in this construct validity.

Furthermore, the tactic of ensuring review by participants was performed strictly, as mentioned during the processing procedure. This is presented in Figure 17.

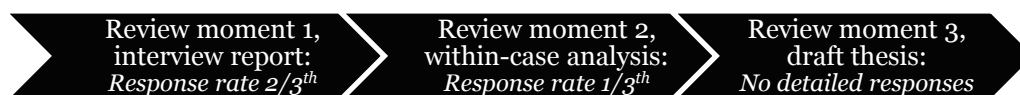


Figure 17: Interviewee review moments and response rates

First, after each interview an interview report was immediately made and sent to the interviewee with a request to provide feedback. Two third of the interviewees responded to this question. The feedback was very positive and included only minor changes in all cases. Second, after the within-case analyses, the results were presented to the group of

interviewees within the particular case study organization. By doing so, the results of each interviewee were presented to the other interviewees in the same case study organization (anonymously). In this way a chain of evidence was established, one of the tactics mentioned by Yin (2003). In each case study two interviewees responded on this request (one third of the case study interviewees), by reading the entire within-case analysis document and placing comments to the issues. When the interviewee did not agree with statements of another interviewee, he or she mentioned that in the feedback. Table 18 presents an overview of this feedback. It shows that the interviewees on average disagreed with only 3 of the 55 issues in the within-case analysis result. This indicates high construct validity. Overall, the feedback was confirmative and mainly included comments that helped to better formulate the issues. In other words, it helped to tighten the coding process.

Table 18: Feedback of interviewees after presentation of within-case analysis results

Case study	Nr. of issues	Feedback of interviewee	Comments	Disagreements
AMC	51	Implementation manager	20	6
		Lead architect	12	0
Damen Shipyards	48	Implementation manager	14	0
		Solution architect	5	4
Rabobank	64	Implementation manager	15	5
		Functional application manager	26	4

When the disagreements concerned issues that were mentioned by only one interviewee in one case study, the issue was deleted, since this would be the case during the across-case analysis anyway (this happened 3 times). When the disagreements were caused by the way the issue was formulated, the data was read again and the issue was reformulated (this happened 10 times). When a disagreement concerned an issue that was mentioned by multiple interviewees in the particular case study and in other case studies, the comment was ignored (this happened 6 times). Table 19 shows examples of this process.

Table 19: Examples of handling disagreements in feedback of interviewees

Within-case analysis issue	Feedback of interviewee	Action (freq.)
<i>The amount of problems/questions with regard to the ES that users announce to the service desk is experienced as too high.</i>	“This is an opinion, you can’t do anything with this. Previously to every release is estimated with the service desk how many questions are expected, and a capacity planning is made.”	Issue deleted (3 x)
<i>Difficulties in data transfer towards tactical/strategic management reporting tools.</i> (risk 40 & 53 after across-case analysis)	“I do not recognize the title, but do recognize the example. I would read this data again and figure out what is the main point of this issue.”	Issue reformulated (10 x)
<i>Insufficient procedures and governance in choices which RFC’s are accepted and which not.</i> (risk 28 after across-case analysis)	“While I can only speak about the period that our department of FAM exists, yields that we control this reasonable strictly. I don’t know who mentioned this, but I can find myself less in this issue.”	Comment ignored (6 x)

The final review moment for interviewees was after a draft version of the thesis was sent to the interviewees, with a personal note (i.e. which pages related to the particular interview and company). None of the interviewees provided detailed feedback anymore. However, this is not an issue, since construct validity was already ensured by gathering and processing detailed feedback during earlier review moments.

7.2.2 Internal validity of framework

The second validation dimension concerns internal validity. Questions in this test are (Yin, 2003): Are the conclusions correct? Have all the rival explanations and possibilities been

considered? Does it appear to be airtight? To answer these questions, three rounds to gather feedback on the risk framework from experts were organized, visualised in Figure 18.



Figure 18: Three rounds of validation with experts

The first round of expert validation was a workshop. The objective of the workshop was to discuss the first draft framework with regard to completeness, correctness and clarity, and to discuss possible improvements. Appendix H.1 describes the participants, setup and results of the workshop. The experts were positive about the content of the framework. Therefore, 90 per cent of the discussion was about visualization, the structure of the framework and the formulation of roles within the organization. The comments gathered during this discussion were very valuable and used as input for revision of the framework. This revision included reformulating roles, relocating certain risks, splitting two roles (functional maintenance and system management) into four roles (user support employee, change manager, FAM, TAM), reformulating the effects and adding three risks. An example of an addition can be found in Table 7 presented in Section 4.2. The additions followed from suggestions of risks that the experts missed in the framework¹¹. These risks were mentioned in multiple case studies, but missed during the coding process. Therefore, the suggestions helped to tighten the coding process. Individual feedback of the experts after the meeting suggested the content of the framework was found to be recognizable, interesting and important to act upon.

After revision of the framework, a second round of feedback was organized to gather individual input from different experts about the correctness, clarity and completeness of the second draft. This was done by means of expert validation forms, with the following questions for each particular risk:

1. *Correctness*: Do you recognize the risk? Is the risk ‘correct’ in your opinion? (✓ = yes; X = no; – when you do not have experience on this field)
2. *Clarity*: Is the risk clear? Do you understand what is meant with this risk? (✓ = yes; X = no; – when you do not have experience on this field)

And for each role:

3. *Completeness*: Do you miss any important risk regarding this particular role in the organization? (text)

Furthermore, the form contained a space to make comments about each risk.

The form was filled out by eight experts and four other experts gave comments in a less formal way. Most of these experts are very senior in the field of enterprise system implementations (around 10 to 20 years of experience). An example of a validation form that was filled out by one of the experts is given in Appendix H.2. This validation assessment per risk again provided very valuable input. The input concerned for 95 per cent formulation issues, since even many of the risks mentioned by ‘completeness’ turned out to be formulation or interpretation issues¹². Moreover, the feedback contained useful suggestions, such as a more logical order of the roles, fine tuning of the formulation of the green boxes and changes in terminology of certain enterprise system related terms. Overall, the experts were very positive about the framework. Some quotes of (different) experts are:

¹¹ This concerned exogenous risks: leave of an important ES project sponsor, bankruptcy or M&A of a vendor and loss of important personnel. (Risk 60, 47, 35)

¹² In the example in Appendix H.2, 20 of the 24 comments were formulation related (85%), but four other experts agreed on all risks and only mentioned formulation suggestions.

- “This is a good way to make clear to organizations why system related process issues exist and what improvement areas are. Also, a standardized assessment tool could be derived from this, to make clear what causes are of a high total cost of ownership.”
- “Especially the approach per stakeholder appeals to me and is relatively new, I think.”
- “Isn’t the role of the customer missing? The ES should contribute to better customer experience, etc..?”¹³
- “This should be a placemat that consultants need to lay down next to their workplace when implementing enterprise systems.”

Processing this feedback resulted in a third version of the framework. This third version was reviewed by an independent researcher in the field of operations management, on the areas of clarity and formulations. No changes were made regarding the content of the framework. However, during this review, an inconsistency was discovered of using full sentences and shortened sentences. Therefore, one third of the risks were reformulated (e.g. ‘Users are not corrected properly, and not stimulated to work in the right way’ into ‘Lack of correction of users and of stimulation of the right way of working’) and grammar mistakes were corrected. Subsequently, a final version was created as presented in this thesis. The extensive process with three rounds of feedback from different experts ensures high intern validity.

7.2.3 External validity of framework

External validity is about knowing whether a study's findings are generalizable beyond the immediate case study (Yin, 2003). In order to enlarge the generalizability, multiple case studies were conducted at organizations in different sectors focused on different enterprise systems. Fortunately, knowledge accumulated across the end of the interviews (replication logic). Especially during the analysis stage of coding, it became clear that almost all issues in the final interviews were mentioned in interviews before. This is important according to Yin (2003): “The generalization is not automatic, however. A theory must be tested by replicating the findings in a second or even a third neighbourhood.” Therefore, as additional validation steps, the framework has also been evaluated by means of four extra small case studies.

The validation case studies were selected with the same criteria as the in-depth case studies: diversity in type of enterprise systems, revenue larger than €0.5 billion and a head office in the Netherlands. Furthermore, they were selected with diversity concerning the phase of the implementation project at the interview moment, shown in Figure 19.

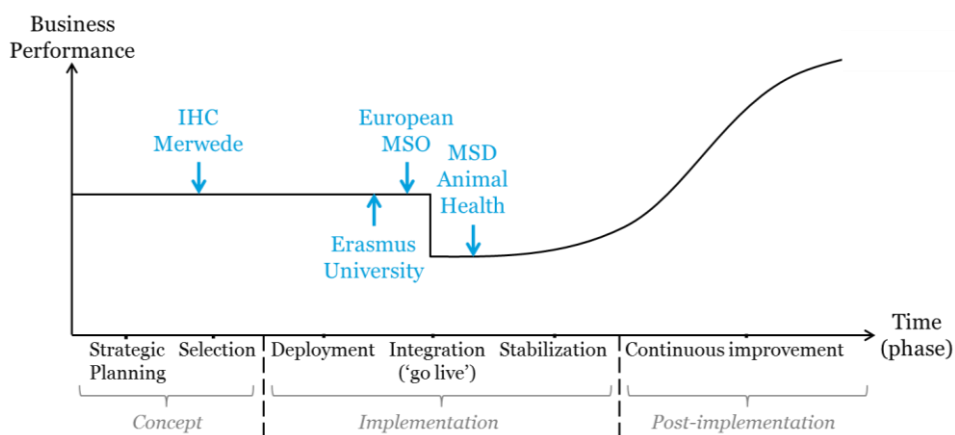


Figure 19: Four validation case studies, executed at organizations being in different phases of the implementation project

¹³ Answer: no, since the customer has no influence on the risks. In the end he is a victim of occurring risks.

For each case study, an interview was held with the program manager of the enterprise system implementation. Besides, the interviewee was asked to fill out a company validation form. The objective of conducting these validation case studies was twofold. The first objective was to validate the framework on generalizability. Each interviewee was asked: “What do you foresee as the largest (e.g. top 10) risks in the post-implementation phase of the implementation, causing the organization to be unable to obtain the full benefits of the system?” The answers were compared with the framework, to check the framework on completeness (are all the risks mentioned by the interviewees, included in the framework?). If the risks mentioned by the validation case study companies were indeed included in the framework, the generalizability of the framework could be confirmed. The second objective was to validate the framework on usefulness. Each interviewee was asked to fill out a company validation form. The objective of this validation form was to get insight in whether the framework raises awareness, provides insight, and/or triggers to undertake (new or additional) actions to prevent or mitigate the identified risks. In other words, by means of the validation form, the interviewees were being asked to indicate per risk:

- *Awareness upfront?* Were you aware of these risks upfront?
- *Already mitigated?* Have you already undertaken actions to mitigate these risks?
- *Awareness now?* Are you now (after seeing the framework) more aware of the risks?
- *Triggered with actions?* Are you now (after seeing the framework) triggered to undertake additional actions to prevent/mitigate these risks?

If the interviewees became more aware of the risks after seeing the framework and if they were triggered to undertake additional actions, this would stress the usefulness of the framework in practice. The setup of the validation case interviews is given in Appendix I.1 and the results of the interviews are given in Appendices 1.2 to 1.5. Furthermore, an example of a company validation form that was filled out by the Erasmus University is given in Appendix 1.6. This example form shows that the framework triggered the interviewee with the following actions:

- *Changes to the system not clearly communicated to users* -> Triggered with action: "Communication of release planning to be improved."
- *Bugs after new releases, due to insufficiently testing* -> Triggered with action: "Improve test method"
- *No application rationalization, legacy systems are still running* -> Triggered with action: "Application life cycle management to be improved"
- *No policy for handling release updates from vendor* -> Triggered with action: "Policy to be defined"
- *No procedures for data cleansing and archiving* -> Triggered with action: "Procedure to be defined"

To give another example, the interviewee of an European MSO wrote after filling in the company validation form: “Found it very helpful and a good checklist for further planning.” Besides the ten risks by which he indicated that he was triggered by the framework to undertake actions, he mentioned that the framework helped to renew the focus on certain risks they already identified before.

Overall, Table 20 presents the results of the four validation case studies. The columns present the company name, the situation (company characteristics and short description of

enterprise system implementation), whether the risks the companies face are included in the framework, what the first reaction was of the interviewee to the framework and whether they are going to use the framework. The final column shows whether the interviewees became more aware of certain risks and were triggered to undertake extra actions after seeing and/or using the framework, following from the company validation forms that were filled out.

Table 20: Results of external validation case studies

Company	Situation	Are the risks mentioned included in framework?	First reaction after seeing the framework	Are they going to use the framework?	Raised awareness and/or triggered with actions?
Erasmus University Rotterdam	20.000 students, 2700 employees, revenue of €0.5 billion. Started a re-implementation and extension of SAP in 2011 ('SAP@EUR'). 'Go live' is planned 3 months after the interview.	Yes, all of the three risks that were mentioned	"What I find a strong aspect of the framework, is that it is primarily focused on the behaviour of people, and how this causes certain effects."	"Yes, I think it is a reasonable framework to use as checklist. In a way that we have to organize all these stakeholders/roles in the right 'position', and if we do not organize it in that way, we can expect the described effects."	Yes, for 5 risks
IHC Merwede	3000 employees and revenue of €0.9 billion. Started the implementation of an ERP system in June 2012 (part of program 'One IHC Merwede'). 'Go live' is planned phased, 2014-2017	Yes, all of the five risks that were mentioned	"Very good. Nice." "Is this going to be a confidential graduation report? No? So, I can read and use it when you are graduated? Nice."	"Yes. I would use it. I provide you that answer without doubt. I would use it to make me, but especially to make others, more aware of the risks after the implementation"	Yes, for 6 risks
MSD Animal Health	6200 employees and revenue of €2.4 billion. Started a global CRM implementation in November 2011. 'Go live' has been performed for 50% of countries.	Yes, all of the seven risks that were mentioned	"It looks structured and solid. I did not study the details yet, but I recognize the big parts. I also see terms and risks of which I think 'that makes sense'."	"Yes, I think so. What I shall do, that triggered me: I will list up the risks that I can identify and I will map the activities that we are currently taking to mitigate these risks. Then I will use the framework to check if we are missing something."	No, they already faced all risks
European Multiple Service Organisation (television, broadband internet, and telephony services)	> 30,000 employees revenue >€15 billion Started the implementation of an IT and network service management system in Dec. 2011. Technical 'go live' is planned 2013-10-9. Operational: 2014-01	Yes, all of the four risks that were mentioned	"I see many risks that I recognize." "Let's have a look at the data tree: 'No clear data model'. Yes, this is what we encountered."	"I need to study the framework and roadmap better, to see what is relevant for us. If I quickly view it, I think it definitely contains relevant aspects for us."	Yes, for 10 risks

Table 20 shows that for all four validation case studies of different enterprise system implementations (CRM, ERP and service management), performed at large companies with a head office in The Netherlands, the framework was experienced useful. Furthermore, all the risks that these companies could identify were present in the framework. This indicates that the results of the case study research indeed are generalizable among different enterprise

systems and different types of organizations. Furthermore, for three of the four validation cases, the framework triggered undertaking specific actions, proving usefulness of the framework. The interviewee of the validation case study that was not triggered to undertake extra actions mentioned: “In my opinion the analysis was extremely complete and structured. It is like a sore thumb that the model has value. Unfortunately, we discovered these risks along the way. When you have such a model upfront, then you are able to take these risks into account already during the planning of the implementation project.”

The validation case studies showed that the framework has a high external validity. This confirms what Eisenhardt (1989) stated: “This research approach is especially appropriate in new topic areas. The resultant theory is often novel, testable, and empirically valid.”

7.2.4 Reliability of framework

The final dimension to evaluate the quality of the research is reliability. The goal of reliability is to minimize the errors and biases in a study. The corresponding question is (Yin, 2003): Can the same research be conducted later and will the investigator arrive at the same findings and conclusions? Yin (2003) states: “One prerequisite for allowing another investigator to repeat an earlier case study is to document the procedures followed in the earlier case.” Therefore, all procedures were strictly documented and the most important ones were presented in this thesis report. The research was conducted in a way that an auditor could repeat the procedures and arrive at the same results. This explains, for example, the very detailed discussion of the analysis process in this thesis.

7.2.5 General validity of roadmap

For the roadmap that has been developed, which cannot be characterized as a result of case study research but rather of design research, the evaluation is performed more concisely. Reliability has been ensured by transparently providing the design method in Section 5.2.1 and intermediate results in Appendix F. Construct validity and internal validity was enlarged by an extensive discussion with two independent experts, who are experienced with the methodologies (trainers of EVD and familiar with ASAP). One expert checked the mapping of the actions per risk, by ensuring that actions were interpreted correctly and mapped to the appropriate risk, by ensuring that the most important actions were selected and by evaluating whether the mapping was complete. The other expert checked the final roadmap, by evaluating the four self-defined actions, the formulation of the goals and the overall structure. Furthermore, an independent researcher in the field operations management checked the overall roadmap on clarity and correctness of formulations. External validity of the roadmap was checked by comparison with literature, as discussed in Section 7.1.2.

8 Conclusion

This chapter concludes the research project. First, an answer is given to all four research questions as defined in the introduction. Secondly, academic and practical contributions of the research will be discussed. Next, limitations of the research will be discussed and the thesis concludes with suggestions for further research.

8.1 Research questions

1. *What is the post-implementation phase of an enterprise system implementation?*

The ES post-implementation phase is the phase after the implementation of a system, when it is in operational use, when the responsibilities for application management have been shifted from the project team to the standing organization, and when normal operations can be executed repeatedly without critical issues (such as failing functionalities, lacking performance, login issues). In other words, it starts when the post-implementation dip has been passed. It endures until the system will be decommissioned or the responsibilities for application management shift back to a project team (due to a major change). The phase includes activities in the field of maintenance, improvement, user support and extension.

2. *What are issues (IT & non-IT oriented) that organizations encounter in the post-implementation phase of enterprise system implementations?*

Three general issues can be distinguished that organizations encounter during the post-implementation phase. First, the most important issue is that many people in the organization have an insufficient understanding of the 'concept' behind the ES, causing an incorrect or suboptimal way of utilising the ES. Secondly, roles and responsibilities are often insufficiently assigned to persons in the organization and these persons are insufficiently prepared, do not have enough resources (e.g. time, knowledge), and take insufficient responsibility for the tasks required. This causes that (relatively small) post-implementation problems cannot be solved quickly and accurately, allowing for issues to accumulate and cause larger negative effects that affect business performance. Finally, a third general issue is that different roles are often insufficiently aligned and people communicate insufficiently with each other. This causes barriers in cooperation and performance and, thus, inefficiency in the organization's attempts to achieve the goals of the enterprise system implementation.

Furthermore, a full overview of issues that organizations encounter regarding different stakeholders is presented in a list (Appendix D). The issues can be summarized as follows:

- In the business: Insufficient understanding of, and responsibility taken for, a correct way of working with the ES
- In IT service management: Insufficient knowledge and capabilities to provide user support, to initiate improvements and extensions, and to maintain the ES
- In information management: No clear vision, governance or procedures for managing ES data and management information

The first issue concerns all people in the organization, but is particularly noteworthy for people in the business. The second issue includes insufficient organization of IT service

management, causing maintenance, user support, improvement and extension activities regarding the enterprise system to not be performed properly or efficiently. During the implementation often insufficient emphasis is given to this preparation of the IT service management organization for their tasks after the 'go live'. For example, a specific issue that arises is the gap between users and the IT organisation, when FAM is not organised properly at central level. Finally, a common goal of ES implementation is to achieve optimised process chains by efficiently managing all resources by means of the available and integrated information in the ES. However organizations typically encounter the issue that management information is insufficiently available. This begins when organizations do not have a clear vision of KPI's and management information (i.e. 'what do we want to know') and when no governance and procedures exist to improve the quality of the (management) information.

To conclude, organizations encounter all types of issues during the post-implementation phase of an enterprise system implementation and, while often the business blames IT or the software, most issues concern organizational aspects.

3. How can these issues be generalized and structured in a risk framework?

The issues could be generalized by conducting open coding (i.e. conceptualizing and categorizing) since they were seen across the different case studies. The issues imply risks for other ESs in the post-implementation phase and therefore could be structured in a risk framework. The result, the Sunshine Framework, is presented at page 31 of this thesis. Risks are structured according to roles (i.e. stakeholders) in the organization. This is done to emphasize the importance of involvement and engagement of these stakeholders and to increase recognisability and applicability for practitioners. Risks were placed by the role that has 'influence' on the risk or by which the risk is 'caused'. Besides, three general risks were defined affecting all roles. Subsequently, risks were structured in a 'cause/effect' diagram.

4. How can the identified risks be prevented or mitigated?

To develop preventive actions and mitigations for the identified post-implementation risks, it is important to identify the root cause of the risks. In fact, the reason that many issues occur during the ES post-implementation phase is that every implementation is restricted by time and budget, which causes the prioritization of actions and decisions taken during the implementation project. A perfect implementation should ideally not lead to many of the risks, particularly if procedures are followed strictly and testing occurs comprehensively (like in an aeroplane construction project). Then stakeholders should be assigned and aligned to solve occurring issues quickly, before accumulation and escalation of issues. However, often the 'go live' of the system is viewed as the ultimate test. Therefore, most of the mitigations for the post-implementation risks can be found in implementation methodologies.

Actions can be defined that should not be missed during an implementation project (i.e. preventive actions), or that should be initiated if the organization is already facing certain risks (i.e. mitigations). A full overview of these actions is given in the roadmap presented on page 33 of this thesis, but the most important actions are:

- Assign roles and ensure that the corresponding persons know their responsibilities, are prepared and have the resources to execute their tasks
- Perform change management and ensure that all stakeholders (fully) understand the ES concept and internalize the new 'way of working' with the ES
- Align roles and ensure active coordination and communication between the roles

Regarding the first action, it is especially important to organise IT service management in a proper and efficient way. While many organizations neglect this until the final preparation for the 'go live', this preparation has to start in the early phases during the implementation project. The design of a support governance, staffing approach and training approach are particularly important. In the end, user support employees, change managers, FAM and TAM should be prepared and aligned to constantly work on continuous improvement of the ES and support the usage of the system in the business. Regarding the second action, it is recommended to initiate a 'concept driven implementation', in which the 'concept' gives meaning to all stakeholders and their tasks and indicates the required outcomes of system or structure changes. This should not only be provided for users, key-users and senior managers, but also for operational managers, since they should correct and stimulate users to internalize a correct way of working with the system in the business. With regard to the third action, it is important to assess the effectiveness of the organizational design and to ensure continuous alignment, coordination and communication between the different roles.

Another important conclusion is that for 10 of the 49 risks (causes only) the studied methodologies seem to lack preventive actions. This gap in the methodologies includes actions regarding involvement of operational managers, relationship management with the vendor, establishment of procedures for prioritizing ES changes and maintenance of process descriptions. This gap has been filled by identifying lessons learned from the case studies and five self-developed actions based on knowledge gathered during the research project.

8.2 Research contributions

For practitioners, the deliverables of this research project raise awareness, provide insight and trigger to initiate (new or additional) actions to prevent or mitigate post-implementation risks. In other words, it will help to actively perform post-implementation risk management and realise the full benefits and estimated enhanced performance of the ES. Identification and awareness of the risks is the first step in this risk management process and the framework presented in this research project supports this. The second step in risk management is the initiation of actions to prevent or mitigate the risks and this is supported by the presented roadmap. The framework and roadmap can be used by (post-) implementation program managers or managers/coordinators of the stakeholder(s) and will be most useful when used periodically. Furthermore, the identified gaps in implementation methodologies will help experts (e.g. system integrators) to enrich their methodologies.

For academics, the research project contributes in several ways to filling the literature gap regarding post-implementation aspects. This research project is the first extensive research project that specifically focuses on post-implementation risks with an inductive approach, contrary to other deductive emerging risk frameworks that were based on existing literature that was not focused on the post-implementation phase specifically. Second, this research project focused on enterprise systems in general, instead of focusing on ERP only. It has demonstrated, by extensive validation, that a general risk framework that is relevant for all kinds of different enterprise systems can be developed. Thirdly, by having the people aspect central in the post-implementation risk framework, the structure of the Sunshine Framework is new in its kind. Finally, this research project is the first that presents a comprehensive and comprehensible roadmap focusing on preventing and mitigating post-implementation risks.

8.3 Limitations

Every study, no matter how well it was conducted and constructed, has limitations.

Regarding this research project, the following limitations are the most important:

1. The framework contains 12 roles. However, during the case studies not all these roles were interviewed in each organization. While replication occurred of issues regarding the roles, mentioned by other interviewees, it would have been ideal to conduct interviews with persons representing all roles.
2. The design of the roadmap started with studying methodologies like EVD and ASAP, which are ES implementation driven. More actions were brought in by adding lessons learned from the case studies and by knowledge gathered during the research project. However, many issues are caused by organizational inadequacies. Therefore, the roadmap could have been more comprehensive by analysing other methodologies and literature, e.g. in the field of human capital or change management, and adding tasks.
3. To increase the validity of the analysis process, a coding consistency check could have been performed by asking an independent coder to code the data and by checking the differences. However, because of the large amount of data, no independent parallel coding has been performed in this research project.

8.4 Suggestions for further research

Suggestions for future research, which can build on the work presented in this thesis, are:

1. Complement the risk framework by quantifying the impact and likelihood of each of the identified risks. This should be approached by a large designed survey, where organizations that are in the post-implementation phase can indicate the impact and likelihood of such risks according to their experiences.
2. Link the effects in the framework explicitly to business performance and benefits. In this thesis, a figure was presented indicating a drop in business performance after the 'go live' and an increase in the business performance during the post-implementation phase. However, business performance can be defined more explicitly and it is interesting and practical valuable to analyse what the impact is of the effects (as defined in the risk framework) on business performance.
3. Complement the roadmap by adding actions from non-IT oriented management approaches, e.g. from the field of human capital or change management. As mentioned in the limitations section, the actions were derived mainly from ES implementation methodologies. Complementing the roadmap with ideas from non-IT methodologies, could trigger actions from practitioners or academics with other viewpoints and help prevent and mitigate the organizational risks.

In other words, this thesis presents a grounded starting point for a further extension of the literature regarding post-implementation risks. It can be concluded with a statement by Strauss and Corbin (1998):

“Our theories, however incomplete, provide a common language (set of concepts) through which research participants, professionals, and others can come together to discuss ideas and find solutions to problems. Yes, we are naive if we think that we can ‘know it all’. But even a small amount of understanding can make a difference.”

Bibliography

- Almotairi, M. (2009). A framework for successful CRM implementation. *European and Mediterranean conference on information systems*, 1–12.
- Aloini, D., Dulmin, R. & Mininno, V. (2007). Risk management in ERP project introduction: Review of the literature. *Information & Management*, 44(6), 547–567. Elsevier.
- Aken, J.E., Berends, H. and van der Bij, H. (2007). *Problem Solving in Organizations*. New York: Cambridge University Press
- Aurum, A., & Wohlin, C. (2005). *Engineering and managing software requirements*. Springer.
- Botta-Genoulaz, V., Millet, P. A. & Grabot, B. (2005). A survey on the recent research literature on ERP systems. *Computers in Industry*, 56(6), 510–522. Elsevier.
- Braganza, A., & Lambert, R. (2000). Strategic integration: developing a process-governance framework. *Knowledge and Process Management*, 7(3), 177-186.
- Chandra, D. & Govindaraju, R. (2012). Recommendation of ERP post-project management. *IEEE International Conference on Management of Innovation and Technology 2012 (ICMIT)*, 418–423.
- Chen, I. J., & Popovich, K. (2003). Understanding customer relationship management (CRM): People, process and technology. *Business Process Management Journal*, 9(5), 672-688.
- Corner, I. & Hinton, M. (2002). Customer relationship management systems: implementation risks and relationship dynamics. *Qualitative Market Research: An International Journal*, 5(4), 239–251.
- Da Silva, R. V. & Rahimi, I. (2007). A critical success factor model for CRM implementation. *International Journal of Electronic Customer Relationship Management*, 1(1), 3-15.
- Davenport, T. H., Harris, J. G. & Cantrell, S. (2004). Enterprise systems and ongoing process change. *Business Process Management Journal*, 10(1), 16–26.
- Dey, P. K., Clegg, B. & Cheffi, W. (2013). Risk management in enterprise resource planning implementation: a new risk assessment framework. *Production Planning & Control*, 24(1), 1–14.
- Eisenhardt, K. (1989). Building theories from case study research. *The academy of management review*, 14, 4, p.532-550.
- Finney, S. & Corbett, M. (2007). ERP implementation: a compilation and analysis of critical

success factors. *Business Process Management Journal*, 13(3), 329–347.

Forrester (2013). *Global, Industry, And Technology Forces Shape The ERP Landscape*. By C. Martens and P.D. Hamerman. Retrieved from Forrester Database

Françoise, O., Bourgault, M. & Pellerin, R. (2009). ERP implementation through critical success factors' management. *Business Process Management Journal*, 15(3), 371–394.

Gartner (2012a). *Address Eight Key Factors for Successful ERP Implementations*. By D. Ganly. Retrieved from Gartner Database (G00239378)

Gartner (2012b). *Best Practices for Transitioning ERP/Business Application Support From the Develop Phase to the Operate and Evolve Phase*. By P. Pehlan. Retrieved from Gartner Database (G00232472)

Gartner (2012c). *Defining the Five Phases of the ERP Life Cycle*. By D. Ganly. Retrieved from Gartner Database (G00232373)

Gartner (2012d). *Life Cycle Guide to ERP Research, Update 2012*. By D. Ganly. Retrieved from Gartner Database (G00234591)

Grabski, S. V., Leech, S. A. & Schmidt, P. J. (2011). A review of ERP research: A future agenda for accounting information systems. *Journal of Information Systems*, 25(1), 37–78.

Ifinedo, P., Rapp, B., Ifinedo, A. & Sundberg, K. (2010). Relationships among ERP post-implementation success constructs: An analysis at the organizational level. *Computers in Human Behavior*, 26(5), 1136–1148.

King, S. F. & Burgess, T. F. (2008). Understanding success and failure in customer relationship management. *Industrial Marketing Management*, 37(4), 421–431.

Kuruppuarachchi, P. R., Mandal, P. & Smith, R. (2002). IT project implementation strategies for effective changes: a critical review. *Logistics information management*, 15(2), 126–137.

Law, C. C., Chen, C. C. & Wu, B. J. (2010). Managing the full ERP life-cycle: Considerations of maintenance and support requirements and IT governance practice as integral elements of the formula for successful ERP adoption. *Computers in Industry*, 61(3), 297–308.

Maes, R. (2003). Informatiemanagement in kaart gebracht. *Maandblad voor Accountancy en Bedrijfseconomie*, 77(11), 521–529.

Markus, M. L., Axline, S., Petrie, D. & Tanis, S. C. (2000). Learning from adopters' experiences with ERP: problems encountered and success achieved. *Journal of information technology*, 15(4), 245–265.

Markus, M. L. & Tanis, C. (2000). The enterprise systems experience—from adoption to success. *Framing the domains of IT research: Glimpsing the future through the past*, 173, 207–173.

- McGinnis, T. C. & Huang, Z. (2007). Rethinking ERP success: A new perspective from knowledge management and continuous improvement. *Information & Management*, 44(7), 626–634.
- Miles, M. B. & Huberman, A. M. (1994). *Qualitative Data Analysis*. Second edition. Sage Publications: California
- Nicolaou, A. I. (2004). ERP systems implementation: drivers of post-implementation success. *Decision Support in an Uncertain and Complex World: The IFIP TC8/WG8. 3 International Conference*, 589–597.
- Norton, A. L., Coulson-Thomas, Y. M., Coulson-Thomas, C. J. & Ashurst, C. (2013). Ensuring benefits realisation from ERP II: the CSF phasing model. *Journal of Enterprise Information Management*, 26(3), 218–234.
- Osterweil, L. (1987). Software processes are software too. *Proceedings of the 9th international conference on Software Engineering*, IEEE Computer Society Press, 2-13.
- Pan, K., Nunes, M. B. & Peng, G. C. (2011). Risks affecting ERP post-implementation: Insights from a large Chinese manufacturing group. *Journal of Manufacturing Technology Management*, 22(1), 107–130.
- Panorama Consulting (2013). 2013 ERP Report. Retrieved from <http://panorama-consulting.com/wp-content/uploads/2009/10/2013-ERP-Report.pdf>
- Parr, A. & Shanks, G. (2000). A model of ERP project implementation. *Journal of information Technology*, 15(4), 289–303.
- Peng, G. C. & Nunes, M. B. (2009a). Surfacing ERP exploitation risks through a risk ontology. *Industrial Management & Data Systems*, 109(7), 926–942.
- Peng, G. C. & Nunes, M. B. (2009b). Identification and assessment of risks associated with ERP post-implementation in China. *Journal of Enterprise Information Management*, 22(5), 587–614.
- Ram, J., Corkindalea, D. & Wu, M.-L. (2013). Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance? *International Journal of Production Economics*.
- Remus, U. (2006). Critical success factors of implementing enterprise portals: A comparison with ERP implementations. *Business Process Management Journal*, 13(4), 538-552.
- Reijers, H. A. (2006). Implementing BPM systems: the role of process orientation. *Business Process Management Journal*, 12(4), 389-409.
- Ross, J. W. & Vitale, M. R. (2000). The ERP revolution: surviving vs. thriving. *Information systems frontiers*, 2(2), 233–241.

Salmeron, J. L. & Lopez, C. (2010). A multicriteria approach for risks assessment in ERP maintenance. *Journal of systems and software*, 83(10), 1941–1953.

Scott, J. E. & Vessey, I. (2002). Managing risks in enterprise systems implementations. *Communications of the ACM*, 45(4), 74–81.

Semler, S. W. (1997). Systematic agreement: A theory of organizational alignment. *Human Resource Development Quarterly*, 8(1), 23-40.

Somers, T. M. & Nelson, K. (2001). The impact of critical success factors across the stages of enterprise resource planning implementations. *Proceedings of the 34th Annual Hawaii International Conference on System Sciences*, 2001.

Strauss, A. & Corbin, J. (1998). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Second edition. Sage Publications: California

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American journal of evaluation*, 27(2), 237-246.

Ward, J., Hemingway, C. & Daniel, E. (2005). A framework for addressing the organisational issues of enterprise systems implementation. *The Journal of Strategic Information Systems*, 14(2), 97–119.

Willis, T. H. & Willis-Brown, A. H. (2002). Extending the value of ERP. *Industrial Management & Data Systems*, 102(1), 35–38.

Yin, R. (2003). *Case study research: design and methods*. Third edition. Sage Publications: California.

Zhu, Y., Li, Y., Wang, W. & Chen, J. (2010). What leads to post-implementation success of ERP? An empirical study of the Chinese retail industry. *International Journal of Information Management*, 30(3), 265–276.

A Abbreviations

BI	Business intelligence
CRM	Customer relationship management
ERP	Enterprise resource planning
ES	Enterprise system
FAM	Functional application management
IS	Information systems
IT	Information technology
KPI	Key performance indicator
RFC	Request for change
TAM	Technical application management

B Full case study descriptions

B.1 AMC

AMC is an academic medical centre in the Netherlands. AMC's three main processes are providing care, performing research and providing education. On a yearly basis around 1.6 million patients are treated in AMC, around 8000 employees work in AMC and 2500 students follow education. The organization of AMC is decentralized and consists of 17 units, namely the executive board, 10 care divisions, and 7 support services.

In 1972 the hospital started to use their first organization-wide information system, called ZIS, to support both the care processes and support processes. For the care processes this included for example the appointments with the patients, planning and admission registrations. For the support processes this included for example salary administration, inventory management, purchasing and finances. However, during the years the organization decentralized more and more, causing the effect that divisions built and managed all sorts of own-developed applications. At the moment the IT landscape of AMC contains more than 1200 applications (including small applications in MS Access or Excel).

Five years ago the desire started to transit to a more robust and simple IT landscape, consisting of two large systems, namely an hospital information system (EPD) for the primary care processes and an ERP system for the support processes. This resulted in the programs called EVA and TOP¹⁴ respectively. The latter one, the implementation of the new ERP system, is subject for this case study.

After a process of tendering and selection, in 2010 the choice was made for the system CareCTRL (SAP with a pre-configuration for Dutch care processes) from the vendor PinkRocade and the implementation partner Deloitte. Subsequently, in 2011 the preparation for the implementation started. AMC chose for an implementation with minimal customization, in other words to retain the standard CareCTRL solution as much as possible. The purpose was to use the ERP implementation to simultaneously improve the support processes, in a way that they become more efficient (e.g. little or no administrative layers) and client centered.

In 2012 was the 'go live' for the basic version of the system, after which a period of improvement and release of extra functionalities started. More specifically, the following stages were part of the implementation:

1. 1 January 2012: purchasing, logistics, finances, housing and a part of HR
2. 1 January 2013: HR pay-roll and improvement stage 1
3. June 2013: HR employee self-service and recruitment, plus improvement stage 1 and 2 and closing the program organization

In total 8 modules of SAP are used in the CareCTRL solution for AMC and all of them run three times (for development, acceptance and production). However, for the user these

¹⁴ Abbreviation for 'Toekomst Ondersteunende Processen', a Dutch term that means 'future of support processes'.

modules are available as one system through single-sign-on via the windows desktop login, which was implemented in May 2012.

System management for CareCTRL is organized within the general ICT service of AMC and is called the 'SAP Competence Center'. This includes technical application management, functional application management and supporting functions. They are responsible for maintenance, change and release management, corresponding testing, incident and problem management and also provide user training. AMC has a non-skilled general ICT service desk, which means that all calls concerning CareCTRL are forwarded to the SAP Competence Center, where they provide support towards the users.

From the business perspective, support is organized through process owners and 'functional process managers'. The process owner is responsible for the design and improvement of the process itself, but also for the results of the process (in terms of quality, time and resource usage) and the hierarchical responsibility for employees working in the process. In general process owners are managers of a support service, for example director purchasing. The functional process managers have a key-user role and work close together with the process owners. Their role is to listen to the needs of the users (e.g. provide training, task instructions and support), to advice the process owner about the optimal operation of the process (e.g. after control of the process), to signalize improvement opportunities and change needs, and to translate them to the SAP Competence Center (e.g. draw a request for change). Moreover, they are involved with testing of new changes and releases and are sparring partners to the functional application managers. In AMC the functional process managers fulfill a role, and not a function, which means that the activities have to be combined with their existent (managerial) job tasks.

Resulting from needs of the users, functional process managers can submit request for changes (RFC's) to the SAP Competence Center. There these requests will be analysed and subsequently an impact analysis will be done by the vendor. Next, in a monthly meeting with all functional process managers, chaired by the head of SAP Competence Center, important request for changes of all different support services are discussed. It can be the case that the vendor acknowledges this request and incorporates it in a new release. However, it can also be the case that the request is rejected, or, if the issue is important and customization is needed, the request can be passed to the change advisory board. The change advisory board gathers every two months and consists of directors of the support services and a member of the executive board. After approval, the RFC's can be sent to the vendor for development.

Every month the SAP Competence Center receives new releases from the vendor. Besides, deliveries resulting from RFC's can come in. The SAP Competence Center decided to quarterly gather all these deliveries and thus only release a new version of CareCTRL every three months. For these releases, regression tests are executed (i.e. Do the existing functions still work well after influence of the new piece of software?) and the functional process managers are involved in testing the functionalities.

SAP Competence Center is also working on business intelligence, to provide management information out of data coming from CareCTRL. The standard reports in CareCTRL that are delivered from the vender are checked and (eventually) adjusted and provided. Furthermore, they are responsible for the operational reports in the SAP BW tool and the data transfer from CareCTRL to Cognos, the management information platform for tactical and strategic

management information. Users can also work with queries, resulting in many options for management reporting.

The system can be considered as being in the post-implementation phase for the first two stages of the implementation, i.e. the basic functionalities of CareCTRL and the HR payroll functionality. Namely, the main processes, such as purchase to pay, service to collection, monthly reporting and salary processing, have been executed more than three times. Furthermore, the management is transferred to system management (the SAP Competence Center), who are responsible for maintenance, user support and improvements through changes and new releases.

B.2 Damen Shipyards Gorinchem

Damen Shipyards is a global operating company with a leading position in shipbuilding. In 1969 the company was founded in The Netherlands, after the original Damen company was split and the current owner continued with 10 employees and 2 yards. During the last 44 years, Damen Shipyards has grown to a multinational company with an annual turnover of 1.7 billion, 38 yards worldwide, 8000 employees worldwide (3000 in The Netherlands and 5000 international) and around 160 annual deliveries of vessels¹⁵. The vessels that Damen builds are used for a wide range of activities, e.g. for maritime operations in harbours, offshore, shipping, public transport, yachting, dredging and fishing. Damen is also specialized in building naval and patrol vessels for security tasks. Besides shipbuilding, Damen offers customer support and after-sales services covering the complete vessel's lifecycle (through the start-up and deployment phases, to the second life or disposal phase). Even though Damen is a major international group, it is still a family-owned company.

Until 2011, Damen used the system Mars for material management and drawing management, software that was developed in the nineties. This software was highly customized to fit the company's specific processes. Therefore, updating to a newer release to make use of new developments in ICT was nearly impossible. This high degree of customization also caused that maturing and changing business processes of Damen could not be fully supported.

Around 2008 the business and IT drivers began to accumulate to replace the outdated system, by a system that facilitates more flexible and internationally orientated data sharing. The main driver was the continuing growth in sales, due to which capacity became limited and a closer link between sales and operations was necessary. In the beginning of 2008 the instruction was given to select and implement a software system and/or landscape, that should replace the current Mars system and by which also redesign and optimization of processes could be realized. The initial scope of that project, which is subject for this case study, were the processes of Damen Shipyards Gorinchem (not the sister yards) and the project was called 'DAWN'. The desire was to have more insight and influence on the total shipbuilding process, including better insight in the early phases of a project, engineering, work preparation, supply chain and logistics.

In 2008 Involvation was chosen as implementation partner, which also provided an internal project leader for selection and implementation. After a phase of exploration, in the summer

¹⁵ <http://www.damen.com/en/about/our-key-figures>

of 2009 a choice was made for the ERP software package IFS due to usability, functional fit and price. The planning of the phases of selection and deployment is given in Figure 20.

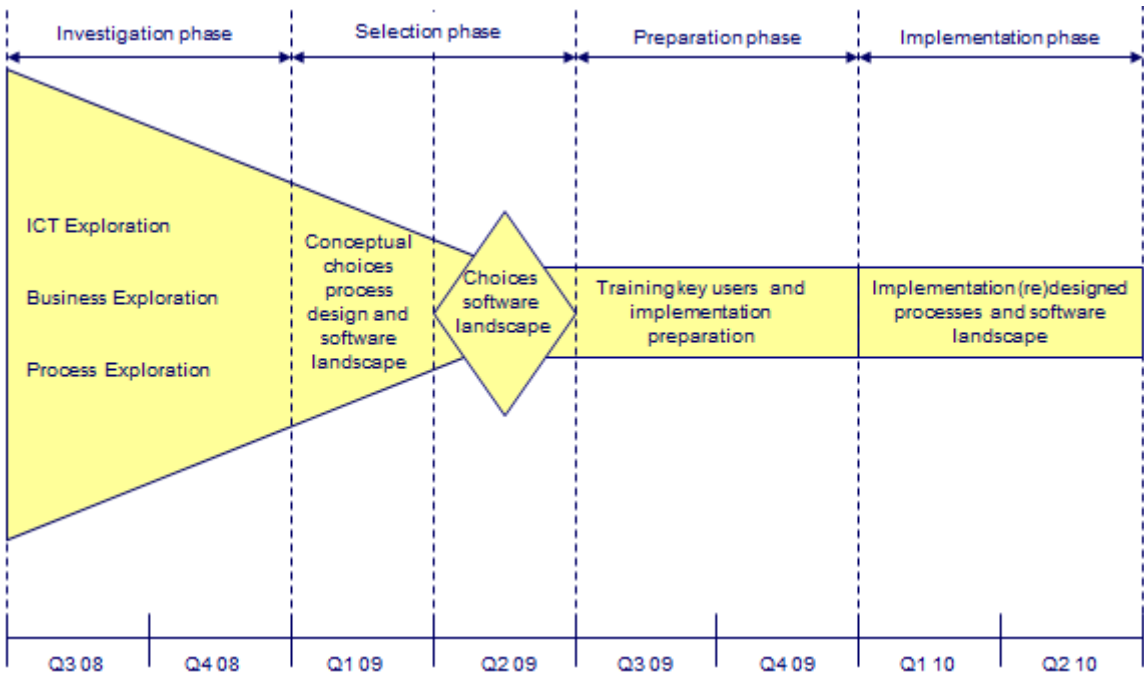


Figure 20: Planning of selection and deployment of the ES

Subsequently, the deployment phase started and the following stages of ‘go live’ were realized:

1. November 2010: finance, services and HR
2. May 2011: purchasing and logistics
3. February 2012: sales and proposals
4. From 2012: engineering (all plans need to be re-designed)

Most of the production occurs in the sister yards of Damen Shipyards Gorinchem (e.g. in Romania, Vietnam, China and Qatar) and therefore the production functionalities of the ERP package were out of scope for the initial implementation in Damen Gorinchem. However, in the beginning of 2012, the executive board made the decision that all sister yards also had to transit to the IFS system. This transition is still going.

The transfer from program management to system management went gradually in 2010 after the first implementation stage. The choice was made to not establish a service desk, but to organize user support through key-users and the IT department.

Within the IT department, the group ‘IFS Support’ has been setup, which is responsible for IFS system management. IFS Support fulfils first line support for users, e.g. answering questions like ‘I cannot login’. They also provide second line support, to further handle the problems or incidents that need more time to be solved, e.g. bugs or wrong settings. Furthermore, they have contact with the vendor IFS (third line support), to request changes or bug-fixers for pieces of software that IFS Support cannot provide themselves. Namely, some requests for changes (RFCs) can be solved by IFS Support, such as quick reports, triggers, certain views and settings, but others need to be developed by the software vendor. Next to processing the RFC’s and the three levels of support, other responsibilities of IFS

Support are user management (e.g. access for new hires) and some remaining system implementation points. With regard to the latter, some configurations of the software were not ready yet at the implementation, those needed to be realized later.

At the business side, users receive support from key-users. In other words, when users experience problems or have questions, they are expected to contact the key-user. These key-users can answer many questions through their experience with the business processes and the system, but also serve as a link between the users and the system management. The key-users are supposed to translate necessary user needs and desires into requests for changes (RFCs) for the department Solution Management, and to communicate system problems with IFS Support.

The department Solution Management has been setup in the beginning of 2012, to develop solutions for (remaining) implementation problems and to help with improving the system. In meetings with the key-users and solution managers, RFC's are presented and discussed. When a RFC not is rejected in this meeting, they continue in the process and are discussed with business process owners. After approval in this meeting, RFC's are sent to IFS Support, which further handles them and discusses the required pieces of software with the vendor. When the required software is developed, IFS Support receives a delivery from the vendor. This delivery needs to be tested and accepted in separated system environments ('test' environments), before it goes in production (the 'live' environment). The business process owners have been assigned recently, to organize a point of contact and responsibility for process issues and changes. Furthermore, the business process owners are responsible for the data that result from their processes ('data ownership').

All functionalities of the Damen Shipyards Gorinchem implementation of IFS, except for engineering, can be considered as being in the post-implementation phase. The project organization does not exist anymore, i.e. the management is transferred to system management, and the main processes have been executed multiple times. Since February 2012 to July 2013 at least 200 vessels and many services have been delivered. However, as stated before, the implementation has not been finished yet for engineering. A successor project organization is assigned for this part of the implementation, named 'DAWNEFI'. At the moment 3 out of the 25 (main) standard types are converted from the old program to IFS. The other standard types still need to be converted. However, since all plans need to be re-designed, this process takes time. In the meantime, the old system that is used for engineering is linked to IFS, such that the purchasing department could work with IFS already in 2011.

B.3 Rabobank

Rabobank Group is an international financial services provider, operating on the basis of cooperative principles. It offers retail banking, wholesale banking, asset management, leasing and real estate services. The organization, which has about 61.000 employees (in FTEs) in 44 countries, is comprised of independent local Rabobanks in The Netherlands plus Rabobank Nederland, their central organization, and its (internationally based) subsidiaries. The 139 independent local Rabobanks in The Netherlands have a staff base of about 27.300

employees (in FTE) and serve 7.6 million Dutch private individuals and corporate clients, offering a full range of financial services.¹⁶

Around the year 2000, the local managers signaled the rapidly changing needs of customers and also wanted the organization to better use the opportunities of new ICT developments. Furthermore, the financial sector was changed in a way that competition raised and it needed to focus on keeping and increasing customers (versus the past where the customer needed to be content with a delivered service from a bank). As a response, the executive board started a CRM program in 2001, with an integral focus on change of culture, structure and systems. The purpose was to build a multichannel bank, to simplify the IT landscape and to improve the customer service. The customer and his or her perception needed to become central in thinking and acting of employees, instead of the financial product itself, to be able to distinguish Rabobank from its competitors. All contact with customers needed to be tracked, to be able to seamlessly proceed customer contact after a customer switched between different channels (e.g. e-mail, telephone, face to face).

Furthermore, the IT landscape was too complex, i.e. for almost every channel and product a different system (53 selling systems) existed, which interrupted a fluent work processes for the employees. The landscape needed to be reduced, to facilitate the employees with a simple way of accessing the relevant data during customer contact moments. The customer data system at that time, OLI, did not facilitate the tracking of contact moments. Therefore, in 2001 the system Siebel was selected to provide multichannel customer service. The system implementation was part of the integrated CRM program focusing on culture, structure and systems. The CRM program consisted of different phases:

1. *2001 – 2002, pilot at four local banks.* Pilot to test the feasibility of installing a basic version of Siebel as central information system, in combination with actions in the area of culture change. The basic functionalities included filling in and maintaining a client, registration of contact and registration of products. The data needed to be actively complemented with what happened in the other (selling) systems.
2. *2003 – 2005, implementation of Siebel at all local banks.* In the end of 2002 the executive board decided to implement the system at all, at that time 152, local banks.
3. *2005 – 2010, reduction of IT landscape and further development of Siebel towards a multichannel system.* The program continued to couple the different selling systems with Siebel, and making them accessible only through Siebel, to configure products and facilitate customer contact via different channels in one system. Furthermore many initiatives were undertaken to change the way of thinking and working of local directors and employees.
4. *2010 – (...), continuous improvement.* Once Siebel is used as central standard information system, each new functionality needs to be connected with Siebel. Therefore continuous improvement and extension takes place.

After the basic functionalities of the system were implemented, the desire grew during phase 3 to improve the system with regard to 1) functionalities, 2) user friendliness and 3) customer service. Siebel became the front-end portal, to which other selling systems directly are coupled and selling information automatically is registered in Siebel. To realize this, every 2 months a new version of the system was released. Furthermore, much attention has been paid to shift employees' focus from a 'product focus' to a 'customer focus'. Because it is not

¹⁶ http://www.rabobank.nl/particulieren/servicemenu/english_pages/rabobankprofile/

about the system implementation, but about the way the system is going to help the employee in customer service. The CRM program organization and the department KIM (Customer Implementation Management, sub department Distribution) worked together to realize and facilitate this business change. Local ownership was the primary issue in this movement. To make this transparent, Rabobank Nederland assigned a level of 'CRM adoption' to local banks and stimulated to work towards a higher level. As a result of these actions, Rabobank was rewarded with the Dutch CRM Award in 2008. Besides, the IT landscape was actually simplified. In the end of this phase, more than 25 of the original 53 product selling systems were phased out.

At the moment, during phase 4, the program is called 'Distribution' instead of CRM and is for example focusing on process improvements and 'straight through processing' (STP) making of processes. Now every 3 months a new version of the system is released. Siebel became the center of the CRM part of the Rabobank, since all selling processes are connected to Siebel and this information needs to be transferred to all kinds of other systems (e.g. marketing systems). Currently 14 million customers and 2 million organizations are registered in Siebel. The system is daily used by 23.000 thousand unique users, who execute on average 14 million clicks a day.

When the users experience problems with the system (both functional and technical), they can call the service desk. Around 25% of the yearly calls to the service desk concern Siebel or a link between Siebel and related systems. Hundred service agents distributed over four locations serve the employees by solving these problems directly (around 60% of the calls), for example by use of 'standard interaction forms' or 'work arounds' which describe a standard way of solving reoccurring problems, or by making a problem/incident and forward this to other departments within the Rabobank Nederland (around 40% of all calls). When it concerns a technical problem, for example the link between Siebel and one of the underlying systems, the problem is forwarded to the department that is responsible for system management (B&E)¹⁷. When it concerns a functional problem, for example a problem caused by wrong usage of the system, the problem is forwarded to the department that is responsible for functional maintenance of the system (Functioneel Beheer CRM¹⁸). The operation of the service desk is monitored daily, and skills of employees and capacity are adapted based on feedback and forecasts (e.g. extended when a new release went 'live' in the weekend).

The department that is responsible for system management within B&E (subgroup Siebel, within the group Distribution in the sub department Application Service of B&E) can be divided in functional application management, technical application management and management at database level. For every new release, they need to test whether all current functionalities still will work properly after adding the new functionalities. At technical field, a great challenge is to keep the big field of machines working with the large amount of daily users and clicks. With regard to the data level, system management is responsible for the transfer of data from Siebel to other systems.

Functional Maintenance CRM was setup in 2010, is positioned within the business unit for non-corporate clients ('Particulieren'), and serves as the bridge between Siebel's system

¹⁷ B&E is the abbreviation for 'Beheer & Exploitatie' in Dutch, which can be regarded as application management.

¹⁸ Functioneel Beheer CRM is Dutch and can be translated as Functional Maintenance CRM

management (B&E) and signals, questions or desires from users in local banks. In other words, it is the bridge between the user organization and the IT organization. In their tasks, Functional Maintenance CRM has contact with a group of representatives of 20 local banks, to discuss about decisions, to raise local ambassadors and to involve users in testing. Another task of Functional Maintenance CRM is to provide release notes for users with information about changes that B&E made to the existing system, and to review release notes that are made for system extensions (made by KIM). Functional Maintenance CRM also advises local banks about an organizational structure of user support management and responsibilities in local banks (e.g. a local CRM coordinator, Siebel User Meetings and super-users per department). The responsibility of the total budget for exploitation, both functional and technical maintenance, is positioned at Functional Maintenance CRM and they work closely together with B&E to execute this.

As described before, the departments B&E and Functional Maintenance CRM are responsible for second line support and try to solve problems that the service desk cannot solve in a first contact with the user (and ideally feedback the solution to the service desk). When it also cannot be solved in second line support and a significant change in software is required to solve the problem, these departments prioritize the problems, decide what needs to be incorporated in a new release and formulate request for changes (RFC's). These RFC's are communicated with the department Applications Development & Maintenance (ADM, more specifically, to sub department 'Portfolio CRM Distributie'), that is responsible for the development of new functionalities of Siebel. ADM assigns this request to a team who becomes responsible to build the solution. Besides RFC's resulting from problems, other development requests can be formulated based upon business requests (e.g. resulting from the program organization formulated by a business change manager). When ADM delivers significant system extensions, for example new functionalities, the department KIM (Customer Implementation Management, sub department Distribution) is responsible for a smooth implementation of these new functionalities, as well as facilitating and realizing the required business change. A guideline is that 20% space in a release is used for RFC's and fixing of defects and 80% for new functionalities.

When a new version of the system will be released, half a year before the release the directors of local banks and super-users are informed about the content of the new release. In this information, the time for users to learn the new functionalities will be made transparent. Subsequently, six weeks before the release the local banks receive a management presentation and four weeks before the release the official release information. At the day the release went 'live', the employees receive an e-mail before 8 am. Simultaneously, extra support is organized at the service desk to cover extra problems, and at the end of each day an update is given to the users about the state of the release.

In March 2005 Siebel was implemented at the final local banks, i.e. large banks in cities like Rotterdam and Eindhoven. This means that in April 2005 for all local banks the basic version of Siebel was up and running. System management was transferred to the responsible department (now called B&E) and by the end of 2005, the main processes in Siebel (filling in customers, registration of contacts and registration of products) were executed for millions of clients. While much new functionality was introduced after 2005 during a continuous period of improvements and extensions, one can say that the post-implementation stage already started in the end of 2005.

C Interview protocol

Date, time

Interviewer: Nienke van Dijk (TU/e & Deloitte)

Interviewee: Name (Company)

1. Introduction

Personal introduction of interviewer and interviewee.

Interviewer introduces research project & case study approach.

2. ES Implementation

General questions about the implementation of the enterprise system.

- 1) Which processes are supported by the enterprise system?
- 2) When did the implementation start?
- 3) When was the 'go live' of the different modules of the enterprise system?
- 4) When was the transition of management of the application towards the standing organization (i.e. application management or IT department)?
- 5) (Additional clarifying questions about the role of the interviewee w.r.t. the ES)

3. Post-implementation phase

Questions about issues in the post-implementation phase of the enterprise system.

- 6) What are the biggest issues (with the most impact) that you and/or the organization encountered in the post-implementation phase of the enterprise system?
- 7) What were the most frequent issues that you and/or the organization encountered?
- 8) With which issues is the organization still dealing at the moment?
- 9) To what extent do you see a change in the nature of the issues that occur during the time after the 'go live' of the system?
- 10) What is necessary to solve the particular issues?
- 11) Which issues receive the most attention from higher management?

Think about issues at the area of technology, people and processes. Or, for example:

- *People, change and learning*
- *Process stability and compliance*
- *Systems stability and uptake*
- *Business intelligence and data quality*
- *Readiness for benefit realisation*

4. Other

- 12) Do you have additional information about the (post-)implementation phase and issues?
- 13) Agreements about processing the results.

D Across-case analysis results

Table 21 shows the results of the across-case analysis. The numbers in the columns ‘C1, C2, C3 and Add.’ represent how many interviewees within that case study organization, or within the group of additional interviews, mentioned the particular issue. The company names of the case study organizations have been anonymized due to confidentiality of the information and the order of C1, C2 and C3 does not represent the order of the cases as presented in Chapter 3. The codes in the columns P&N and S&L represent the comparison with literature as described in Section 7.1.

Table 21: Across-case analysis results

Nr.	Role (blue)	Issues (organized in cause=black/effect=green)	Case studies				Literature	
			C1	C2	C3	Add.	P&N	S&L
4	Operational manager	Managers take insufficient responsibility for, and direction towards, the right way of working with the ES in the business	1	2	3		AR1.1	
5		Lack of correction of users and of stimulation of the right way of working	2	2	3			
6		Lack of skills/sense of need to direct processes based on ES management information	4	1	2			
7		Insufficient understanding of the ES concept and potential value	2	2	4			
8	Process owner	Process ownership is not executed properly, resulting in sub-optimal processes						
9		Lack of person responsible for management of business processes	2	1				
10		Lack of integration of ES processes with other business processes		1		1		
11		Lack of updates of process descriptions and work instructions (or usage to begin with)	3		2	1		
12		KPI's of processes are not clear	1			1		
13	Key-user	Key-users are too busy with 'ad hoc' problem solving, and unable to signalize improvement opportunities						
14		Too few people in the business with knowledge about the system and processes (too high dependency on a few people)	1	2		1		
15		Workload key-users too high	2	1				
16		Insufficient acknowledgement and evaluation of tasks, since the tasks were added to existing job profiles	2	1				
17	User	Users lack a right way of working with the ES, resulting in incomplete or incorrect data in the system					OR1.2	
18		Incorrect execution of processes (e.g. other process variations, skipping steps, ...)	4	2	1	1		
19		Reluctance to use the system due to: 1) changed job responsibilities 2) transparency, e.g. for managers, in (un-) performed tasks of users 3) no direct benefits for the users themselves 4) reduced freedom	4	4	5		OR1.1 OR4.1 OR4.2	R23
20		Insufficient (full) understanding of the ES concept & benefits	3	4	5	1		
21	User support	User support (e.g. service desk) is not organized						

	employee	sufficiently or efficiently, resulting in user problems not being solved quickly							
22		Insufficient system and business knowledge and lack of proper knowledge management	1		2				R30
23		No coordination with service desk when new releases are introduced (workload too high and lack of knowledge)			2				
24	Change manager	Process of prioritisation and deployment of changes is sub-optimal; no clear vision on further system improvement exists						OWR 2.2	
25		No 'top down' vision/strategy for future ES development in combination with insufficient governance for RFCs, causing too much 'ad hoc' customizations	3	1	1				
26		Insufficient knowledge of, and alignment with, future ES developments of the vendor	2		1				
27		Insufficient alignment with the business (w.r.t. impact) during discussion about RFCs	1	2	2			OWR 2.1 TR3.3	R2 R5 R4
28		Improper development, and subjective evaluation, of business cases of requests for change (RFC)	2	1	1				R8
29	Functional application manager (FAM)	System does not properly fit the business processes (and/or vice versa), causing users to experience failing functionalities							
30		Too many routes/dialogs to perform the same task, causing complexity for users (user unfriendliness)		1	2				
31		Improper design of authorisation/permission concept, resulting in high workload	1	3	2			OWR 4.4 OWR 4.5	
32		Missing completion of remaining implementation tasks after the project has been finalized	2			1			
33		Lack of structural training program and of coordination of training for new hires & retraining for existing users	3	2	1	1		OWR 4.1	R24
34		Unclear communication of changes to the system to users	1	1	3				
35		Improper organisation of FAM & TAM; incapability to cope with changes due to: 1) insufficient knowledge transfer & documentation 2) system extensions not accompanied by an increase in staff 3) no increase of staff parallel to system extensions 4) loss of important personnel	4	5	3	2		OWR 3.1 OWR 3.2 OWR 3.3	R9 R10 R11 R16 R12 R14
36	Technical application manager (TAM)	Technical problems with the enterprise system occur, limiting system (or functionalities) availability							
37		No policy for handling release updates from vendor	2						
38		No application rationalisation, legacy systems are still running		1		1			
39		Bugs after new releases due to insufficient testing (of scenarios, versions, integrations)	1	2	4	1			R21
40		(Data) errors in integration with other systems			4	3		TR2.1	R27
41		Performance and stability issues	2		3	3		TR2.2	
42	Vendor	Vendor does not provide sufficient support, limiting TAM and FAM to properly execute maintenance tasks	1		1	1		OWR 5.1	

43		Difficulties in finding the right channels/procedures to communicate with the vendor	1	1	1			
44		Long duration of response to questions and requests		3		1		
45		Shift of attention of vendor to new clients; difficulties in retaining sufficient attention		2				
46		Slow, and non pro-active, delivery of bug fixes	1	1			TR3.1	
47		Disturbed relationship with vendor (e.g. due to bankruptcy or M&A of vendor)			2			
48	(Master) data manager	Data governance is not followed, corrective actions need to be taken to get or keep data in the system correctly						
49		No procedures for data cleansing and archiving	4		1		TR3.2	
50		Errors (e.g. incorrectness, incompleteness, duplicates) in basic/master data of the ES and no procedures to solve these errors	2	3	2		OR3.1	
51		No clear data model	1	1	1			
52	Reporting/BI manager	No clear ES information analysis is performed, resulting in insufficient/incorrect information for decision support						
53		No clear vision ('holistic view') on information analysis and required management information	1	2				
54		Insufficient governance to process the changed reporting needs	1	1		1		
55		Insufficient operational reports/dashboards to monitor processes	2	3	3	2	AR2.1 2.3 3.1 3.2 4.1	
56		Many different reporting tools (op./tact./strat.), but lack of unity and consistency	2	2	2			
57	Senior manager	Little (or no) actions are undertaken at senior level to evaluate and realize continuous goals/ambitions, resulting in a loss of potential benefits						
58		Insufficient understanding of ES concept and its impact on the business; little attention for potential of the system	1	3			OWR 1.1 OWR 1.3	
59		No clear responsibilities for achieving the on-going ambitions after the project has been finalized	1	2				R20
60		Leave of an important ES program sponsor	2		1		OWR 1.2	
61		Insufficient budget assigned to post-implementation developments		1	1		OWR 2.3	
1	General risks concerning all roles	Unclear assignment of tasks/roles/ responsibilities	2	2	1	0		
2		Insufficient understanding of the ES concept	3	4	5	1		
3		Insufficient alignment and communication between roles	1	2	2	1		

E Literature frameworks

E.1 Model for ERP post-project management

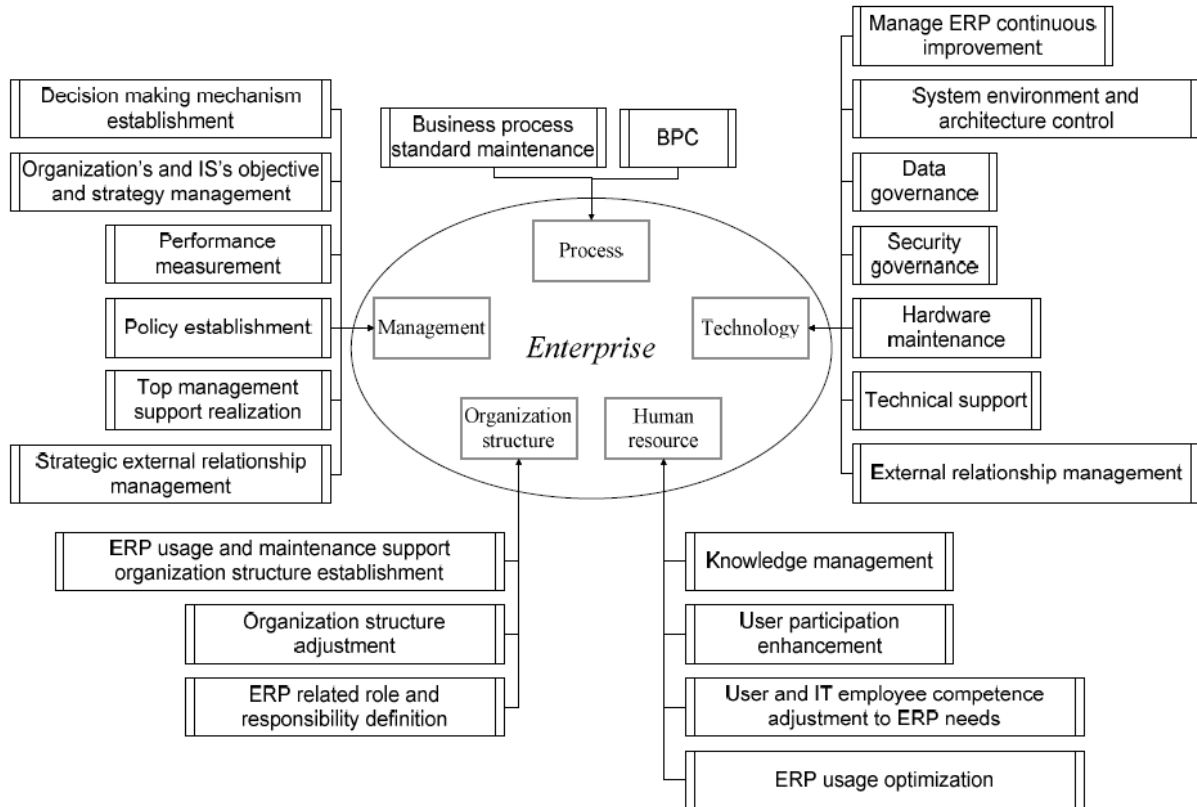


Figure 21: Model for ERP post-project management (Chandra & Govindaraju, 2012)

E.1 Risk in ERP post-implementation ontology

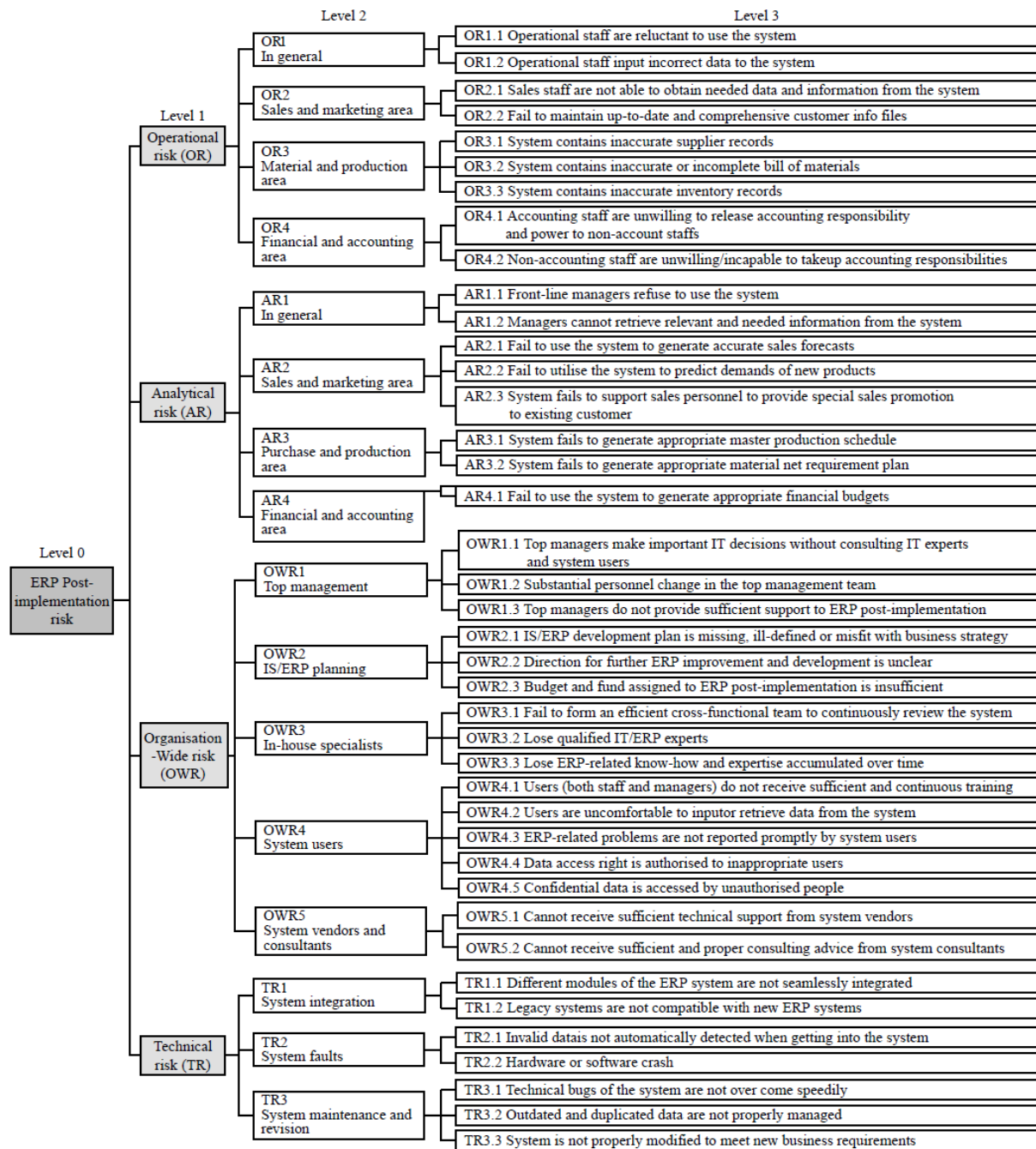


Figure 22: Risk in ERP post-implementation ontology (Peng & Nunes, 2009)

E.3 General ERP maintenance risks taxonomy

Phase	ID	Risk
Problem/modification identification, classification and prioritization	R2	Unstable organizational environment
	R5	Conflicting ERP requests
	R6	Continuing stream of requirement changes
	R8	Inadequate requirements prioritization
	R15	Wrong management/selection/control external parties (consultants, ERP vendors, subcontractors)
Analysis	R23	ERP system users are reluctant/reticent to the changes
	R7	Evaluation of performance requirements
	R9	Inadequate ERP maintenance manager
	R18	Wrong ERP project resources/size estimates
Design	R27	Wrongly fit ERP system with pre-existing applications
	R4	Miscommunications or misunderstanding of the requirements
	R10	Conflict and non-cooperation between ERP maintenance team members
	R11	Team members lack skills/knowledge/experience required by ERP maintenance
	R16	Short/null/poor/documentation
Implementation	R26	Incorrect choice of the ERP modules
	R28	Specific competence of ERP consultants
	R1	Changing structure/processes/tasks ERP-adopting organization
	R12	High turnover within ERP maintenance team
	R13	ERP maintenance team members are unmotivated/not committed
Regression system testing	R14	Inadequately trained ERP maintenance team members
	R17	Quality of original programming
	R19	Poor establishment of standard process/procedures/methodology
	R20	ERP project milestones not clearly defined
	R25	Excessively complex procedures
Acceptance testing	R21	Inadequate measurements/tools/technology for test/simulation/evaluation
	R29	Lack of proper tests
Delivery	R3	Managers and/or employees (not maintenance team members) do not cooperate/support the maintenance project
	R22	Poor establishment of ERP quality standards
	R24	Lack of training of ERP users
	R30	Poor documentation for support of ERP users

Figure 23: General ERP maintenance risks taxonomy (Salmeron & Lopez, 2010)

F Input for roadmap design

F.1 EVD gap analysis

This document contains the conclusions of the EVD ‘gap analysis’, i.e. an answer to the question: *Does EVD contain all necessary tasks to prevent the identified enterprise system (ES) risks that organizations face in the post-implementation phase?* In this analysis EVD for SAP 3.7 and EVD for AMS 2.3 were analysed and 49 risks of the Sunshine Framework (the identified causes only) were assessed. The effects were excluded, since actions need to be initiated to prevent or mitigate causes. To answer the question presented above, tasks in the methodologies were mapped to specific risks in the Sunshine Framework, when a task implies a preventive action/mitigation for that risk.

For at least 37 of the 49 risks in the framework, clear and accurate actions in EVD could be mapped to the post-implementation risks. However, for some risks no explicit preventive actions or mitigations could be found in EVD. These are discussed below, according to the structure of the framework (per role in the organization):

With regard to the role of operational managers:

5. *Lack of correction of users and of stimulation of the right way of working:*
EVD mentions general change management strategies like ‘CM.CP - Develop Organizational Change Management Strategy’ and ‘CM.CP Develop Stakeholder Engagement Approach’. Furthermore it mentions explicit actions to engage users, key-users and senior management. However, no explicit (training and alignment) actions are undertaken to trigger operational managers to take their responsibility for good usage of the system in their business department. This is surprising, since they are critical in enterprise system success. They need to correct and stimulate the users to use the system in the right way.
6. *Lack of skills/sense of need to direct processes based on ES management information:*
See 5.

With regard to the role of process owner:

10. *Lack of integration of ES processes with other business processes:*
EVD focuses on the development of the ‘to-be processes’ that should be supported by the enterprise system. However, the mapping of the intersection/integration with processes of other legacy systems or enterprise applications is not explicitly covered in the methodology.
11. *Lack of updates of process descriptions and work instructions:*
EVD contains tasks in the ‘business process management’ discipline which describe that it is important to make process descriptions. However, no task is included describing that one should ‘maintain process descriptions’ (while this is desirable as input for training, corrective actions or system extensions).

With regard to the role of change manager:

26. Insufficient knowledge of, and alignment with, future ES developments of the vendor:

In the beginning of the project (Phase 1), EVD contains the task 'PM.PL - Establish Supplier Agreement' in which also agreements should be included about service delivery by the vendor after the 'go live'. However, no task later on in the project explicitly mentions that the client needs to manage the relationship with the vendor.

27. Insufficient alignment with the business (w.r.t. impact) during discussion about RFCs:

The only thing mentioned regarding this risk is 'SM.SP - Perform Change Management'. Contrary to other levels of detail in the methodology, no further details (explicit tasks for change management processes) are given here.

28. Improper development, and subjective evaluation, of business cases of requests for change (RFC):

See 27.

With regard to the role of functional application manager (FAM):

32. Missing completion of remaining implementation tasks after the project has been finalized:

EVD contains the tasks 'PM.MG - Manage Decisions, Risks and Work Plan' and 'PP.PK - Conduct Fit Gap Analysis', which gets the most attention in the early phases of the project. However, no explicit tasks are included in EVD which focus on monitoring and resolving the issues that still open after the 'go live'.

With regard to the role of vendor:

43. Difficulties in finding the right channels/procedures to communicate with the vendor:

See 26.

44. Long duration of response to questions and requests

See 26.

With regard to the role of (master) data manager:

49. No procedures for data cleansing and archiving:

Nothing could be found in EVD which describes that, during the design phase, procedures should be developed of how transactional data should be archived.

With regard to a general risk:

3. Insufficient alignment and communication between roles:

EVD contains organizational alignment tasks, including for example 'Develop Organization Operating Model' (Phase 2). The objective of this task is to design an Organization Operating Model that will represent the future state of the organization's groups and how they will interact. Furthermore, tasks 'Develop Detailed Organization Design' (Phase 3) and 'Assess Organization Design

Effectiveness' (Phase 6) are included. However, no specific task during the (preparation for) 'go live' emphasizes the importance of alignment, coordination and communication between the different stakeholders in the organization.

F.2 ASAP gap analysis

As a next step in the design of the roadmap, the ASAP methodology for Standard SAP Projects (version 8) was studied to search whether the gaps that were identified in the 'EVD gap analysis' are covered in the ASAP methodology, or, whether this methodology also contains possible gaps. In other words, the purpose was to answer the question: *Can the possible gaps in EVD be complemented with actions/tasks included in ASAP?*

Below, the risks that were identified as gaps in EVD are presented and is explained whether ASAP does contain tasks to prevent/control these issues.

With regard to the role of operational managers:

5. *Lack of correction of users and of stimulation of the right way of working:*
No, mitigations to these issues also seem to be a gap in ASAP. EVD even seems to represent the aspects of organizational change management in a more detailed way. In ASAP, engagement of operational managers could be implicitly covered in: 1) Task 'Prepare Organizational Change Management Roadmap' in '1.10 Organizational Change Management Roadmap'; 2) Task 'Validate organizational alignment approach' in '2.4 Change Impact Analysis'; 3) Task 'Execute Role Mapping and Transition Planning' in '3.4 Organizational Alignment'. Besides, specific tasks are included in ASAP to engage users and key users (e.g. 'Identify Key-users' and 'Pre Go-Live End-User Training Delivery'). However, no tasks describe in an explicit way that it is important to engage (operational and senior) managers.
6. *Lack of skills/sense of need to direct processes based on ES management information:*
See 5.

With regard to the role of process owner:

10. *Lack of integration of ES processes with other business processes:*
No, this also seems to be a gap in ASAP. Like EVD, ASAP focuses on the development of to-be processes which should be supported by the enterprise system. The mapping of the intersection/integration with processes of other (legacy) applications is not mentioned explicitly.
11. *Lack of updates of process descriptions and work instructions:*
No, this also seems to be a gap in ASAP. As in EVD, a task '3.17 Develop Business Process Procedure Document' is mentioned, but a task similar to 'Maintain Business Process Procedure (Document)' is not included.

With regard to the role of change manager:

26. *Insufficient knowledge of, and alignment with, future ES developments of the vendor:*

No, this is even less covered in SAP than in EVD. The ASAP methodology is assuming that SAP is chosen as vendor and that the relationship between the vendor and the client stays well. Therefore, no tasks are included in the methodology to ensure that the client liaises the relationship with the vendor.

27. Insufficient alignment with the business (w.r.t. impact) during discussion about RFCs:

No, mitigations to these issues are also not mentioned very detailed in ASAP. The only things mentioned about change management are the task 'Determine Change Control Management Procedure' in module '1.8 Project and Operational Standards' and the task 'Perform assessment of Change Control Management set up' in module 6.6 'Change Control Management Optimized'.

28. Improper development, and subjective evaluation, of business cases of requests for change (RFC):

See 27.

With regard to the role of functional application manager (FAM):

32. Missing completion of remaining implementation tasks after the project has been finalized:

Yes, preventive tasks for this issue are more explicitly covered in ASAP. Namely, the following tasks exist in ASAP: 'Monitoring Open Issues to Resolution' in module 5.6 'Production Support After Go Live', and the task 'Resolve and close open issues' in module 5.10 'Project Closure and Sign-Off Project Deliverables'.

With regard to the role of vendor:

43. Difficulties in finding the right channels/procedures to communicate with the vendor:

See 26.

44. Long duration of response to questions and requests

See 26.

With regard to the role of (master) data manager:

53. No procedures for data cleansing and archiving:

Yes, this is covered in ASAP. In phase 3 'Realization', tasks are included in module '3.27 SAP Data Archiving' with the objective to 'Prepare Data Archive Plan', 'Prepare Data Archive Storage Plan' and 'Conduct Data Archive Implementation Test'.

With regard to a general risk:

3. Insufficient alignment and communication between roles:

ASAP contains a way less organizational alignment actions than EVD does. Therefore, also in ASAP no specific task during the (preparation for) 'go live' emphasizes the importance of alignment, coordination and communication between the different stakeholders in the organization.

Besides the identified gaps of EVD, preventive actions/mitigations to three other risks seem to be covered more explicitly in ASAP than in EVD:

37. No policy for handling release updates from vendor:

EVD contains the task 'Develop Software Development Strategy' which could cover this. However ASAP contains a task 'Determine Upgrade Management' (in 1.8 Project and Operational Standards), which mentions mitigations to issue for this task more explicitly.

9. Lack of person responsible for management of business processes:

In EVD this is implicitly covered in the organizational changes (e.g. 'Develop Organization Operating Model'). However, ASAP mentions this more explicitly by the task 'Set-up Business Process Monitoring' in module '3.17 Technical Operations and Handover Plan'

50. Errors (e.g. incorrectness, incompleteness, duplicates) in basic/master data of the ES and no procedures to solve these errors:

Like in EVD, several tasks exist to design the master data in a good and structured way. Besides, in ASAP an explicit task is incorporated in module '4.3 Organizational and Production Support Readiness Check' of ASAP, namely 'Validate that Master Data Support Processes is established'. The purpose of this task is to ensure the customer establishes the means to manage their data in an integrated environment.

The conclusion of this analysis is that to 2 of the 12 'gaps in EVD', ASAP does provide preventive tasks or mitigations where EVD did not. Besides, for three other risks the actions that were mapped from EVD are complemented by some tasks derived from ASAP, since ASAP seemed to cover these risks more explicitly.

However, this means that for in total 10 issues of the 49 risks (causes only) in the Sunshine Framework, preventive actions or mitigations are not explicitly covered in three very well-known and the most widely accepted methodologies:

5. Lack of correction of users and of stimulation of the right way of working

6. Lack of skills/sense of need to direct processes based on ES management information

10. Lack of integration of ES processes with other business processes

11. Lack of updates of process descriptions and work instructions

26. Insufficient knowledge of, and alignment with, future ES developments of the vendor

27. Insufficient alignment with the business (w.r.t. impact) during discussion about RFCs

28. Improper development, and subjective evaluation, of business cases of requests for change (RFC)

43. Difficulties in finding the right channels/procedures to communicate with the vendor

44. Long duration of response to questions and requests

3. Insufficient alignment and communication between roles

This provides opportunities to enrich these methodologies.

F.3 Case study mitigation analysis

Table 22 below presents the results of the mitigation analysis of the interview data gathered during the case study research. (*) Indicates that the interviewee mentioned something that was done in the post-implementation phase to mitigate a certain risk, i.e. a lesson learned. Without (*) indicates that the interviewee mentioned something that ‘should have been done’ or ‘should be done’.

Table 22: Mitigations mentioned by interviewees during the case study research, mapped to risks

Risk	Case	Lesson learned/mitigation
4	Rabo	Trigger operational managers to improve the level of ES usage in their business department, e.g. by benchmarking ES adoption in the different user groups/departments or by a bonus (*)
5	DSG, AMC	Plenary discuss ‘best practices’ of the ES usage with user groups in the business departments (*)
5	AMC, Rabo	Individually discuss system usage with users, and correct/direct them in a positive way (discuss improvement opportunities) (*)
6	AMC, Rabo	Build feedback moments in management meetings to discuss the management information and related business operations (and thus the actual usage of management information) (*)
7	DSG, Rabo	Stir operational managers to understand the ES concept fully, i.e. that strictly following the processes also leads to other benefits
9	DSG	Assign business process owners (*)
10	AMC	Map the process intersections between the ES and other applications
11	Rabo	Integrate process descriptions and system instructions into clear work instructions and keep them up to date
12	DSG	Develop KPI’s during development/ deployment
14	AMC	Involve enough people in deployment, who can fulfill a role in support (in the business) during post-implementation
18	AMC, Rabo	Develop ‘quick reference card’ and short instruction movies (*)
18	DSG	Develop control frameworks / dashboards for individual users, to provide feedback about their work
19	Add.	Define Deployment Strategy: scrum method to raise involvement in the user organization
19	Rabo	Establish communications website and start community groups for users to learn from each other (*)
20	DSG, Rabo	Develop Organizational Change Management Strategy, focusing on full understanding of the ES concept by users (*)
21	Add.	Introduce ‘floorwalkers’ to solve ad hoc problems after new releases (*)
21	Rabo	Develop ICT portal with standard solutions for functional problems (*)
22	Rabo	Introduce Service Knowledge Management System to manage knowledge to answer reoccurring questions (gather knowledge from FAM and TAM) (*)
23	Rabo	Prepare user support employees for new releases, by training them, by developing standard solutions to questions out of user acceptance tests and by scaling up the support team for a certain period (*)
26	Rabo	Develop top-down vision with important system improvement steps for the next 3 – 5 years (in plateau’s), with stable forecast of ± 18 months (*)
27	Rabo	Assign change advisory committee with representatives from different user groups of business departments to discuss the prioritization of changes, the consequences of changes, to raise advocates and to involve them in test trajectories (alignment with business before translating changes into

		functional requirements) (*)
27	Rabo	Communicate open and transparently to user groups and involved people about new releases, e.g. by movies with the most important developments in the next year (*)
28	DSG	Calculate total cost of ownership of changes, including testing, introducing and maintaining the solution, when developing business cases of changes
29	Rabo	Clearly communicate system changes to users, e.g. by distributing release notes, presentations, user manuals and trainings, after the introduction of a new release of the ES (*)
29	Rabo	Organize 'ES User Groups' in the business departments to discuss system problems/ changes and assign responsibility for coordination of these meetings (*)
30	Rabo, AMC	Introduce 'single sign on', such that users automatically get access to the right parts of the system after logging in (*)
31	AMC	Increase FAM and TAM staffing parallel to system extensions
31	DSG, Rabo	Start early with building and training of in-house expertise for FAM and TAM
31	AMC	Practice FAM and TAM processes already during the deployment phase
31	Rabo	Organize sessions (e.g. quarterly) within FAM and TAM teams to discuss 'where are we at' and 'what goes well and what goes wrong' to create an open and learning team (*)
31	Rabo	Involve FAM and TAM during the development phase of (new) ES related projects, to bring in experiences from the maintenance and user support processes (*)
31	Rabo	Organize functional application management at central level, to form a bridge between the users and IT (i.e. TAM) (*)
232	AMC, Rabo	Build smart GUI, such that certain fields automatically get filled in or get constraints (after a certain value in another field), such that less ES knowledge is required for the execution of certain processes
34	DSG	Develop training curriculum for 'continuous learning' of users
34	Rabo	Organize 'ES in- depth training' for new hires, 4 to 6 weeks after joining the organization (*)
34	Rabo	Check courseware on consistency in style of writing and on ease of reading (e.g. follow writing course for 'easy reading') (*)
36	Rabo	Maintain architecture governance decisions, such that for example performance issues cannot rise
38	DSG	Develop strategy about handling release updates from vendor
40	AMC, Rabo	Properly test the critical processes of the system before 'going live' (*)
40	Rabo	Work with pilots when introducing a new piece of software, to discover bugs and errors (which were not discovered during the technical tests) (*)
41	Rabo	Map data transfer between systems clearly during the development phase of projects, to prevent data errors in integration with other systems afterwards (*)
42	AMC	Attend client days/sessions of vendor (*)
45	Rabo	Continuously press influence on vendor about development of the ES (roadmap), to ensure that no useless investments will be made (*)
47	DSG	Develop a data governance, and assign roles conform to that vision (data owners and a master data manager) (*)
47	AMC	
47	DSG	Make clear agreements on data input in the process and build in mechanisms to control this (either control by managers or control by tools)
48	Rabo	Develop a clear data model

49	AMC	Assign responsibility for information analysis
49	DSG	Design reporting structure already during the development phase
50	Rabo	Develop clear procedures about data archiving, to be able to control the large amounts of transactional data (these decisions can have influence on management information) (*)
50	Rabo	Introduce tooling to get insight in data quality (*)
51	DSG	Develop procedures to ensure that master data is kept up to date
51	Rabo	Think about mechanisms to create ownership in the business for the data quality problem (e.g. sell products from data analyses)
52	AMC	Visit other companies with the same ES and learn from their reporting solutions (e.g. which standard reports do they use?) (*)
53	AMC, Rabo	Ensure that senior managers have understanding and insight in the actions that need to be undertaken to make the ES successful
54	AMC	Decide during the development phase which reporting tools are going to be used
56	AMC	Establish a team that is responsible for tracking the benefits and maintaining the business case
57	AMC	Make sufficient budget available for post-implementation developments
58	AMC	Ensure that a function or role is assigned at executive level, who gives direction and vision towards achievement of the ES goals

F.4 Final risk - action mapping

In the subsections below, actions are mapped to the identified risks in the post-implementation phase that should prevent or mitigate these risks. The actions are presented per role and per risk. The sources that are used are: 1) EVD = EVD for SAP 3.7, 2) ITIL = EVD for AMS 2.3, 3) ASAP = sap methodology, 4) Case studies, 5) Self-developed (supported with literature).

F.4.1 Technical application manager (TAM)

Performance and stability issues:

- Phase 2: Define Business Intelligence Data Modelling Standards and Guiding Principle (EVD)
- Phase 3: Identify System Stabilization Metrics (EVD)
- Phase 3: Maintain and Operate Infrastructure (EVD)
- Phase 3: Develop Batch Job Schedule (EVD)
- Phase 3: Conduct Physical Infrastructure, Performance and Stress Tests (EVD)

(Data) errors in integration with other systems:

- Phase 2: Define Software Development Standards and Guidelines (EVD)
- Phase 2: Develop Interface and Data Conversion Control Strategy (EVD)
- Phase 2: Define Integration Exception and Error-Handling Mechanism (EVD)
- Phase 2: Define Test Strategy (EVD)
- Phase 2: Develop Data Conversion Approach (EVD)
- Phase 3: Develop Software Development Architecture (EVD)
- Phase 3: Conduct Integration, Parallel, and Regression Tests (EVD)
- Phase 4: Implement Interface and Data Conversion Control Techniques (EVD)
- Practical tip (case Rabobank) – Map data transfer between systems clearly during the development phase of ES related (extension) projects, to prevent data errors in integration with other systems afterwards

No application rationalization, legacy systems are still running:

- Phase 1: Define Legacy System Decommissioning strategy (EVD)
- Phase 2: Document To-Be Application Landscape (EVD)
- Phase 4: Perform Legacy System Decommissioning (EVD)

No policy for handling release updates from vendor:

- Phase 1: Determine Upgrade Management (ASAP)

Bugs after new releases due to insufficient testing (of scenarios, versions, integrations):

- Phase 2: Define Test Strategy (ITIL)
- Phase 2: Develop Regression, Integration, User-Acceptance, Technical and Configuration Unit Test Approach (ITIL)
- Phase 5: Perform Release and Deployment Management (ITIL)

F.4.2 Functional application manager (FAM)

Improper organisation of FAM & TAM; incapability to cope with change:

- Phase 2: Develop Project Team Capability Transfer Approach (EVD)

- Phase 2: Develop To-Be Service Delivery Approach (ITIL)
- Phase 2: Develop Service Catalog & Document Service Delivery Requirements (ITIL)
- Phase 2: Develop To-Be Continuous Service Improvement Approach (ITIL)
- Phase 2: Compile Service Delivery Operations Manual (ITIL)
- Phase 2: Design To-Be Service Delivery Governance (ITIL)
- Phase 2: Develop Service Levels and Business Partner Agreements (ITIL)
- Phase 2: Develop Service Delivery Staffing Approach (ITIL)
- Phase 2: Design To-Be Service Delivery Processes (ITIL)
- Phase 3: Document Technical Procedures (EVD)
- Phase 3: Establish Service Delivery Infrastructure and Tools (ITIL)
- Phase 3: Develop Service Delivery Training Curriculum and Materials (ITIL)
- Phase 4: Complete Project Team Capability Transfer (EVD)
- Phase 4: Conduct Service Delivery Transition (ITIL)
- Phase 4: Conduct Service Delivery Knowledge Transfer (ITIL)
- Phase 4: Conduct Service Delivery Training (ITIL)
- Phase 4: Develop Service Delivery Training Maintenance Plan (ITIL)
- Phase 5: Perform Problem Management (ITIL)
- Phase 5: Perform Development Management (ITIL)
- Phase 5: Perform Service Delivery Knowledge Management (ITIL)
- Phase 6: Manage Service Catalogue (ITIL)
- Phase 6: Monitor Service Delivery Performance (ITIL)
- Phase 6: Identify & Prioritize Continuous Service Improvement Opportunities (ITIL)
- Phase 6: Implement Continuous Service Improvement Program (ITIL)
- Phase 6: Monitor Continuous Service Improvement Performance (ITIL)
- Phase 6: Maintain Service Delivery Training Materials (ITIL)
- Practical tip (case Rabobank) – Organize sessions (e.g. quarterly) within FAM and TAM teams to discuss ‘where are we at’ and ‘what goes well and what goes wrong’ to create an open and learning team (Practical tip, case Rabobank)
- Practical tip (case Rabobank) – Involve FAM and TAM during the development phase of (new) ES related projects, to bring in experiences from the maintenance and user support processes

Unclear communication of changes to the system to users:

- Phase 5: Perform Request Fulfilment (ITIL)
- Practical tip (case Rabobank) – Communicate open and transparently to user groups and involved people about new releases, e.g. by movies with the most important developments in the next year
- Practical tip (case Rabobank) – Develop release notes, presentations, user manuals and trainings, after the introduction of a new release of the ES
- Practical tip (case Rabobank) – Organize ‘ES User Groups’ in the business departments to discuss system problems/ changes and assign responsibility for coordination of these meetings

Lack of structural training program and of coordination of training for new hires & retraining for existing users:

- Phase 2: Define Courseware Development Standards (EVD)
- Phase 2: Develop End-User Training Approach and Curriculum (EVD)
- Phase 3: Develop Instructor-Led Training Course Outlines (EVD)

- Phase 3: Build Training Environment and Training Data (EVD)
- Phase 4: Manage Training Logistics (EVD)
- Phase 4: Develop End-User Training Program Maintenance Plan (EVD)
- Phase 5: Conduct Post Go-Live End-User Training (EVD)
- Practical tip (case Rabobank) – Organize ‘ES in- depth training’ for new hires, 4 to 6 weeks after joining the organization
- Practical tip (case Rabobank) – Check courseware on consistency in style of writing and on ease of reading (e.g. follow writing course for ‘easy reading’)

Missing completion of remaining implementation tasks after the project has been finalized:

- Phase 4: Manage Decisions, Risks and Work Plan (EVD)
- Phase 5: Monitoring Open Issues to Resolution (ASAP)
- Phase 5: Resolve and Close Open Issues (ASAP)

Too many routes/dialogs to perform the same task, causing complexity for users (user unfriendliness):

- Phase 2: Define User Interface Information Architecture (EVD)
- Phase 2: Conduct User Research (EVD)
- Phase 3: Conduct User-Acceptance Test (EVD)

Improper design of authorisation/permission concept, resulting in high workload:

- Phase 2: Define Business Roles (EVD)
- Phase 2: Define Segregation of Duties and Sensitive Access (EVD)
- Phase 2: Develop Identity and Access Management Solution Design Document (EVD)
- Phase 3: Design Security Composite, Master and Derived Roles (EVD)
- Phase 3: Develop Security Access Procedures (EVD)
- Phase 3: Build Identity and Access Management Solution Design (EVD)
- Phase 4: Develop Identity and Access Management Operations Manual (EVD)
- Phase 5: Perform Access Management (ITIL)
- Practical tip (case AMC, Rabobank) – Introduce ‘single sign on’, such that users automatically get access to the right parts of the system after logging in

F.4.3 Change manager

Improper development, and subjective evaluation, of business cases of requests for change (RFC):

- Phase 5: Perform Change Management (ITIL)
- Phase 6: Identify & Prioritize Continuous Service Improvement Opportunities (ITIL)
- Phase 6: Monitor Continuous Service Improvement Performance (ITIL)
- Self-developed: Develop clear procedure for prioritization of changes (Phase 2)

Insufficient alignment with the business (w.r.t. impact) during discussion about RFCs:

- Phase 5: Perform Change Management (ITIL)
- Phase 6: Identify & Prioritize Continuous Service Improvement Opportunities (ITIL)
- Phase 6: Monitor Continuous Service Improvement Performance (ITIL)
- Practical tip (case Rabobank) – Assign change advisory committee with representatives from different user groups of business departments to discuss the prioritization of changes, the consequences of changes, to raise advocates and to involve them in test trajectories (alignment with business before translating changes into functional requirements)

Insufficient knowledge of, and alignment with, future ES developments of the vendor

- Phase 1: Establish Supplier Agreement (EVD)
- Phase 1: Determine Upgrade Management (ASAP)
- Phase 2: Design To-Be Service Delivery Governance (ITIL)
- Self-developed – Manage relationship with vendor (Phase 6)
- Practical tip (case AMC) – Attend client days/sessions of vendor

No ‘top down’ vision/strategy for future ES development in combination with insufficient governance for RFCs, causing too much ‘ad hoc’ customizations:

- Phase 2: Develop To-Be Service Delivery Approach (ITIL)
- Phase 2: Design To-Be Service Delivery Governance (ITIL)
- Phase 6: Identify & Prioritize Continuous Service Improvement Opportunities (ITIL)
- Phase 6: Monitor Continuous Service Improvement Performance (ITIL)
- Practical tip (case Rabobank) – Develop top-down vision with important system improvement steps for the next 3 – 5 years (in plateau’s), with stable forecast of ± 18 months

F.4.4 User support employee

Insufficient system and business knowledge and lack of knowledge management:

- Phase 2: Develop To-Be Service Delivery Approach (ITIL)
- Phase 2: Compile Service Delivery Operations Manual (ITIL)
- Phase 2: Develop Service Delivery Staffing Approach (ITIL)
- Phase 2: Design To-Be Service Delivery Processes (ITIL)
- Phase 3: Establish Service Delivery Infrastructure and Tools (ITIL)
- Phase 3: Develop Service Delivery Training Curriculum and Materials (ITIL)
- Phase 4: Conduct Service Delivery Knowledge Transfer (ITIL)
- Phase 4: Conduct Service Delivery Training (ITIL)
- Phase 4: Develop Service Delivery Training Maintenance Plan (ITIL)
- Phase 5: Perform Service Desk Function (ITIL)
- Phase 5: Perform Incident Management (ITIL)
- Phase 5: Perform Service Delivery Knowledge Management (ITIL)
- Phase 6: Monitor Service Delivery Performance (ITIL)
- Phase 6: Maintain Service Delivery Training Materials (ITIL)
- Practical tip (case Rabobank) – Introduce Service Knowledge Management System to manage knowledge to answer reoccurring questions (gather knowledge from FAM and TAM)
- Practical tip (case Rabobank) – Develop ICT portal for users with standard solutions for functional problems

No coordination with service desk when new releases are introduced (workload too high and lack of knowledge):

- Phase 2: Compile Service Delivery Operations Manual (ITIL)
- Phase 4: Develop Service Delivery Training Maintenance Plan (ITIL)
- Practical tip (case Rabobank) – Prepare user support employees for new releases, by training them, by developing standard solutions to questions out of user acceptance tests and by scaling up the support team for a certain period
- Practical tip (Additional interviews) – Introduce ‘floorwalkers’ to solve ad hoc problems after new releases

F.4.5 User

Insufficient (full) understanding of the ES concept & benefits:

- Phase 1: Develop Organizational Change Management Strategy (EVD)
- Phase 2: Establish Communications Website (EVD)
- Continuous: Develop and Deliver Communications (EVD)
- Practical tip (case Rabobank) – Start community groups for users, to facilitate ‘inter-user learning’

Reluctance to use the system:

- Phase 5: Conduct Post Go-Live User Readiness Assessment (EVD)
- Phase 5: Conduct Change Network Briefings (EVD)

Incorrect execution of processes (e.g. other process variations, skipping steps, ...):

- Phase 4: Conduct Pre Go-Live End-User Training (EVD)
- Phase 4: End-User Training Program Maintenance Plan (EVD)
- Phase 5: Conduct Post Go-Live End-User Training (EVD)
- Practical tip (cases AMC, Rabobank) – Develop ‘quick reference card’ and short instruction movies

F.4.6 Key-user

Workload key-users too high:

- Phase 3: Develop Organization Transition Approach (EVD)
- Phase 3: Launch Super User Program (EVD)
- Phase 5: Conduct Super User Briefings (EVD)

Insufficient acknowledgement and evaluation of tasks, since the tasks were added to existing job profiles:

- See general mitigations

Too few people in the business with knowledge about the system and processes (too high dependency on a few people):

- Phase 3: Build Super User Skills (EVD)
- Phase 3: Prepare Subject Matter Experts (EVD)
- Phase 5: Conduct Super User Briefings (EVD)

F.4.7 Process owner

Lack of person responsible for management of business processes:

- Phase 2: Develop Business Process Controls Framework (EVD)
- Phase 3: Set-up Business Process Monitoring (ASAP)
- Phase 4: Implement Business Process Controls Techniques (EVD)
- See general mitigations

Lack of updates of process descriptions and work instructions:

- Self-developed: Maintain Business Process Descriptions and Work Instructions (Phase 6)

Lack of integration of ES processes with other business processes:

- Self-developed: Design integration of ES processes with other business processes (Phase 2)

KPI's of processes are not clear:

- Phase 2: Design To-Be Processes (including KPI's) (EVD)

F.4.8 Operational manager

Lack of correction of users and of stimulation of the right way of working:

- Phase 2: Develop Stakeholder Engagement Approach (EVD)
- Practical tip (case Rabobank) – Trigger operational managers to improve the level of ES usage in their business department, e.g. by benchmarking ES adoption in the different user groups/departments or by a bonus
- Practical tip (case Damen Shipyards, AMC) – Plenary discuss ‘best practices’ of the ES usage with user groups in the business departments
- Practical tip (case AMC, Rabobank) – Individually discuss system usage with users, and correct/direct them in a positive way (discuss improvement opportunities)

Insufficient understanding of the ES concept and potential value:

- Phase 1: Develop Organizational Change Management Strategy (EVD)
- Phase 2: Develop Stakeholder Engagement Approach (EVD)

Lack of skills/sense of need to direct processes based on ES management information:

- Phase 2: Develop Stakeholder Engagement Approach (EVD)
- Practical tip (case AMC, Rabobank) – Build feedback moments in management meetings to discuss the management information and related business operations (and thus the actual usage of management information)

F.4.9 Senior manager

Insufficient understanding of ES concept and its impact on the business; little attention for potential of the system :

- Phase 1: Develop Organizational Change Management Strategy (EVD)
- Phase 2: Conduct Leadership Alignment Interviews (EVD)
- Phase 2: Brief Leadership (EVD)
- Phase 3: Develop Leadership Action Plans for Realization (EVD)
- Phase 4: Develop Leadership Action Plans for Final Preparation (EVD)
- Phase 5: Develop Leadership Action Plans for Go-Live & Support (EVD)

Insufficient budget assigned to post-implementation developments:

- Phase 5: Develop Post Implementation and Evaluation Report (EVD)
- Continuous: Maintain Business Case (EVD)

No clear responsibilities for achieving the on-going ambitions after the project has been finalized:

- Phase 2: Develop Benefits Tracking Approach (EVD)
- Phase 4: Establish Benefits Tracking Team (EVD)
- Phase 6: Identify Value Enhancement Opportunities (EVD)
- Phase 6: Develop Value Enhancement Approach (EVD)
- Phase 6: Track Benefits Realization (EVD)

Leave of an important ES program sponsor:

- Out of scope (exogenous factor)

F.4.10 Reporting / BI manager

Insufficient operational reports/dashboards to monitor processes:

- Phase 2: Develop Business Intelligence Approach (EVD)
- Phase 2: Develop Business Intelligence Development Standards (EVD)
- Phase 2: Develop Business Intelligence Reporting Functional Specifications (EVD)
- Phase 2: Define Business Intelligence Data Modelling Standards and Guiding Principle
- Phase 2: Design Business Intelligence Reporting Processes (EVD)
- Phase 3: Configure Business Intelligence Data Architecture (EVD)
- Phase 3: Develop Business Intelligence Reports (EVD)
- Phase 3: Develop Business Intelligence Technical Specifications (EVD)
- Phase 3: Conduct Information Management Unit Test (EVD)
- Practical tip (case AMC) – Visit other companies with the same ES and learn from their reporting solutions (e.g. which standard reports do they use?)

Insufficient governance to process the changed reporting needs:

- Phase 1: Assess Information Capabilities (EVD)
- Phase 3: Develop Information Governance Policies (EVD)

Many different reporting tools (op./tact./strat.), but lack of unity and consistency:

- Phase 2: Develop Business Intelligence Approach (EVD)
- Phase 2: Define Business Intelligence Data Modelling Standards and Guiding Principle (EVD)
- Phase 3: Configure Business Intelligence Data Architecture (EVD)

No clear vision ('holistic view') on information analysis and required management information

- Phase 2: Develop Business Intelligence Approach (EVD)
- Phase 2: Define Business Intelligence Data Modelling Standards Guiding Principle (EVD)
- Phase 2: Design To-Be Processes (including KPI's) (EVD)
- Phase 3: Configure Business Intelligence Data Architecture (EVD)

F.4.11 (Master) data manager

No clear data model

- Phase 1: Define Enterprise Data Scope (EVD)
- Phase 2: Design Data Architecture (EVD)
- Phase 2: Develop Logical Data Model (EVD)
- Phase 2: Design Physical Data Model (EVD)
- Phase 2: Develop Metadata Glossary (EVD)
- Phase 3: Develop Information Governance Policies (EVD)

Errors (e.g. incorrectness, incompleteness, duplicates) in basic/master data of the ES and no procedures to solve these errors:

- Phase 2: Identify Master Data Objects (EVD)

- Phase 2: Develop To-Be Master Data Design (EVD)
- Phase 2: Develop Data Cleansing Rules (EVD)
- Phase 3: Develop Information Governance Policies (EVD)
- Phase 4: Validate that Master Data Support Processes is established (ASAP)

No procedures for data cleansing and archiving:

- Phase 3: Develop Data Cleansing Rules (EVD)
- Phase 3: Develop Information Governance Policies (EVD)
- Phase 3: Prepare Data Archive Plan (ASAP)
- Phase 3: Conduct Data Archive Implementation Test (ASAP)
- Practical tip (case Rabobank) – Develop clear procedures about data archiving, to be able to control the large amounts of transactional data (these decisions can have influence on management information)
- Practical tip (case Rabobank) – Introduce tooling to get insight in data quality

F.4.12 Vendor

Long duration of response to questions and requests:

- Phase 1: Establish Supplier Agreement (EVD)
- Self-developed – Manage relationship with vendor (Phase 6)
- Practical tip (case AMC) – Attend client days/sessions of vendor

Slow, and non pro-active, delivery of bug fixes:

- Phase 1: Establish Supplier Agreement (EVD)
- Phase 2: Develop Service Levels and Business Partner Agreements (ITIL)

Shift of attention of vendor shifts to new clients; difficulties in retaining sufficient attention:

- Phase 1: Establish Supplier Agreement (EVD)

Difficulties in finding the right channels/procedures to communicate with the vendor:

- Phase 1: Establish Supplier Agreement (EVD)
- Practical tip (case AMC) – Attend client days/sessions of vendor
- Practical tip (case Rabobank) – Continuously press influence on vendor about development of the ES (roadmap), to ensure that no useless investments will be made
- Self-developed – Manage relationship with vendor (Phase 6)

Disturbed relationship with vendor (e.g. due to bankruptcy or M&A of vendor):

- Phase 1: Establish Supplier Agreement (EVD)

F.4.13 General mitigations

Unclear assignment of tasks/roles/ responsibilities:

- Phase 2: Define Business Roles (EVD)
- Phase 2: Develop Organization Operating Model (EVD)
- Phase 3: Conduct Job Analysis (EVD)
- Phase 3: Document Job Profiles (EVD)
- Phase 3: Perform Role-to-Position Mapping (EVD)
- Phase 3: Develop Organization Transition Approach (EVD)
- Phase 4: Conduct Go-Live Transition Workshops (EVD)
- Phase 4: Facilitate Project Team Capability Transfer (EVD)

- Phase 5: Complete Project Team Capability Transfer (EVD)
- Phase 6: Assess Organization Design Effectiveness (EVD)

Insufficient alignment and communication between roles

- Phase 2: Develop Organization Operating Model
- Phase 3: Develop Detailed Organization Design
- Phase 6: Assess Organization Design Effectiveness
- Self-developed: Continuous alignment, coordination and communication between roles

Insufficient understanding of the ES concept:

- Phase 1: Develop Organizational Change Management Strategy (EVD)
- Phase 2: Develop Stakeholder Engagement Approach (EVD)
- Phase 2: Develop Change Network Approach
- Phase 2: Develop Communications Approach
- Phase 3: Develop Change Network Action Plans
- Phase 4: Manage Training Logistics (EVD)
- Phase 5: Conduct Change Network Briefings
- (+ see separate actions mentioned at specific roles)

G Theoretical validation

G.1 Comparison of framework with literature

Authors	Issues mentioned in literature	Risk(s) in Sunshine Framework
Markus et al. (2000)	<i>User skill with system remains low</i>	18. Incorrect execution of processes (e.g. other process variations, skipping steps, ...)
	<i>Data quality remains low</i>	50. Errors (e.g. wrong information, duplicates, incompleteness) in basic/master data of the enterprise system and no procedures to solve these errors.
	<i>System not used in managerial decision making</i>	6. Lack of skills/sense of need to direct processes based on ES management information.
	<i>Inadequate management reporting</i>	55. Insufficient operational reports/ dashboards to monitor processes
	<i>Insufficient plans for on-going system support and business improvement</i>	57. Little (or no) actions are undertaken at senior level to evaluate and realise continuous goals/ambitions, resulting in a loss of potential benefits. (First part of risk)
	<i>Planned improvements not achieved</i>	57. Little (or no) actions are undertaken at senior level to evaluate and realise continuous goals/ambitions, resulting in a loss of potential benefits. (Second part of risk)
	<i>Business improvements were not sought as part of ERP implementation</i>	This is not really an issue, but a statement, and it is not present in the Sunshine Framework. However, it is not likely that this statement is true, since every enterprise system implementation contains (at least a simple) business case. In this business case the business improvements are calculated to outweigh the costs of the implementation. It is more likely that Markus et al. (2000) mean that business process improvements are not realized. This issue is partly represented in risk 18. 'Incorrect execution of processes (e.g. other process variations, skipping steps, ...)' and risk 29. 'System does not properly fit to the business processes (and/or vice versa), whereby users experience lacking functionalities' in the Sunshine framework.
	<i>Turnover of experienced users and support personnel</i>	35. Improper organization of FAM & TAM; incapability to cope with changes due to: (...) 4) loss of important personnel.
Ross and Vitale (2000)	<i>Failing to establish performance metrics</i>	12. KPI's of processes are not clear.
	<i>Resourcing the post-implementation stage inadequately</i>	1. Unclear assignment of tasks/roles/ responsibilities & 61. Insufficient budget assigned for post-implementation developments.
	<i>Failing to translate increased availability of data into management information</i>	52. No clear information analysis based on data in the system, resulting in insufficient/wrong information for decision support.
	<i>Addressing resistance to change slowly or not at all</i>	5. Lack of correction of users and of stimulation of the right way of working

G.2 Comparison of roadmap with literature

Authors	CSFs mentioned in literature	Action(s) in Sunshine Framework
Norton et al. (2013)	<i>Creation of knowledge workers</i>	<ul style="list-style-type: none"> - Build super user skills - Prepare subject matter experts - Develop support staffing approach - & other learning actions

	<i>Internal dissemination of knowledge</i>	<ul style="list-style-type: none"> - Develop approach to transfer project team capabilities to standing organisation - Conduct go-live transition workshops - Prepare subject matter experts - Develop support training curriculum and materials & other learning actions
	<i>Ensuring knowledge transfer from the vendor</i>	<ul style="list-style-type: none"> - Establish supplier agreement - Attend client days/sessions of vendor - Manage relationship with vendor
	<i>Promotion of the benefits of the system</i>	<ul style="list-style-type: none"> - Develop stakeholder engagement approach - Conduct change network briefings - Identify value enhancement approach
	<i>Assignment of new responsibilities</i>	<ul style="list-style-type: none"> - Document job profiles - Develop organizational transition approach - Transition of responsibilities to the assigned person & other organizational actions
Somers and Nelson (2001)	<i>Interdepartmental communication</i>	<ul style="list-style-type: none"> - Continuous alignment, coordination and communication between roles
	<i>Top management support</i>	<ul style="list-style-type: none"> - Establish benefits tracking team - Maintain business case - Track benefits realization
	<i>Vendor support & partnership with vendor</i>	<ul style="list-style-type: none"> - Establish supplier agreement - Attend client days/sessions of vendor - Manage relationship with vendor
	<i>Interdepartmental cooperation</i>	<ul style="list-style-type: none"> - Continuous alignment, coordination and communication between roles
	<i>User training on software</i>	<ul style="list-style-type: none"> - Develop end-user training program maintenance plan - Conduct post 'go-live' end-user training - Train key-users to organize 'ES user group' meeting sin the business departments to discuss system problems/changes
Law et al. (2010)	<i>Minimal customization</i>	<ul style="list-style-type: none"> - Develop 'top-down' vision with important ES improvement steps for the next 3-5 years
	<i>Formalization of the M&S practice + M&S strategy</i>	<ul style="list-style-type: none"> - Design to-be service delivery governance - Develop to-be support approach - Design to-be support processes & other IT service management actions
	<i>Alignment with the vendor</i>	<ul style="list-style-type: none"> - Establish supplier agreement - Attend client days/sessions of vendor - Manage relationship with vendor
	<i>Support and participation from personnel at all levels</i>	<ul style="list-style-type: none"> - Develop stakeholder engagement approach - Develop approach to transfer project team capabilities to standing organisation - Conduct go-live transition workshops - Conduct change network briefings & other organizational actions
	<i>Use of multiple sources of ERP expertise</i>	<ul style="list-style-type: none"> - Develop support staffing approach
Gartner (2012a)	<i>Also MDM, BPM and BI in scope of ERP</i>	<ul style="list-style-type: none"> - Develop to-be master data design - Design to-be processes - Design integration of ES processes with other business processes - Develop BI approach & other BPM, MDM and BI actions
	<i>Retain and maintain executive management support</i>	<ul style="list-style-type: none"> - Establish benefits tracking team - Maintain business case - Track benefits realization

	<i>Plan sustainment costs at least over 7-year period</i>	<ul style="list-style-type: none"> - Maintain business case - Develop value enhancement approach
	<i>Initiate on-going training and change management initiatives</i>	<ul style="list-style-type: none"> - Develop end-user training program maintenance plan - Conduct change network briefings & other learning actions
	<i>Train also for post-implementation support</i>	<ul style="list-style-type: none"> - Develop support staffing approach - Launch super user program - Prepare subject matter experts & other IT-service management actions
	<i>Minimize modifications</i>	<ul style="list-style-type: none"> - Develop 'top-down' vision with important ES improvement steps for the next 3-5 years
	<i>Carefully design all ERP infrastructure</i>	<ul style="list-style-type: none"> - Maintain and operate infrastructure

H Expert validation

H.1 Workshop results

Friday 30 August 2013, 08:00 – 10:00

Organizer:

Nienke van Dijk – Graduate intern, Enterprise Architecture service line

Participants (experts at Deloitte Consulting):

Bart Smulders – Senior manager, Oracle service line

Constantijn Hesseling – Senior manager, System Integration service line

Eric Onderdelinden – Senior manager, Enterprise Architecture service line

Peter Kuiperij – Senior consultant, Human Capital service line

Tjerk Molenaar – Intern, Strategy & Operations service line

H.1.1 Workshop setup

The objective of the workshop was to discuss the draft framework with experts, with regard to completeness, correctness and clarity. Additionally, the purpose was to propose improvements at these points, where desirable or necessary.

The agenda was as follows:

08:00 Opening

08:10 Introduction to the graduation topic and research design

08:25 Discussion of main categorization of framework

08:45 Discussion of one example cause/effect tree

09:10 Discussion of comments on the remainder of the framework

09:50 Closure

As preparation for the workshop, the participants were asked to read the framework (and to make comments) and to write down 5 to 10 issues that they experienced during their projects in the past years. The latter were used to check the framework for completeness, in other words to check whether the framework misses important issues.

H.1.2 Outcomes of the workshop

According to the experts:

- “If you can draw one conclusion from the workshop, then it is that you are on the right track. Experts with much experience were present at the workshop, and we all recognized the content of the framework and found it interesting.”
- “The framework triggered me to read it. It was nice to read. My first impression was: ‘I need to do something with this information’.”
- “It looks like your work is progressing smoothly. The framework looks already good and recognizable.”

In the next subparagraphs, the comments of the experts with regard to clarity, completeness and correctness, will be presented.

H.1.3 Clarity

The experts made the next comments with regard to the main categorization of the first draft framework:

- It is not clear what is meant with the term 'functional maintenance'. 'Functioneel beheer' is a Dutch term, however 1) this is organized in different ways at different organizations, 2) different people have different opinions about the responsibilities and tasks, and 3) there is no clear English translation. The conclusion is that this term has to be further defined by splitting it into other terms. Suggestions were made to split this up in 'user support' (help desk and training, etc.) and 'demand management' or 'template management' (prioritizing of changes, etc.).
- Functions and roles are used disorderly in the framework. For example, key-users and process owners are roles, while functional maintenance and system management are functions. The suggestion is to choose one (e.g. roles) and reformulate some of the 'blue circles'.
- It is good to make clear that the issues are assigned to the roles where they have been caused, not per definition to the roles of people that are affected.
- Some rectangles with effects can be phrased better. In fact, the rectangles have to describe something you can see on a 'photo'. So if you make a picture of the organization, the rectangle has to describe the effect that you see happening at that role. The description of the effect at 'key-user' can have an example role. It contains an observation (first half of the sentence) and an explanation why this is bad (second half of the sentence). For example the rectangle at 'reporting management' is not phrased as a real effect.
- Some issues are caused by other issues located in another cause/effect tree. These interrelationships are not made explicit in this visualization of the framework. Also the time dimension is not made visible in this framework. The suggestion is made to incorporate a dimension to the issues: operational, tactical, and strategic. Thus, to distinguish between issues that occur directly (operational), issues that include that processes are not designed (tactical) and issues that a policy or vision is not clear (strategic). The suggestion was also made to change the visualization into a matrix to make the interrelationships explicit. In a brainstorm several categorizations were suggested, e.g. the split in 'usage', 'management' and 'IT'.

H.1.4 Completeness

The experts agreed on the fact that they did not miss significant issues in the model. The only discussion that arose was about exogenous factors. They mentioned: mergers & acquisitions, bankruptcy of a vendor, leave of an important IT manager. Some of these are implicitly incorporated in the model, others are not.

Instead of incompleteness, the experts mentioned a duplication. The issue 'errors in data transfer to other management information tools' is, in fact, captured in the issues 'no clear data model' and '(data) errors in integration with other systems'.

H.1.5 Correctness

The experts all agreed on the fact that the issues are very recognizable. The content of the framework seems to be good, since they experienced the same things in their work projects at clients of Deloitte. They were positive about the fact that this framework gives an overview of all these points.

More specifically, coding steps were explained for the cause/effect branch of ‘reporting management/BI’. This branch contains 5 issues and for all of them, the presenter presented interview results (‘which interviewee from which organization, mentioned what’) and the coding steps. The experts agreed on the way the interview results were coded and formulated into an issue. Again, they also agreed on the content of the issues, since they recognized these points from their own work experience. E.g. “Yes, very recognizable. Yes, this is an issue you see everywhere, (...)”

However, one comment they made was that some of the issues are possibly out of scope. They mentioned that the definition of the post-implementation phase is clear and they advised to use this definition to see whether some of the issues are, in fact, out of scope. In the opinion of the experts, the issue with regard to the question when the system has to be replaced and the issue that legacy systems are still running, are out of scope.

H.1.6 Additional comments

Additionally, some other comments were made by the experts, which are possibly valuable for further improvement or for the textual explanation of the framework:

- Which problems can be prevented by a better implementation and more extensively testing? And which problems not? When (by far) most of the problems can be prevented, this is an important conclusion..
- What is the main cause of the total of issues at each case study organization? What do the organizations think themselves? The answer is that the organizations do not have this overview of problems.. Most organizations do not realize this. Most probably it is caused by the time/budget constraints of the implementation, resulting in certain priorities and actions.
- Is the framework a risk framework or is it a visualized list of issues? The comment was to think about the name of the framework. Another question was ‘Is an issue really a cause?’. The answer is yes: it is a cause of the visualized effect. However, the issues itself are (indeed) caused by other issues.
- Some experts did make specific comments about formulations of issues. These comments were discussed outside the workshop and will be incorporated in the first revision.

H.1.7 Conclusion

The workshop was very valuable to gather input for revision and improvement of the framework. The experts were very positive about the content of the framework. Therefore, most of the discussion was with regard to visualization and making the interrelationships explicit (e.g. by adding dimensions). These comments can be processed in a next version of the framework, or in the development of a new framework with mitigations.

H.2 Sample expert validation form

The purpose of this expert validation form is to validate the Sunshine Framework on the following dimensions:

1. **Correctness:** Do you recognize the risk? Is the risk ‘correct’ in your opinion?
(✓ = yes; X = no; – when you do not have experience on this field)
2. **Clarity:** Is the risk clear? Do you understand what is meant with this risk?
(✓ = yes; X = no; – when you do not have experience on this field)
3. **Completeness:** Do you miss any important risk regarding this particular role in the organization?
(text)

Table 23: Expert validation form, filled out by a partner in the CRM area at Deloitte Consulting

Nr.	Role	Risks (organised in cause/effect)	1. Correctness ✓, X or –	2. Clarity ✓, X or –	3. Comments or formulation tips? Text
17	Users	Users do not use the system in the right way, resulting in incomplete or incorrect data in the system	✓	X	<i>In my opinion it concerns more the way of working than the system. In other words, I think that system is a cause and inadequate way of working an effect.</i>
20		Users do not (fully) understand the ES concept & benefits	✓	✓	
19		Users are reluctant to use the system, due to: 1) changed job responsibilities, 2) transparency of (not) performed tasks, 3) reduced freedom, 4) no direct benefits for the user self, 5) irritations caused by user unfriendliness of the system	✓	✓	<i>I would distinguish the lack of user friendliness as a separate issue.</i>
18		Processes are executed wrongly, causing incorrect data flows	✓	X	<i>I would think that mainly process variations are used that were not included in the design or that are (insufficiently) supported by the system.</i>
		Completeness: Do you miss any important risk regarding this role in the organization? <i>No</i>			
13	Key-users	Key-users are too busy with problem solving and not able to work on improvement/extension	✓	✓	<i>Task/role/responsibility of key-user is insufficiently defined and/or communicated within the organization.</i>
15		Workload key-users too high	✓	✓	
16		Insufficient time and acknowledgement to perform tasks	✓	✓	<i>Too less time and too high workload sounds similar to me. However, I would distinguish as issue that key-user being is not acknowledged as part of the job tasks (in other words, a new role/responsibility has been assigned to someone’s job profile). Thus, the person should also be evaluated on this.</i>
14		Too much knowledge about system and processes at one person	✓	✓	<i>Dependency of one person is too high (business risk)</i>

		Completeness: Do you miss any important risk regarding this role in the organization? <i>No</i>			
8	Process owners	Process ownership is not executed properly, resulting in sub-optimal processes	✓	✓	
9		No real point of contact for changes/improvement to business processes (process ownership is not assigned)	✓	✓	<i>I think that the end-to-end process responsibility is often unclearly and insufficiently assigned. Key-users are often responsible for sub processes, but who looks after the end-to-end processes. (And I would leave out the word 'real').</i>
11		Process descriptions and work instructions are not kept up to date (and are not used)	✓	✓	<i>"and are not used" is an issue concerning the user and not really the process owner</i>
10		Process integration, with processes that are not supported by the ES, is lacking	✓	✓	<i>Exactly: lack of end-to-end process design and implementation, maintenance</i>
12		KPI's of processes are not clear, these have to be designed during the post-implementation	✓	✗	<i>Is that good or bad?! I think that business and process direction KPI's, in fact, need to be designed upfront and are key for development of process, system and reporting</i>
		Completeness: Do you miss any important risk regarding this role in the organization? <i>No</i>			
4	Operational managers	Managers take insufficient responsibility for, and direction towards, good usage of the system in the business	✓	✗	<i>Again, in my opinion it is way of working instead of system</i>
5		Users are not corrected properly, too much freedom arises	✗	✓	<i>Freedom is not a problem – prevent a rigid system. The main point is that you (as continuous improvement) need to be able to respond fast and efficiently to changes and asked improvements in process, way of working and system.</i>
7		Managers do not understand the ES concept sufficiently	✓	✓	
6		Managers do not feel the need and/or have insufficient skills to direct processes on basis of management information	✓	✓	
		Completeness: Do you miss any important risk regarding this role in the organization? <i>No</i>			
21	User support employees	User support (e.g. service desk) is not organized in a good or efficient way, causing that user problems cannot be solved quickly	✓	✓	
22		Not enough (system and process) knowledge to solve problems, and knowledge is not properly managed	✓	✓	
23		No coordination with service desk when new releases are introduced (too high workload and too less knowledge)	✓	✓	
		Completeness: Do you miss any important risk regarding this role in the organization? <i>Lack of sense of business priorities (what is critical and what can wait for a while, if necessary). Knowledge of the business.</i>			

24	Change advisory manager	A sub-optimal process of prioritisation and deployment of changes, and no clear vision on further system improvement	✓	✓	
28		Business cases of changes are not properly made and considerations are not fully objective	✗	✗	<i>Business case is not measured anymore during post-implementation</i>
27		Insufficient harmonisation with the business (w.r.t. impact), during discussion about changes/RFC's	✓	✓	
25		Insufficient governance about changes/RFC's, causing too much customizations (ad hoc, no clear vision)	✓	✓	
		Completeness: Do you miss any important risk regarding this role in the organization? <i>Lack of knowledge of future developments of the standard ES software by the vendor; in other words, new functions and features are not used to support new desires of the business (this causes dissatisfied business), or are not used to replace earlier customizations (simplification of the IT landscape with positive impact on total cost of ownership).</i>			
29	Functional application managers (FAM)	System does not properly fit to the business processes (and/or vice versa), whereby users experience lacking functionalities	✓	✓	
34		Changes to the system not clearly communicated to users	✓	✓	
33		No structural design and execution of training for new users and (re)training for existing users	✓	✓	
32		Remaining implementation tasks stay postponed and are difficult to solve	✓	✓	
30		Too many routes to perform the same task, increasing the complexity for users	✓	✓	
31		Authorisation/permission concept not properly designed, resulting in a high workload	✓	✓	
35		FAM & TAM not organised properly; not capable of coping with changes, due to: 1) little knowledge transfer & documentation, 2) no increase of resources parallel to system extensions, 3) too less in-house expertise of system and processes, 4) loose of important personnel (28, 42, 52, 74, 81, 82)	✓	✓	
		Completeness: Do you miss any important risk regarding this role in the organization? <i>Typically is FAM/TAM at a lower level with regard to content and competence than the project resources. In this way already 'loss' occurs.</i>			
36	Technical application managers (TAM)	Technical problems with the enterprise system, hindering system (or functionalities) availability	✓	✓	
41		Performance and stability issues	✓	✓	
40		(Data) errors in integration with other systems	✓	✓	
39		Bugs after new releases, due to insufficiently testing (of scenarios, versions, integrations)	✓	✓	

38		No application rationalisation, legacy systems are still running	✓	✓	
37		No policy for handling release updates from vendor	✓	✓	<i>See above.</i>
		Completeness: Do you miss any important risk regarding this role in the organization? <i>No</i>			
42	Vendor	Vendor does not provide sufficient support, whereby TAM and FAM cannot properly maintain the system	✓	✓	
44		Response to questions and requests takes very long	✓	✓	<i>In many cases is the client organization insufficiently aware of the support organization of the vendor. In other words, they don't contact the vendor via the right channels or they don't escalate via an appropriate way, when necessary.</i>
46		Bug fixers are delivered slowly and not pro-actively	✓	✓	<i>Quality of testing is within the client organization.</i>
45		Attention of vendor shifts to new clients, it is difficult to retain sufficient attention	✓	✓	<i>I think that this issue is decreasing in importance (especially at cloud vendor who need to renew the contracts every time). I think this is more a kind of 'prove' of my earlier statement of the awareness of the support organization of the vendor.</i>
26		Information about future ES developments and adjustments is not clearly provided	✓	✓	<i>Same.</i>
47		Disturbed relationship with vendor due to M&A of vendor	✓	✓	<i>Most customers only are interested in the relationship with the vendor when something went wrong, i.e. when they are already dissatisfied. One usually does not invest in the relationship when everything is ok.</i>
		Completeness: Do you miss any important risk regarding this role in the organization? <i>No</i>			
48	Data managers	Data is not properly managed, extra processes need to be executed to get or keep data in the system in the right way	✓	✓	
51		No clear data model	✓	✓	
50		Errors in basic (master) data of the enterprise system	✓	✓	
49		No procedures for data cleansing and archiving	✓	✓	
		Completeness: Do you miss any important risk regarding this role in the organization? <i>No</i>			
52	Reporting managers / BI	No clear information analysis based on data in the system, resulting in insufficient/wrong information for decision support	✓	✓	
55		Insufficient operational reports/dashboards to monitor processes	✓	✓	
54		Reporting needs change during usage; they point out to be different then upfront was thought	✓	✓	

56		Many different reporting opportunities (op./tact./strat.), but lack of unity and an integrated message	✓	✓	
		Completeness: Do you miss any important risk regarding this role in the organization? <i>Client organization rarely has a good view during the project of what their management information actually is/should be.</i>			
57	Senior managers	Loose of potential benefits, since little (or no) actions are undertaken at senior level to evaluate and realise initial goals/ambitions	✓	✓	
58		Too less understanding of the ES concept and the impact on the business, and little attention for the potential of the system	✓	✓	
61		Insufficient budget assigned for post-implementation developments	✓	✓	
59		Diffused responsibility of goals when project organisation stopped	✓	✓	
60		Leave of an important (IT) manager	✓	✓	
		Completeness: Do you miss any important risk regarding this role in the organization? <i>Promotion of senior managers after a project has been finalized (since they managed it successful). For that very reason face new managers risk 53 raised by you.</i>			

I Company validation

I.1 Validation interview protocol

The objective of the interview (in combination with the validation form) is to validate the developed framework on the dimension of usefulness. In other words, does the framework raise awareness, provide insight, and/or trigger to undertake (new or additional) actions to prevent or mitigate the identified risks? The agenda of the interview is as follows:

1. Introduction

Personal introduction of interviewer and interviewee.

2. Enterprise system implementation

General questions about the enterprise system implementation project.

- a. In which phase of the implementation project is the company at the moment?
- b. What are the objectives/ambitions of the project?
- c. When is the 'go live' of the software planned?
- d. When will the transition from project management to application management be performed?

3. Risks in the post-implementation phase

Questions about the post-implementation phase.

- a. What do you foresee as the largest (e.g. top 10) risks in the post-implementation phase of the implementation, which causes that the organization cannot obtain the full benefits of the system?
- b. What kind of actions have been undertaken to mitigate these risks?

4. Discussion of risk framework

Introduction of the research project and the developed framework. Questions about the usefulness of the framework.

- a. What is your first impression of the framework and roadmap in total?
- b. Do you think the framework is useful? Are you going to use it during the implementation and post Go-live?

5. Discussion of validation form

Explanation of the company validation form. The validation form consists of the list of risks, and for each risk the questions (all to be filled in with V, X or -):

- *Were you upfront aware of this risk?*
- *Have you already undertaken actions to mitigate this risk?*
- *Are you now (after seeing the framework) more aware of this risk?*
- *Are you now (after seeing the framework and roadmap) triggered to undertake additional actions to mitigate this risk?*

- a. Are you willing to fill out the 'company validation form'?

I.2 Interview results Erasmus University Rotterdam

I.2.1 Introduction

Interviewee A is the program manager of ‘SAP@EUR’, i.e. he manages the total SAP implementation at the EUR, including (amongst others) system, process, information and organizational work streams. Interviewee B is the information manager in the ‘CIO office’ of the Erasmus University Rotterdam, and is closely involved in the SAP implementation (project-architect).

I.2.2 Validation case description

The Erasmus University Rotterdam is an international oriented university, with a strong embodiment in the city Rotterdam and the region. Primary processes of The Erasmus University are education and research, which is structured in 8 faculties. Resulting from the involvement with the urban environment, specific focus areas of the EUR are medicine and healthcare, economics, econometrics and management. In total more than 20.000 students study at the Erasmus University and 2700 employees work at the EUR. In 2013 the EUR is positioned at place 72 in the top 400 World University Rankings of the Times Higher Education¹⁹.

Until 2007, the EUR used legacy systems for their support processes. However these systems were not reliable and maintainable anymore and needed replacement. Therefore, in 2007 the EUR started with the implementation of SAP for HR and Finance. This implementation endured 2.5 years and was driven by system replacement, not by process improvement. In 2008 was the ‘go live’ at the first faculty and in the next 1.5 years the system was rolled out at the other faculties. In the end, the system was customized in such a high level that the old processes were now facilitated by a new system, but nearly any aspect was changed in the employees’ way of working.

In 2011, a large university-wide program was initiated called ‘BV2013’ (‘Operational Management 2013’), with the aim to modernize the operational management of the university. Within this program, 45 projects were started, e.g. the replacement of the student information system, the replacement of the research information system and the implementation of a CRM system to recruit students. Furthermore, one project was initiated to provide better management information at different levels in the organization. However, during this project, it turned out that much information was not structured in the right way and that some information even was not stored, which limits the opportunities to provide good management information. Therefore, the conclusion was made that the solution has to start with tackling the problems in the source systems. This led to the decision to start with a re-implementation and extension of SAP for the HR, Finance en Purchasing domain

After an European tender, the Erasmus University started in February 2013 in combination with implementation partner Deloitte with the new (“plateau driven”) SAP implementation. The goals and ambitions of the project are captured in a business case and include to make a quality improvement, e.g. to improve the management information, in combination with an efficiency improvement, e.g. by modernization. At the moment the period of development of the first (and biggest) ‘plateau’, the e-HRM and finance modules, is almost finished and the

¹⁹ https://www.eur.nl/eur/feiten_cijfers/

testing phase of this first plateau has already been started. The 'go live' is planned at 2 January 2014. During development, the project organization has been started with preparing the (functional and technical) application management groups for taking over responsibility for system management and user support in the period after 'go live'. The next plateau is planned and includes the purchasing-domain.

I.2.3 Risks in the post-implementation phase

According to the interviewees, the largest risks of the post-implementation phase are:

- *Still no process uniformity*: at the moment, many processes are executed in a non-uniform way. Employees are very creative in handling exceptions, e.g. by contacting other people in an informal network of 'experts'. Instead of changing the way of working and thinking into standard processes, the risk exists that employees keep on trying to fit the old non-uniform and non-compliant process in the new system.
- *Not enough discipline/commitment of users (and management) at the start of the process*: many exceptions exist by not properly following the procedures in the start of the process (e.g. no address filled in or using a wrong code). The risk exists that users are not committed enough to the new way of working, causing all different sorts of exceptions, which cannot be efficiently handled by the standard processes of SAP.

Above risks cover the same point, namely that organizational change management is not achieved on a high enough level, causing that the system will not be used in the right way and that improved business performance will not be achieved. The resistance now quickly starts to rise in the organizational layers, after the first series of testing has been started. In other words, the challenges of the interviewees are: "How to realize that the people in the organization are going to behave in a different way?" and "How to reach the 'isolated and uninterested' scientist and commit him/her with the new way of working?".

Besides, the interviewees mentioned the risk that functional and technical application management cannot deliver the required level of system support. Contrary, the interviewees mentioned several times that they do not fear about performance or system stability issues, but about the 'people aspects'.

I.2.4 Discussion of risk framework

The first impression of the interviewees was:

- B: "You represented the framework in a nice way. If I quickly scan the framework, then I think that the main point is that people do not take the right responsibility for the right role."
- A: "What I find a strong aspect of the framework, is that it is primarily focused on the behaviour of people, and how this causes certain effects."
- A: "It contains two roles, which we did not clearly assign to someone. The master data manager and the BI manager are not covered rightly." B: "I think these roles are assigned, but implicitly. The question is whether those persons act in that way."
- A: "Interesting. I am happy that we made time for this appointment, to discuss the framework." B: "Indeed, it is tightening to what we are focusing on."

The answer on the question 'Are you going to use this framework?' was:

- “Yes, I think it is a reasonable framework to use as checklist. In a way that we have to organize all these stakeholders/roles in the right ‘position’, and if we do not organize it in that way, we can expect the described effects.”

Suggestion of one interviewee was:

- “Can you make a ‘positive framework’, such that we can check what we should achieve? And it would be helpful to see a time aspect into that, such that we know when which aspects need the most attention.”

I.2.5 Discussion of validation form

The interviewees will fill out the validation form.

I.3 Interview results IHC Merwede

I.3.1 Introduction

The interviewee is the program manager of ‘One IHC’, i.e. he manages the total transformation of IHC Merwede towards more uniformed, rationalized, accurate and efficient processes and tools.

I.3.2 Validation case description

IHC Merwede is focused on the development of design and construction activities for the maritime sector, with a major focus on dredging and mining vessels (and corresponding equipment) and supplies for offshore construction. The company’s broad customer base includes dredging operators, oil and gas corporations, offshore contractors and government authorities. The head office of IHC Merwede is located in The Netherlands and various shipyards are located all over the world (e.g. Brazil, China, United States). In total over 3,000 people are employed by IHC and the annual turnover of 2012 was €0.9 billion²⁰.

At the moment, the companies of IHC Merwede to some extent have their own processes, tools, purchasing trajectories etc. Therefore, at the beginning of 2012, the board of IHC Merwede announced the start of a programme with the aim to uniform the processes, work methodologies, systems and tools of IHC Merwede in total. The final objective of this global improvement is to achieve better, more accurate and more efficient operations. The programme is called ‘One IHC Merwede’ and has a large scope, i.e. it includes all processes from engineering to after-sales and support activities. Therefore, it embraces, amongst others, the implementation of ERP, PDM, CRM, CAD and planning software.

On 1 June 2012 ‘One IHC Merwede’ started formally, after the development of requirements and project plans. At the moment the period of design is almost finished, i.e. the processes were mapped, an information model was made and software is largely selected, and the phase of development will start soon. The phase of implementation is planned per unit of IHC Merwede and per application, with a total roll-out period of four years (2014-2017).

I.3.3 Risks in the post-implementation phase

According to the interviewee, the largest risks of the post-implementation phase are:

²⁰ <http://www.ihcmerwede.com/about-ihc-merwede/company-profile/>

- *Insufficient functional fit*: risk that the software does not deliver what IHC Merwede expected upfront and that users have difficulties using it.
- *Still a diffused landscape*: risk that the aim to uniform processes will not be entirely achieved, since every part of the organization will naturally claim some freedom in configuring ‘unit specific’ solutions.
- *Employees cannot become used to the new way of working*: risk that, after a period of system stabilization (when the system works well and according to specification), the users still find it difficult to work properly with the new methods and tools.
- *Major changes in the organization, resulting in a decreased fit of the solution*: risk that the organization will be significantly changed (e.g. parts of the organization are sold or acquired, products are significantly changed, volumes are changed), causing that afterwards one would like a modified solution.
- *Management does not direct clear enough towards good usage of the software*: risk that employees do not use the system according to the principles, but that they use it in a way that is closer to the ‘old way of working’. When management does not actively monitor the usage of the system and does not take actions, then there is a risk that improved business performance will not be entirely achieved.

I.3.4 Discussion of risk framework

The first impression of the interviewee was:

- “Very good. Nice.”
- “Is this going to be a confidential graduation report? (...) No? So, I can basically read and use it when you are graduated? Nice.”

The answer on the question ‘Are you going to use this framework?’ was:

- “Yes. I would use it. I provide you that answer without doubt. I would use it to make me, but especially to make others, more aware of the risks after the implementation. I can say: ‘Guys, someone thought about this from a neutral point of view, with experiences from Damen Shipyards, Rabobank and AMC, let’s take benefits from this.’ Yes, I believe in frameworks like this.”

Suggestion of the interviewee was:

- “To quickly obtain insight from the framework, it would help me to have an idea of the importance of the different issues. Can you categorize the issues, e.g. according to A: extreme important issue, B: very important issue, C: important issue?”

I.3.5 Discussion of validation form

The interviewee will fill out the validation form.

I.4 Interview results MSD Animal Health

I.4.1 Introduction

The interviewee is project manager at MSD Animal Health. The last 1.5 years, he has been responsible for the global implementation of a CRM system.

I.4.2 Validation case description

MSD Animal Health, known as Merck Animal Health in the United States and Canada, is the global animal health business unit of Merck. MSD Animal Health offers veterinarians, farmers, pet owners and governments the widest range of veterinary pharmaceuticals, vaccines and health management solutions and services. The company has offices in more than 50 countries and business operations in more than 150 countries. MSD Animal Health operates a global network of manufacturing sites and dedicated R&D facilities. In 2011, MSD Animal Health had a revenue of US\$ 3.3 Billion and 6200 employees.²¹ Before a merger in June 2011, the company was named Intervet International.

Merck Animal Health intends “to use its resources appropriately to meet the expectations of customers, regulators and governments” and aims to be a customer-centric organization²². In order to achieve this goal, in November 2011 MSD Animal Health started a global CRM implementation. The objective of the implementation is to professionalize the sales organization, to standardize processes and to enlarge sales by better managing the customer base.

In November 2011 the company started with the design of a global solution and a global deployment approach for the implementation in offices in all 50 countries. The decision was made to use Veeva, a Cloud-Based Business Solutions for the Global Life Sciences Industry, based on Salesforce.com. Important component of this solution is iRep, an App running on the iPad, giving the salesrep the possibility to have access to the most important CRM functions. The implementation and ‘go-live’ in the first country started in May 2012, after which subsequently another country went ‘live’ almost every month.

For the implementations in the different countries, the central CRM program organization in the Netherlands trained employees in the different regions to implement the system according to the developed standard implementation approach. This standard implementation approach takes around 3 to 4 months to implement the Veeva system and consists of a period of readiness assessment and planning, deployment (including local configuration, training, data conversion, etc.), the ‘go-live’ and the transition to application management (around 2 to 4 weeks after the ‘go-live’).

At the moment, the system is live in 20 countries with 1800 users, representing 80% of the total amount of users. However, at the moment MSD Animal Health has taken ‘a marking time’, and temporarily stopped the deployment of the system in the other 30 countries. The reason is that the user adoption stagnates (or even decreases) in the 20 countries that are currently using the system. The objective is to secure the acceptance and usage of the system before the global system deployment will be continued.

I.4.3 Risks in the post-implementation phase

According to the interviewee, the largest risks in the post-implementation phase are:

- *Level of acceptance of the solution below expectation:* several reasons contribute to a low acceptance of the system by the sales representatives and managers in the different countries. For example: 1) The implementation was driven by IT and a responsible business partner was not in place for a long time. 2) Commitment at management level was insufficient. 3) Users have resistance to use the system, since it brings transparency for managers in the task they do (not) perform. The solution

²¹ <http://www.merck-animal-health.com/binaries/fact-sheet.pdf>

²² <http://www.merck-animal-health.com/company/a-trusted-source.aspx>

sometimes is more seen as a control tool than a helpful tool. 4) The interest of users in the system decreases, since they do not experience benefits. Sales representatives put a lot of effort and data in the system, but 'get little in return'. In fact, the KPI's should be coupled directly to what is represented in the system.

- *No clear communication of system development*: this risk is in line with point 4) above. A basic version of the system was rolled out, and the planning is to add more advanced functionalities to the system in the future. However, this means that the focus mainly has been on the system adoption by sales representatives (users), and not on the adoption by other departments that could retrieve benefits from data in the system and departments that could add contribution by adding data to the system. This causes that the possible benefits of the system are not very visible, which (in turn) decreases the user adoption. The question is: 'What does the improvement path look like?' There has to be a clear vision/strategy and clear communication of the system improvement plans. 'Where are we now?' and 'Where are we going to?' To mitigate this risk, the CRM program team started with the distribution of newsletters, the startup of an online community and the assignment of a Change Advisory Board. In this board, business representatives drive the CRM strategy and direction, by setting priorities to the requested changes and enhancements.
- *Low data quality, since users have to fill out too much data in the system*: questions are 'which data is necessary?' and 'which data is actually used by managers to direct on processes?' Users have to fill out many data, which takes too much time for them, causing that certain fields are being skipped (low data quality). Only data that is necessary as input for directing on processes should be required in the fill out fields in the system. Acceptance of the system is directly linked to the quality of the data in the system. Incorrect and duplicate information needs to be identified and removed. This is not a one-off but ongoing activity, putting a lot of pressure on the back-office.
- *Users have unanswered questions about the way of working with the system*: training should be repeated. Risks exist that users have questions that stay unanswered, causing irritations or decreased user acceptance/adoption.
- *Countries experience too little flexibility*: the decision was made to use one core system which would require globally standardized processes, resulting in less freedom for country specific configurations. This can cause irritations and decrease acceptance/adoption of the system. An example is that a country has limited possibilities for changing their territory structure. For quite some country administration activities the central CRM team's help is needed. This is experienced as a limitation.
- *No alignment between different countries in the decision about changes or system extensions*: a global system desires a global direction towards system improvement and extension. This means that different countries have to be aligned for decisions about changes or extensions. Risks exist that desires of certain countries are aligned, which can disturb system adoption/acceptance.
- *No global KPI's and no management information based on data in the system*: so far, little management information has been available of data in the system. Also, no global KPI's exist, which makes it difficult to initiate a global strategy towards customers. This can cause that the initial objectives and enlarged business performance cannot be achieved.

I.4.4 Discussion of risk framework

The first impression of the interviewee was:

- “The framework looks structured. It seems to be solid. I did not study the details yet, but I recognize the big parts. I also see terms and risks of which I think ‘that makes sense’.”
- “I think this framework and roadmap also helps when you are going to start a new project. In a way that you can use it to become aware of the risks that the implementation will bring, and that you can check whether the preconditions are met in a proper way, such that you can start the project.”
- “It is also useful to use periodically. To check from time to time: ‘we are now in this phase, are the preconditions met?’ and when you are facing a risk that could not be prevented, to think about the question ‘what are we going to do now to eliminate it in the future?’ ”
- “In my opinion it looks extremely comprehensive.”
- “It is good to think about responsibilities: are these assigned in a proper way and are these people aware of the responsibilities they carry?”

The answer on the question ‘Are you going to use this framework?’ was:

- “Yes, I think so. What I shall do, that triggered me: I will list up the risks that I can identify and I will map the activities that we are currently taking to mitigate these risks. Then, I will use the framework to check if we are missing something, and to check whether the actions we are taking are sufficient to mitigate the risks in the continuous improvement phase, or whether we have to initiate other actions. This was also the reason why I wanted to participate in your validation case studies (kind of give and take).”

I.4.5 Discussion of validation form

The interviewee will fill out the validation form.

I.5 Interview results European MSO

I.5.1 Introduction

The interviewee is responsible for operational planning in the organization, i.e. dealing with operational requirements for the different development phases of new product initiatives (e.g. in the different product steams of content, video and connectivity products). Previously, he was manager of network operations and during that function he initiated the implementation project of a new global service management system. In his current function he is still the business sponsor of that project, to ensure that operations are focused on solving incidents and restoring of the network and IT operations.

I.5.2 Validation case description

The European MSO (multiple service operator) is a large international cable company with operations in many countries. Television, broadband internet, and telephony services are provided through next-generation networks and innovative technology platforms.

To improve the performance and stability of the network operations, in 2011 an improvement strategy was developed. Part of this improvement strategy was to uniform the processes and tools for the incident, change & problem management processes, since the organization had

undertaken a lot of acquisitions of companies (each with their own operational processes and tools). However, these different parts of the organization need to cooperate and need to be coordinated centrally. For example, the different countries are connected to the international network backbone, and when something goes wrong in the network or IT operations, this first needs to be troubleshot locally and then needs to be escalated to the central operations team (if it has to do with the central platforms or the international backbone). “Who troubleshots what, at which moments by which KPI’s”, needs to be coordinated centrally. However, the fact that different parts of the organization follow different processes and use different tools for this incident process, results in delayed restoration of network and IT outages. Also split responsibilities of local operations, network operations and IT operations, interfere with a good coordination of the incident process. Therefore, a coordination improvement potential was identified by globally implementing a tool for ticketing, which enables to troubleshot according to one process and to analyse problems and implement changes in the network. The project is called ‘USMS’, which stands for unified service management solution, and has the ambition to unify and enable one way of working for incident process of all network, IT and local operations.

The kick-off for the USMS project was in December 2011, after which a business case, requirements and process descriptions were developed. This phase of planning and design was completed in June 2012. The tool Remedy ITSM from the vendor BMC was selected, since the network operations already were supported by an older (and customized) version of Remedy. After a long discussion, about internal cloud or external cloud hosting, the architecture and build phase of the USMS project were started in the beginning of 2013.

The ‘go-live’ moment will be split in a ‘technical go-live’, in which the system will be run, and an ‘operational go-live’, in which the users will start to use the system. The ‘technical go-live’ will be within one or two weeks and the ‘operational go-live’ will be at least in the beginning of December 2013, since the user community of 600 people need to be trained and management reporting needs to be developed. After the ‘technical go-live’, the application management will be outsourced to a third party in India. They will provide operational (e.g. second and third line) support for the application. Within the organization, a ‘USMS product owner’ at the CIO office will be responsible for coordinating this application management (e.g. functional application management, change management). The preparation of this transition has been started recently.

I.5.3 Risks in the post-implementation phase

According to the interviewee, the largest risks of the post-implementation phase are:

- *Disappointed users by experiencing less functionality than the previous application:* the users are already using an older and customized version of Remedy. If the new system offers less functionality than the previous one, the users will be disappointed and dissatisfied after the implementation. This could lead to resistance, which makes a good implementation very difficult. To mitigate this, the interviewee has carefully mapped the old versus the new functionalities and ensured that ‘richer’ functionalities already become available in the first releases of the new implementation. To balance the dissatisfaction of ‘missed’ functionalities by new functionalities that make the employees happy (e.g. higher performance, automatically ticket making out of error reports).
- *Resistance in different countries against the unified process:* every country has its own processes and way of working, resulting in its own specific requirements for the

new system. This causes the risk that you need to deliver a customized solution for every country, to encourage them to use the system. As mitigation, the project team initiated requirement sessions with local incident and change managers of all different countries and initiated workshops about unifying the service processes. This mitigation is a good basis, however the 'devil is in the detail'. There is a risk that people have expectations, because they gave their requirements, and that those are interpreted differently and that the system will not fulfill all expectations.

- *No clear communication of roadmap with system improvements*: a clear vision and clear communication is necessary to manage the expectations of the users with regard to improved system functionalities. However, expectations can largely diverge and user feedback after the implementation can also lead to new expectations, while this was not part of the roadmap and initial business case. A risk is thus also that using the new system triggers requirements that are close to the old way of working. The new system can provide benefits for one country but a downturn for another country, and these feedback and expectations need to be managed carefully.
- *Still no unified way of working*: a risk exists that the implementation will lead to a globally used tool, but that processes will still be executed differently in the different countries.

I.5.4 Discussion of risk framework

The first impression of the interviewee was:

- "I see many risks that I recognize."
- "Let's have a look at the data tree, because we are experiencing problems with data. 'No clear data model'. Yes, this is what we encountered. (...)"
- (about reporting governance to process the changed reporting needs) "We also need to do something with this. We don't have a reporting team yet, that can absorb this. Maybe the people of the departments can handle this, but then responsibilities need to be clearly assigned and workload needs to be managed."

The answer on the question 'Are you going to use this framework?' was:

- "I need to study the framework and roadmap better, to see what is relevant for us. If I quickly view it, I think it definitely contains relevant aspects for us."
- "I think it should be good if the persons in the project team, who are working on those different aspects, think about the actions that the organization should undertake after the implementation to mitigate these risks."

Suggestion of the interviewee was:

- "In fact, the negative effects in the framework should be visualized red and the positive effect in the roadmap should be green, right?"

I.5.5 Discussion of validation form

The interviewee will fill out the validation form.

I.6 Sample company validation form

The objective of this validation form (in combination with the validation interview) is to validate the framework and roadmap on the dimension of usefulness. In other words, does

the framework and roadmap raise awareness, provide insight, and/or trigger to undertake (new or additional) actions to prevent or mitigate the identified risks?

In order to perform this validation you are being asked to indicate per risk:

1. **Awareness upfront?** Were you upfront aware of these risks?
2. **Already (planned to) mitigate(d)?** Have you already undertaken actions, or planned to undertake actions, to mitigate these risks?
3. **More awareness now?** Are you now (after seeing the framework) more aware of these risks?
4. **Triggered with actions?** Are you now (after seeing the framework and roadmap) triggered to undertake additional actions to prevent/mitigate these risks?

All to be answered with ✓, ✗ or –.

✓ When the answer on the question is yes; ✗ when the answer on the question is no; and – when you have no or too little experience with this issue to answer the question.

Table 24: Company validation form, filled out by an interviewee of Erasmus University Rotterdam

Nr	Role	Issues (organized in cause/effect)	1. Awareness upfront? ✓, ✗ OR –	2. Already mitigated? ✓, ✗ OR –	3. More awareness now? ✓, ✗ OR –	4. Triggered with actions? ✓, ✗ OR –	5. Which actions? + evt. Comments Text.
17	Users	Users do not have the right way of working with the ES, resulting in incomplete or incorrect data in the system					
20		Users do not (fully) understand the ES concept & benefits	✓	✓	✗	✓	Increase effectiveness of actions already taken
19		Users are reluctant to use the system, due to: 1) changed job responsibilities 2) transparency, e.g. for managers, in (not) performed tasks of users 3) no direct benefits for the user themselves 4) reduced freedom	✓	✓	✗	✗	Training/ coaching by application management
18		Processes are executed wrongly by the users (e.g. other process variations, skipping steps, ...)	✓	✓	✗	✗	Supervision and coaching by functional application management
13	Key-users	Key-users are too busy with 'ad hoc' problem solving, and not able to signalize improvement opportunities					
15		Workload key-users too high	✓	✓	✗	✗	Known risk of capacity levelling for Service management processes
16		Insufficient acknowledgement and evaluation of tasks, since the tasks were added to existing job profiles	✓	✓	✗	✓	Extra knowledge/ capacity to be assigned for first quarter after Go Live
14		Not enough persons in the business with knowledge about the system and processes (too high dependency of a few people)	✓	✓	✗	✓	Extra knowledge/ capacity to be assigned for first quarter after Go Live

8	Process owners	Process ownership is not executed properly, resulting in sub-optimal processes					
9		No point of contact for management of business processes (process ownership is not assigned)	√	√	X	X	Process ownership already assigned
11		Process descriptions and work instructions are not kept up to date (and/or are not used)	√	√	X	X	Known risk for functional application management
10		Process integration, with processes that are not supported by the ES, is missing	√	√	X	X	Known process integration points
12		KPI's of processes are not clear	√	√	X	X	Known risk of unknown/undefined KPI's. Improvement at plateau 2
4	Operational managers	Managers take insufficient responsibility for, and direction towards, the right way of working with the ES in the business					
5		Users are not corrected properly, and not stimulated to work in the right way	√	√	X	X	Known risk. Difficult subject for organizational change management
7		Managers do not understand the ES concept and potential value sufficiently	√	√	X	X	Known risk. Impact and communication actions planned.
6		Managers do not feel the need and/or have insufficient skills to direct processes on basis of management information	√	√	X	X	Known risk. Difficult subject for organizational change management
21	User support employees	User support (e.g. service desk) is not organized in a good or efficient way, causing that user problems cannot be solved quickly					
22		Not enough (system and business) knowledge to solve problems, and knowledge is not properly managed	√	√	X	X	Extra knowledge/capacity to be assigned for first quarter after Go Live
23		No coordination with service desk when new releases are introduced (too high workload and too less knowledge)	√	√	X	X	Known risk. Actions assigned to improve Release management process
24	Change advisory manager	A sub-optimal process of prioritization and deployment of changes, and no clear vision on further system improvement					
28		Business cases of requests for change (RFC) are not properly made and considerations are not fully objective	√	√	X	X	Architecture principles defined (i.c business case). Change management process to be improved. Change Advisory Board to be implemented.
27		Insufficient harmonization with the business (w.r.t. impact), during discussion about RFC's	√	√	X	X	Known risk. Change management process to be improved. Change Advisory Board to be implemented.
26		Not enough knowledge of, and alignment with, future ES developments of the vendor					

25		No 'top down' vision/strategy for future ES development in combination with insufficient governance for RFC's, causing too much 'ad hoc' customizations)	✓	✓	✗	✗	<i>Architecture principles defined. Known risk. Change management process to be improved. Change Advisory Board to be implemented.</i>
29	Functional application managers (FAM)	System does not properly fit to the business processes (and/or vice versa), whereby users experience lacking functionalities					
34		Changes to the system not clearly communicated to users	✗	✗	✓	✓	<i>Communication of release planning to be improved.</i>
33		No structural design and execution of training for new users and (re)training for existing users	✓	✓	✗	✗	<i>Known risk. Training/coaching of application management planned.</i>
32		Remaining implementation tasks are not completed anymore after the project end	✓	✓	✗	✗	<i>In scope of project to solve this</i>
30		Too many routes/dialogs to perform the same task, causing complexity for users (user unfriendliness)	✓	✓	✗	✗	<i>Master plan for application management available, to guide implementation of operational service processes</i>
31		Authorization concept not properly designed, resulting in a high workload	✓	✓	✗	✗	<i>Authorization design is audited by external accountant</i>
35		FAM & TAM not organized properly; not capable of coping with changes, due to: 1) not enough knowledge transfer & documentation 2) system extensions not accompanied by an increase in staff 3) insufficient in-house expertise of system and processes 4) loss of important personnel	✓	✓	✗	✗	<i>Known Risk. Extra knowledge/capacity to be assigned for first quarter after Go Live</i>
36	Technical application managers (TAM)	Technical problems with the enterprise system, limiting system (or functionalities) availability					
41		Performance and stability issues	✓	✓	✗	✗	<i>Pre Go Live performance testing planned as indicator for Post Go Live risk. Scaleable IT infrastructure.</i>
40		(Data) errors in integration with other systems	✓	✓	✗	✗	<i>Pre Go Live performance testing planned as indicator for Post Go Live risk. Redesign if necessary. Improve test methods</i>
39		Bugs after new releases, due to insufficient testing (of scenarios, versions, integrations)	✓	✗	✗	✓	
38		No application rationalization, legacy systems are still running	✓	✗	✗	✓	<i>Application life cycle management to be improved</i>
37		No policy for handling release updates from vendor	✗	✗	✓	✓	<i>Policy to be defined</i>
42	Vendor	Vendor does not provide sufficient support, which limits TAM and FAM to properly execute maintenance tasks					
44		Response to questions and requests takes very long	✓	✓	✗	✗	<i>Same vendor continued.</i>
46		Bug fixes are delivered slowly and not pro-actively	✓	✓	✗	✗	<i>Saem vendor</i>

45		Attention of vendor shifts to new clients, it is difficult to retain sufficient attention	✓	✓	✗	✗	<i>Vendor management process to be improved</i>
43		Difficulties in finding the right ways/channels to communicate with the vendor	✓	✓	✗	✗	<i>Vendor management process to be improved</i>
47		Disturbed relationship with vendor (e.g. due to bankruptcy or M&A of vendor)					<i>Inapplicable (vendor = SAP)</i>
48	Data managers	Data is not properly managed, extra corrective actions need to be performed to get or keep data in the system in the right way					
51		No clear data model	✓	✓	✗	✗	<i>Data model defined en maintained</i>
50		Errors in basic (master) data of the enterprise system	✓	✓	✗	✗	<i>Task of functional application management addressed</i>
49		No procedures for data cleansing and archiving	✗	✗	✓	✓	<i>Procedure to be defined.</i>
52	Reporting managers / BI	No clear information analysis based on data in the system, resulting in insufficient/wrong information for decision support					
55		Insufficient operational reports/dashboards to monitor processes	✓	✓	✗	✗	<i>Improved management reports to be implemented is one of the project goals. Competence center will be organized</i>
54		Insufficient governance to process the changed reporting needs	✓	✓	✗	✗	<i>Competence center will be organized, to support this need.</i>
53		No clear vision ('holistic view') on information analysis and required management information	✓	✓	✗	✗	
56		Many different reporting tools (op./tact./strat.), but lack of unity and consistency	✓	✓	✗	✗	<i>Architecture principles defined and implemented for this purpose.</i>
57	Senior managers	Little (or no) actions are undertaken at senior level to evaluate and realize continuous goals/ambitions, resulting in a loss of potential benefits					
58		Not enough understanding of the ES concept and the impact on the business, and little attention for the potential of the system	✓	✓	✗	✗	<i>Known risk. Especially for sr education & research management</i>
61		Insufficient budget assigned for post-implementation developments	✓	✓	✗	✗	<i>Plateau 2 will be planned.</i>
59		No clear responsibilities for achieving the on-going ambitions after the project has stopped	✓	✓	✗	✗	<i>Implementation of service organization, Change Advisory Board and project Board planned.</i>
60		Leave of an important ES program sponsor	✓	✓	✗	✗	<i>Known Risk. Management Development program</i>
What is your overall impression of the framework and roadmap? <i>Useful checklist to identify post Go Live Risks.</i>							

J Confidential appendix

This appendix is excluded due to confidentiality considerations.

J.1 All interview results

This section contains the transcriptions of all interviews.

J.2 Within-case analyses

This section contains the within-case analyses of the three different case studies and the group of additional interviews. For each identified issue, it is presented which interviewee(s) mentioned the particular issue and an explanation is given to the presented name (by means of interviewee quotes).

J.3 Confidential across-case analysis

This section contains the across case analysis results. Again, for each identified issue, it is presented which interviewee(s) in which case study organization(s) mentioned it and an explanation is given to the presented name (by means of interviewee quotes).

J.4 Conversion table

This section contains a table that can be used for the conversion of the confidential across-case analysis towards the across case analysis as presented in Table 21. By means of this table, it can be tracked which interviewees said particular comments that led to the risks presented in Table 21.

J.5 Mitigation analysis

This section contains a more detailed version of Table 22, with the interviewee names and particular quotes about the lessons learned and preventive actions/mitigations mentioned by the interviewees.