

A. Appendix

Contents

A.1. Questionnaire of the Evaluation	47
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A.1. Questionnaire of the Evaluation

Evaluation: Template-based dashboard configuration

The purpose of this questionnaire is to evaluate the template-based dashboard configuration tool, which was developed for the the Project Management Cockpit for inexperienced users. Within the framework of this tool, a dashboard template is a set of question - answer pairs. A **question** is defined as an *information need* of a user and an **answer** is a *dashboard item*, which illustrates an information or data. For an example, a project manager or team leader are users, who have the following information need (question): *will the project finish on time?* This question can be answered, for instance, with the metric *Earned Value*, which is represented by a diagram (dashboard item).

In addition to the question-answer pairs, the dimensions are defined. A **dimension** describes for whom or for what a template is relevant. Examples for a dimension are the user role in the current project or the project type. Each dimension consists of **characteristics**, which form the dimension. For instance, a project type can be either a new development, a major enhancement, a bug fix or an operation.

According to the developed approach of the rule-based dashboard configuration, the user can select the relevant dimensions and characteristics and the system will suggest the appropriate question-answer pairs. The rule-based dashboard configuration tool represents the support for the creation of templates, where the rules for the generation of question-answer pairs corresponding to dimensions are defined.

The following questions are presented in the form of multiple choice or text and divided into four groups. In the first group the question ask about the information about experience of the test person with dashboards and dashboard templates. The second group asks about suggestions for improvement after the subject tried to create a template. The answers to the third and the fourth group

of questions will give information about the quality of the tool's functionality and user satisfaction respectively.

A Question about user's experience

1. I have experience with the creation of templates for the configuration of project dashboards.

Completely Agree Completely Disagree
Do not know

2. I have an experience with the creation of project dashboards by using dashboard templates (in context described above).

Completely Agree Completely Disagree
Do not know

3. I have experience with the creation of dashboards.

Completely Agree Completely Disagree
Do not know

4. It is difficult for me to formulate my information needs and to select the appropriate metrics for measuring and analysis of my information needs of my subject area.

Completely Agree Completely Disagree
Do not know

B User's experience with the rule-based dashboard configuration tool

Please, try to create a dashboard template according to the scenario described below. Use the rule-based dashboard configuration tool and note your suggestions for improvement and critique.

Abide the following **scenario**, when creating the dashboard template.

In this scenario, your task is to generate dashboard templates by using the dashboard initialization tool. At first, you should create a template with the name *Dev Template*. In order to define the rules that define the validity of a template, you have to create the dimensions *Role* and *Project Type*. The characteristics of the dimension *Role* are Project Manager, Team Leader, Tester and Developer. The characteristics of the dimension *Project Type* are New Development, Major Enhancement, Maintains/Bug Fixes and Operation. Optional, you can also create your own dimension with characteristics. In the next step you need to create the following questions for the information needs: *Will the project stay within the given budget?*, *What are the quality risks in the product?* and *Will the project finish on time?* You can create your own information needs optional. Create dashboard items with the following visualization IDs: *Earned Value* and *Mean Time to Defect*. You can also create dashboard items with your own visualization IDs. Assign to each visualization ID an available image. You need now to navigate to your *Dev Template* in order to define the template rules.

You can check the result of your template rules on the Dashboard SetUp page.

Your suggestions and critique:

C Quality of the tool's functionality

Suitability of the task

1. The arrangement of the elements on the screen is meaningful for the execution of the tasks.

A. Appendix

Completely Agree Completely Disagree
Do not know

2. I understand what steps I have to execute in order to perform a task.

Completely Agree Completely Disagree
Do not know

3. Too many steps are needed to perform a task.

Completely Agree Completely Disagree
Do not know

4. I can navigate easily through the tool and it is easy to find necessary information to perform the tasks.

Completely Agree Completely Disagree
Do not know

Self-descriptiveness

1. The tool provides enough information, what tasks are possible in a certain situation.

Completely Agree Completely Disagree
Do not know

2. I understand the terms and concepts used in the tool.

Completely Agree Completely Disagree
Do not know

3. The tool provided all important information, that were required to create a dashboard template.

Completely Agree Completely Disagree
Do not know

Controllability

1. The tool provides navigation hints, which allow optimal usage of the tool.

Completely Agree Completely Disagree
Do not know

2. The proposed validation process allows an optimal usage of the tool.

Completely Agree Completely Disagree
Do not know

D Conformity with user expectations

1. I understand the purpose of a rule-based dashboard configuration provided by the tool.

Completely Agree Completely Disagree
Do not know

2. The proposed concept for the dashboard configuration corresponds to my expectations.

Completely Agree Completely Disagree
Do not know

3. The layout of the visual components allows optimal usage of the tool.

Completely Agree Completely Disagree
Do not know

4. The results are predictable during the execution of tasks.

Completely Agree Completely Disagree
Do not know

5. The rule-based dashboard configuration is helpful for an inexperienced dashboard user.

Completely Agree Completely Disagree
Do not know

Bibliography

- [1] Ergonomie der Mensch-System-Interaktion - Teil 110: Grundsätze der Dialoggestaltung (ISO 9241-110:2006); Deutsche Fassung EN ISO 9241-110:2006, 2008.
- [2] Martin Backschat and Otto Gardon. *Enterprise JavaBeans und JPA: Grundlagen- Konzepte- Praxis zu EJB 3.1 und JPA 2.0*. Spektrum Akademischer Verlag, 2002.
- [3] H. Balzert, R. Koschke, U. Lämmel, H. Balzert, P. Liggesmeyer, and J. Quante. *Lehrbuch Der Softwaretechnik: Basiskonzepte Und Requirements Engineering*. Spektrum Lehrbücher der Informatik. Spektrum Akademischer Verlag, 2009.
- [4] V.R. Basili, G. Caldiera, and H.D. Rombach. The Goal Question Metric Approach. *Encyclopedia of Software Engineering*, 1:528–532, 1994.
- [5] E. Burns, C. Schalk, and N. Griffin. *JavaServer Faces 2.0: The Complete Reference*. The Complete Reference. McGraw-Hill, 2009.
- [6] Strategic dashboards. Strategic dashboards. <http://www.bidashboard.org/types/strategic.html>, 2010-2011. Date accessed 15 July 2012.
- [7] Micheline Elias and Anastasia Bezerianos. Exploration views: Understanding Dashboard Creation and Customization for Visualization Novices. In *Proceedings of the 13th IFIP TC 13 international conference on Human-computer interaction - Volume Part IV*, INTERACT'11, pages 274–291, Berlin, Heidelberg, 2011. Springer-Verlag.
- [8] Dr. Gary J. Evans. A Framework for Project Metrics. Deciding what to measure and how to measure it. CVR/IT Consulting LLC. http://www.cvr-it.com/Presentations/ProjectMetrics_CVR-IT.pdf, 2007. Date accessed 13 July 2012.
- [9] Frederic Evers. Conceptual Extension of Project Dashboards for Inexperienced Users. Master Thesis, 2012, RWTH Aachen.
- [10] Norman E. Fenton and Martin Neil. Software metrics: Roadmap. In *Proceedings of the Conference on The Future of Software Engineering*, ICSE '00, pages 357–370, New York, NY, USA, 2000. ACM.

- [11] Stephen Few. *Information Dashboard Design: The Effective Visual Communication Of Data*. O'Reilly Series. O'Reilly, 2006.
- [12] Stephen Few. Dashboard Design for Real-Time Situation Awareness. http://www.perceptualedge.com/articles/Whitepapers/Dashboard_Design.pdf, 2007. Date accessed 14 July 2012.
- [13] Jesse James Garrett. Ajax: A New Approach to Web Applications. <http://adaptivepath.com/ideas/essays/archives/000385.php>, 2005. Date accessed 3 July 2012.
- [14] Zach Gemignan. A Guide to Creating Dashboards People Love to Use. <http://www.dashboardinsight.com/articles/digital-dashboards/fundamentals/a-guide-to-creating-dashboards-people-love-to-use-part-3.aspx>, 2009. Date accessed 3 August 2012.
- [15] Ragae Ghaly. *Sams Teach Yourself EJB in 21 Days*. Pearson Education, 2002.
- [16] Jens Heidrich and Jürgen Münch. Goal-Oriented Setup and Usage of Custom-Tailored Software Cockpits. In *Proceedings of the 9th international conference on Product-Focused Software Process Improvement, PROFES '08*, pages 4–18, Berlin, Heidelberg, 2008. Springer-Verlag.
- [17] IEEE. IEEE Standard Glossary of Software Engineering Terminology. *Office*, 121990, 1990.
- [18] Oliver Ihns, Dierk Harbeck, Stefan M. Heldt, and Holger Koschek. *EJB 3 professionell. Grundlagen- und Expertenwissen zu Enterprise JavaBeans 3 für Einsteiger, Umsteiger und Fortgeschrittene*. Dpunkt Verlag, 2007.
- [19] ISO/IEC. IEEE Standard Adoption of ISO/IEC 15939:2007 Systems and Software Engineering Measurement Process (ISO/IEC 15939:2007(E)). *IEEE Std 15939-2008*, pages C1 –40, 30 2009.
- [20] Eric Jendrock, Jennifer Ball, Debbie Carson, Ian Evans, Scott Fordin, and Kim Haase. Oracle Corporation: The Java EE 5 Tutorial. <http://docs.oracle.com/javaee/5/tutorial/doc/gexaf.html>, 2010. Date accessed 30 June 2012.
- [21] Rob Johnson. *Expert one-on-one J2EE design and development*. Wrox, 2003.
- [22] H. Kerzner. *Project Management Metrics, KPIs, and Dashboards: A Guide to Measuring and Monitoring Project Performance*. John Wiley & Sons, 2011.
- [23] Alicia Key, Bill Howe, Daniel Perry, and Cecilia Aragon. VizDeck: self-organizing dashboards for visual analytics. In *Proceedings of the 2012 ACM*

- SIGMOD International Conference on Management of Data*, SIGMOD '12, pages 681–684, New York, NY, USA, 2012. ACM.
- [24] Tristan Langer. Extending the Gargoyle Codegen with Semantic Relationships. Bachelor Thesis, 2012, RWTH Aachen.
- [25] Jochen Ludewig and Horst Lichter. *Software Engineering - Grundlagen, Menschen, Prozesse, Techniken*. dpunkt.verlag, 2007.
- [26] M. Marinschek, M. Kurz, and G. Müllan. *JavaServer Faces 2.0: Grundlagen und erweiterte Konzepte*. Dpunkt Verlag GmbH, 2009.
- [27] Richard Monson-Haefel and Tim Rohaly. Oracle Corporation. jGuru - Enterprise JavaBeans Fundamentals. <http://java.sun.com/developer/onlineTraining/EJBIntro/EJBIntro.html>, 2000. Date accessed 23 June 2012.
- [28] Themis Palpanas, Pawan Chowdhary, George Mihaila, and Florian Pinel. Integrated model-driven dashboard development. *Information Systems Frontiers*, 9:195–208, 2007.
- [29] Kathy Sierra and Bert Bates. *Head first EJB - passing the Sun certified business component developer exam: a brain-friendly study guide*. O'Reilly, 2003.
- [30] SWEBOK. Chapter 12 Software Measurement (SWEBOK). http://mensura2007.uib.es/documents/SwMeasBok_Ch12_vMay192007.pdf, 2007. Draft May 1 (2007). Date accessed 12 July 2012.
- [31] Matthias Vianden. *Introduction EJB-GenCodename: Gargoyle*. RWTH Aachen, 2011.

Faculty of Mathematics, Computer Science and Natural Sciences

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Bachelor Thesis

Rule based Initialization of Project Dashboards

Regelbasierte Initialisierung von Projektdashboards

Elena Emelyanova

August, 2012

Reviewer:

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

Supervisor:

Dipl.-Inform. Matthias Vianden

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

Aachen, den 09.08.2012

— Elena Emelyanova —

Contents

1. Introduction an Motivation	1
2. Foundations	3
2.1. Enterprise JavaBeans	3
2.2. JavaServer Faces	5
2.2.1. JavaServer Faces Standard Request-Response Life Cycle	6
2.2.2. Features and Components of JSF 2.0	8
2.3. Gargoyle-Codegenerator	10
2.4. Metrics	13
2.5. Dashboard	15
3. Related Work	17
4. Requirements	21
4.1. Stakeholder List	21
4.2. The functional Requirements derived from the Stakeholder List	23
4.3. The non functional Requirements	24
5. Realization	25
5.1. GUI and Concept	25
5.2. Architecture	33
5.3. Implementation and Experiences	37
6. Evaluation	41
6.1. Results of the Evaluation	41
6.2. Conclusion and Future Work	42
7. Summary and Outlook	45
A. Appendix	47
A.1. Questionnaire of the Evaluation	47
Bibliography	53

List of Figures

2.1. EJB Architecture.	5
2.2. JavaServer Faces Standard Request-Response Life Cycle.	7
2.3. The Target Architecture of the Gargoyle Codegenerator.	11
2.4. The Gargoyle Codegenerator Architecture.	12
2.5. The hierarchical Structure of the Goal Question Metric Model (from [4]).	15
5.1. Statechart Diagram of Creation of a Dashboard Template and Initialization Rules.	26
5.2. A Dashboard Template List in the Software Prototype.	27
5.3. Software Prototype: The Pop-Up Dialog for the Creation of a new Template.	27
5.4. Sequence Diagram of Method Invocations in the System during HTTP Request initiated by Activation of the Button <i>Create New Dashboard Template</i>	28
5.5. The Dashboard Template Edit Page in the Software Prototype.	29
5.6. The Dimension Edit Page in the Software Prototype.	30
5.7. The Setup Page of the Project Management Cockpit in the Soft- ware Prototype.	31
5.8. The first Option: Selection of Dashboard Template in the Combo Box of the Setup Page.	31
5.9. The first Option: the returned <i>Information Need-Dashboard Item</i> pairs.	32
5.10. The second Option: Selection of Dimension Characteristics.	32
5.11. The second Option: the affected Templates and Dimensions with Characteristics.	33
5.12. The second Option: the returned <i>Information Need-Dashboard Item</i> pairs.	33
5.13. The Architecture of the Rule-Based Dashboard Initialization Tool.	33
5.14. The UML Class Diagram of the Domain Model of the Rule-Based Dashboard Initialization Tool.	34
5.15. The Structural Relation of the Tool Components.	36
5.16. The Resources List.	37
5.17. Fetching of a Dimension.	38
5.18. The CharacteristicsList Template.	38
5.19. Not working Implementation of the CharacteristicsList Template	39
5.20. Correct Implementation of the CharacteristicsList Template.	39
5.21. Implementation of the <i>selectOneRadio</i> UI Component.	40

