1. Introduction

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The aim of this chapter is to provide an overview of the whole thesis at a glance. It identifies the problem domain and explains the topic statement. After presenting the topic, the thesis goals are addressed. The contents of each chapter of the thesis are summarized in a sentence in order to enable the reader to quickly find the points of interest. Section 1.4 then presents the approach to solving the thesis problem and highlights the tight interrelations between the chapters. It is an overview that explains why the thesis is structured in the chosen way.

The thesis was developed in cooperation with an industry partner. The external partner and its role in the development of this work is also presented in this chapter. First however, the problem domain is specified.

1.1. Problem Domain

Management is an important discipline during software development. Effective management requires transparency, achieved by developing and applying metrics. They provide the basis for monitoring and controlling the different aspects of software development projects. The different tasks in a project will inevitably lead to different metrics, which need to be visualized in a way that maximizes their expressiveness. The visualizations of the devised metrics and additional project information can be grouped together into a project cockpit. A cockpit needs to be specifically built for a project, because projects widely differ from each other.

On the one hand, these cockpits provide valuable guidance for the project manager. On the other hand, the information extracted from these cockpits needs to be communicated within the organization. For example, information needs to be reported to higher management or the information is used to steer activities

within the project itself. The communication of these results, however, is often not directly addressed in the cockpit and a tool switch is needed.

The information that is communicated includes the metrics visualized in the cockpits and their meaning. Often there are multiple interpretations of a metric, depending on various factors, such as the role of the cockpit user. In other cases the interpretation of these metrics is subjective or unclear. Therefore the visualization of the metrics needs to be enriched with additional information to guide their interpretation. Guidance to the multiple possible interpretations of a single metric visualization, as well as assistance for the usage and maintenance of a cockpit help the more effective management. Such kinds of guidance are of especially high importance to persons, who are new to a project, but need to interpret the metrics and/or use a project cockpit.

Many unanswered issues are available in the dynamically evolving field of project controlling and project cockpits in particular. The thesis address some of the most central ones.

1.2. Topic Description and Objectives

The aim of this master thesis is to investigate the different requirements for project management cockpits. The main milestones of the development of this work are:

- Getting acquainted with the topic and reading related work
- Thorough investigation and analysis of the requirements for cockpits
- Research for possible solutions
- Development of a cockpit concept

This requirements analysis should especially focus on two points – the "collaborative" aspect and the "interpretation aids" that are described above. It should include the establishment of a methodology for the evaluation and the thorough execution of the devised requirements engineering process. Mining the related work and providing an overview of existing solutions are parts of the investigation. Depending on the results of this analysis, an initial horizontal prototype of a collaborative project cockpit with integrated interpretation aids could be created.

The next section is to be used as a quick reference to the elements of the thesis.

1.3. Thesis Structure

The thesis is structured as follows:

Chapter 1 identifies the problem domain, explains the thesis goals and the approach to solving the thesis problem. The industry partner is presented.

Chapter 2 builds up the theoretical background, required for understanding the other chapters. Common language in the field of cockpits is established.

Chapter 3 focuses on the process of engineering of the requirements for a cockpit.

Chapter 4 analyzes the cockpits, dashboards and business intelligence solutions market. An evaluation of the available products with respect to the requirements of a leading corporation is offered.

Chapter 5 discusses the concept of a modern cockpit solution with respect to its use cases, domain model and architecture.

Chapter 6 summarizes the thesis results and discusses future work.

These chapters are tightly interrelated. The next section explains those interrelations.

1.4. Thesis Approach and Overview

This section provides an overview of the approach to solving the thesis problem. It also explains the interrelations between the performed requirements engineering process, the research and the cockpit conception.

The initial idea was to design and prepare a prototype of a cockpit application that is later to be offered to the company GDIS (see section 1.5). The preparation started with a research of the cockpit market. It showed that in the theoretical field multiple interpretations of the term *cockpit* exist. Additionally, very few of the products on the market were referred to as cockpits. This posed the need to search for other products that were *not* referred to as cockpits, but practically offer the features of a cockpit. In order to find these products, the typical functionality of a cockpit had to be clarified.

Assuming that the cockpit field is relatively well-known and that the typical features of a cockpit are easy to find, the initial approach was to quickly research the standard cockpit functionality and then to begin modeling the cockpit. The assumption proved wrong, because the cockpit field is actually very dynamic. Lots of research is performed in this field and many companies enter this fast-growing market. They try to distinguish their products by giving them well-sounding names and classifications, which sometimes do not express their

supported functionality. This initial research proved that lots of different types of cockpits exist.

Starting with the design and implementation of a cockpit at this stage was not reasonable. There were multiple directions for the development of a solution. Instead of directly implementing a product and running the risk that it never gets deployed in the industry, I decided to perform a thorough requirements engineering phase at a big software development company – GDIS (see section 1.5). Important was to analyze the current state at GDIS, the thesis partner from the industry, and its needs. Apart from establishing the commitment of the company, many assumptions had to be verified, lots of additional information had to be gathered and the software infrastructure analyzed before starting with the development of a new solution.

The requirements engineering phase was conducted in parallel with a detailed research for possible solutions. Open-source technologies and frameworks for implementation and charting were also considered at the initial stages of the phase. A cockpit model, based on own ideas and observations of available products was evolving during this process. Those ideas are described in chapter 5 Conception. The requirements engineering phase verified the acceptance of those ideas. The latter do not apply only to a concrete solution for a given company, but might serve for the implementation of cockpit solutions in general.

1.5. Industry Partner

This paper has been developed with the cooperation of Generali Deutschland Informatik Services in Aachen as an industry partner. The Generali Group and the position and responsibilities of Generali Deutschland Informatik Services (GDIS) within the Group is presented. The functions of the department of GDIS that assisted during the development of the thesis and its role are later addressed.

The Generali Group is one of the most significant participants in the global insurance and financial products market [Gen11]. The Group's parent and principal operating company is Assicurazioni Generali, founded in 1831 in Trieste. It is present in 68 Countries and has strong positions in western Europe, its main area of activity [Gen11]. In recent years, the Group has expanded to 14 central-eastern European markets. Besides insurance and financial products, the Generali Group offers real estate services and asset management products.

The German division of the group is the **Generali Deutschland Holding**. The structure of the Group and the Group companies are shown on figue 1.1. Among them are the Aachen-Muenchener, CosmosDirekt, Central, Badenia, Advocard.

Generali Deutschland Informatik Services supports the whole Generali

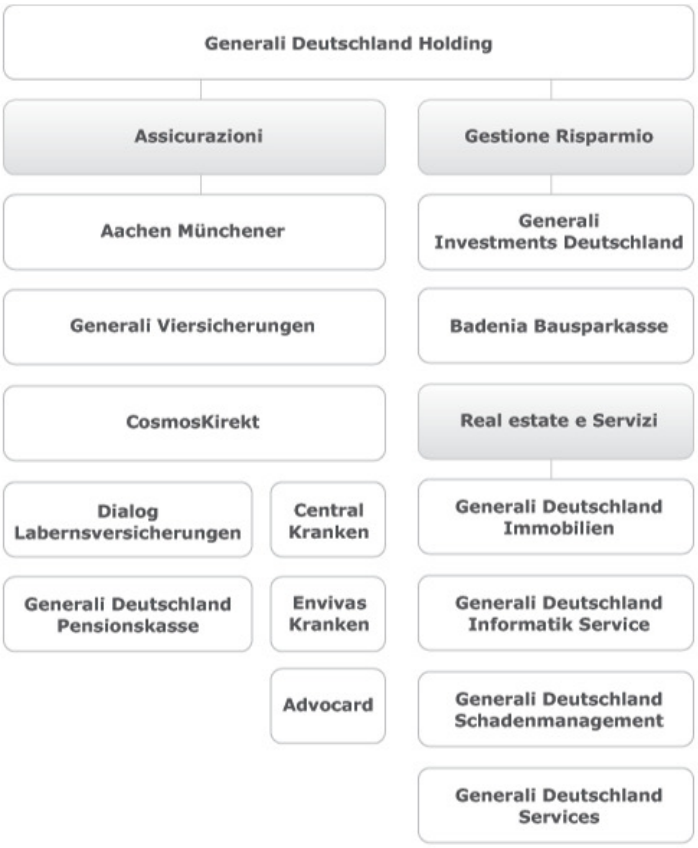

Figure 1.1.: Generali Group structure and companies

Group with information technology solutions and services. Its core competencies are in the stable and economical operation of a multi-platform infrastructure and the development of efficient and future-proof IT applications. At the international level, Generali Deutschland Informatik Services with its data center provides services for the central and east European regions. The data center serves the Generali companies in Belgium, the Netherlands, Austria, Bulgaria and six other European countries. With approximately 1,200 employees and a turnover of 370 million €it is one of the leading developers of information systems in Germany [GDI11].

The software Engineering Process Group (EPG) within Generali Deutschland Informatik Services is responsible for process improvement. It is at the center of the collaborative effort of everyone in the organization who is involved with software engineering process improvement [FRCI90]. Among the functions of the EPG are the facilitation of software process assessments. The EPG actively works with managers, whose projects are affected by changes in software engineering practice, and with software engineers in order to obtain, plan for and install new practices and technologies [FRCI90]. It defines the engi-

neering process with the active collaboration of all the roles in it. The group organizes trainings aimed at informing the staff about the software engineering process and its recent improvements. The process improvement process includes tracking and monitoring of the improvement efforts and their effectiveness. The EPG maintains process experience and best practice databases to assist its work. Frameworks like the Capability Maturity Model and the Capability Maturity Model Integration project (CMM/CMMI) also help in the process management and improvement process.

This thesis is developed with the assistance of the **EPG as an industry partner**. During the requirements engineering process, the requirements of the EPG for a cockpit were elicited. In this process, representatives of other roles in the software engineering process at GDIS were involved. The idea behind the cooperation with GDIS is the establishment of the "real" requirements of a software development company with years of experience in project controlling. In the course of the work, the industry partner is referred to as *GDIS*.

1.6. Acknowledgement

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