

Master Thesis

Conception of Collaborative Project Cockpits with Integrated Interpretation Aids

Konzeption von kolaborativen Projektleitstaenden mit integrierten
Interpretationshilfen

by

Stefan Cholakov

Vorgelegt der: Fakultät fuer Mathematik, Informatik
und Naturwissenschaften der Rheinisch-
Westfaelischen Technischen Hochschule
Aachen im Maerz 2011

Angefertigt am: Lehr- und Forschungsgebiet Informatik 3
Prof. Dr. rer. nat. Horst Lichter

Gutachter: Prof. Dr. rer. nat. Horst Lichter
Prof. Dr. Bernhard Rumpe

Betreuer: Dipl.-Inform. Matthias Vianden

Geheimhaltungserklaerung

Die vorliegende Arbeit beinhaltet interne vertrauliche Informationen der Generali Deutschland Informatik Services GmbH. Die Weitergabe des Inhalts der Arbeit im Gesamten oder in Teilen sowie das Anfertigen von Kopien oder Abschriften - auch in digitaler Form - sind grundsatzlich untersagt, mit Ausnahme der Verwendung in Forschung und Lehre am Lehr- und Forschungsgebiet Informatik 3 der RWTH Aachen. Weitere Ausnahmen beduerfen der schriftlichen Genehmigung der Generali Deutschland Informatik Services GmbH.

Generali Deutschland Informatik Services GmbH
Anton-Kurze-Allee 16
52064 Aachen

Hiermit versichere ich, dass ich die vorliegende Arbeit selbstaendig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt sowie Zitate kenntlich gemacht habe.

Aachen, den 01.03.2011

— Stefan Cholakov —

Contents

1. Introduction	1
1.1. Problem Domain	1
1.2. Topic Description and Objectives	2
1.3. Thesis Structure	3
1.4. Thesis Approach and Overview	3
1.5. Industry Partner	4
1.6. Acknowledgement	6
2. Theoretical Background	7
2.1. Project Management and Project Controlling	7
2.2. Progress Measurement and Analysis Techniques	10
2.2.1. Variance Analysis	11
2.2.2. Earned-Value Analysis	12
2.2.3. Milestone Trend Analysis	13
2.3. Terminology: Cockpit vs. Dashboard vs. BI	14
2.3.1. Performance measurement versus performance management system	15
2.3.2. Report	15
2.3.3. Mashup	16
2.3.4. Dashboard	16
2.3.5. Scorecard	17
2.3.6. Cockpit	17
2.3.7. Business Intelligence	19
2.4. Data Warehouse	20
2.4.1. Benefits	20
2.4.2. Data warehouse design	21
2.4.3. OLAP cube	23
2.5. Project Collaboration	24
3. Requirements engineering	25
3.1. Requirements Elicitation	26
3.1.1. Methodology	26
3.1.2. Choice of requirements gathering techniques	28
3.1.3. The Elicitation Process: Application of the Techniques	29
3.1.4. Elicitation results	32
3.2. Requirements Analysis	37
3.3. Modeling Requirements	38
3.4. Validating and Negotiating Requirements	38
3.5. Specification of the Central Requirements	40

4. Research	43
4.1. IBM Rational Insight	44
4.1.1. Cognos Business Intelligence	46
4.2. Oracle Primavera P6 Analytics and Primavera P6 Reporting Database 2.0	47
4.2.1. Oracle Primavera P6 EPPM	49
4.2.2. Oracle Business Intelligence Foundation Suite	49
4.2.3. Oracle Project Analytics	50
4.2.4. Oracle Daily Business Intelligence for Projects	51
4.3. Microsoft SharePoint	51
4.4. Jaspersoft BI Suite	53
4.5. Pentaho	54
4.6. Dundas Dashboard	55
4.7. CenterView	57
4.8. Discussion	57
4.8.1. Overview of the Analyzed Products	58
4.8.2. Requirements Fulfillment	58
4.8.3. Advantages	59
4.8.4. Considerations and Risks with BI initiatives	61
4.8.5. Costs	62
5. Conception	65
5.1. Vision	66
5.2. Metrics meta model	67
5.3. Central features	69
5.4. Logical Architecture	71
6. Summary and Outlook	73
6.1. Summary	73
6.2. Outlook	74
A. Questionnaire (Expert) v2.1	75
Bibliography	84

List of Figures

1.1. Generali Group structure and companies	5
2.1. Project Management Process Groups	8
2.2. Project Controlling	9
2.3. Outputs of Project Controlling	10
2.4. Project Constraints	11
2.5. Example for Earned-Value Analysis	12
2.6. Example for Milestone Trend Analysis	13
2.7. Nomenclature fuzz	14
2.8. A terminology classification according to decision-making support	15
2.9. A Boeing 737 Cockpit	18
2.10. Sales data warehouse: Star schema	22
2.11. Sales data warehouse: OLAP Cube	23
3.1. Decision matrix for elicitation techniques	27
3.2. Requirements elicitation process	30
3.3. Central Requirements	40
4.1. Solutions Overview	44
4.2. IBM Rational Insight	45
4.3. Oracle's PM and BI Solutions	47
4.4. Dependency of Primavera P6 Analytics on other project manage- ment and business intelligence solutions	48
4.5. SharePoint BI Stack	52
4.6. Jaspersoft BI 4 ETL	54
4.7. Pentaho Functional Architecture	55
4.8. Dundas Dashboard annotations	56
4.9. Requirements fulfillment matrix	59
4.10. Main advantages of the solutions	60
4.11. Average cost per user over three years, by vendor	62
4.12. Division of BI costs over three years	63
5.1. Use cases of the conceptual cockpit	66
5.2. Metrics meta model of the conceptual cockpit	68
5.3. Logical Architecture	71

1. Introduction

Contents

1.1. Problem Domain	1
1.2. Topic Description and Objectives	2
1.3. Thesis Structure	3
1.4. Thesis Approach and Overview	3
1.5. Industry Partner	4
1.6. Acknowledgement	6

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