Requirements Interchange Format (RIF)

RECOMMENDATION

Requirements Interchange Format (RIF), PSI 6
Version 1.2

ProSTEP iViP

Abstract

Requirements management has been established in the industry as a primary method to get flawlessly from the early product target definitions over the implementation up to the validation and testing phase. Despite its cross-functional nature requirements management is a key factor for successful partner integration within the development cycle. Manufacturers specify requirements for their entire product as well as the aggregation of systems/components and their suppliers provide system specifications describing how their product will meet these needs. In order to manage the complexity growths due to the increase of requirements and requirement specifications, especially with regards to mechatronics, manufacturers and suppliers introduced requirements management systems. These systems are used within an organizational context but can not really bridge the gap between manufacturers and suppliers, as only tool specific exchange formats and methods exist.

In order to address the circumstance of the unavailability of a generic requirements exchange format the "Simulation and Tools" Group of the HIS (Hersteller Initiative Software) specified the Requirement Interchange Format (RIF). This specification was then handed over to the ProSTEP iViP Association to be published as ProSTEP iViP Recommendation. This Recommendation will serve as a basis for a future international standardization of the RIF to enable its broad application.

This ProSTEP iViP Recommendation covers the use cases to be supported, the format specification as data model description and additional implementation details to be considered.

Disclaimer

ProSTEP iViP Recommendations (PSI Recommendations) are recommendations that are available for general use. Anyone using these recommendations is responsible for ensuring that they are used correctly.

This PSI Recommendation gives due consideration to the prevailing state-of-the-art at the time of publication. Anyone using PSI Recommendations must assume responsibility for his or her actions and acts at their own risk. The ProSTEP iViP Association and the parties involved in drawing up the PSI Recommendation assume no liability whatsoever.

We request that anyone encountering an error or the possibility of an incorrect interpretation when using the PSI Recommendation should contact the ProSTEP iViP Association (psi-issues@prostep.com) immediately so that any errors can be rectified.

Copyright

I. All rights on this ProSTEP iViP Recommendation, in particular the copyright rights of use and sale such as the right to duplicate, distribute or publish the recommendation remain exclusively with the ProSTEP iViP Association and its members.

II. The recommendation may be duplicated and distributed unchanged, for instance for use in the context of creating software or services.

III. It is not permitted to change or edit this recommendation.

IV. A suitable notice indicating the copyright owner and the restrictions on use must always appear.

Table of Contents

1 Overview 1
1.1 Introduction 1
1.2 Who should read this document 1
1.3 Conventions 1
1.4 Structure of this Document / How to read this Document 2
1.5 Why we need an Interchange Format for Requirements 2
1.6 Objectives of RIF 3
1.7 RIF Partners 4
2 Use Cases Supported by RIF 5
2.1 Overview: Main Use Cases 5
2.2 The Use Cases in Detail 5
2.2.1 Use Case: UC-1 External Creation of a complete Specification 5
2.2.2 Use Case: UC-2 Customer and Supplier exchanging Specifications 6
2.2.3 Use Case: UC-3 Send first version of a specification to a partner 7
2.2.4 Use Case: UC-4 An Answer is sent to (parts of) a previously received Specification 8
2.2.5 Use Case: UC-5 Send an updated version of a specification to a partner 9
2.2.6 Use Case: UC-6 External review of a specification 10
2.2.7 Use Case: UC-7 Proof reading of a specification (Corrector Use Case) 11
2.2.8 Use Case: UC-8 Documentation generation 11
3 RIF – Format and Interfaces 13
3.1 RIF Modeling 13
3.1.1 Introduction: Why modeling RIF? 13
3.1.2 Information Elements and Information Types 13
3.1.2.1 Relationships between Information Types 14
3.2 Description of the RIF-model 15
3.2.1 General structure 15
3.2.2 RIFHeader 16
3.2.3 RIFContent: Basic information 17
3.2.3.1 Identifiable 18
3.2.3.2 SpecElementWithUserDefinedAttributes 19
3.2.3.3 SpecObject 22
3.2.3.4 SpecGroup 22
3.2.3.5 SpecHierarchyRoot 23
3.2.3.6 SpecGroupHierarchyRoot 24
3.2.3.7 DatatypeDefinition 24
3.2.3.8 SpecType 25
3.2.3.9 SpecRelation 26
3.2.4 RIFContent: Data types 27
3.2.4.1 Simple data type 28
3.2.4.2 Enumeration data types 29
3.2.4.3 Complex data types 30
3.2.5 RIFContent: Access policies 32
3.2.6 RIFContent: XHTML name space 33
3.2.6.1 Object embedding in the XHTML namespace 36
3.2.7 RIFToolExtension 36

4 Implementation Details for RIF 37
4.1 XML Formalization 37
4.1.1 General rules 37
4.1.2 Inheritance 39
4.1.3 Composition 40
4.1.4 Association 43
4.1.5 Changing the XML namespace 44
4.2 XML Internationalization 44
4.2.1 Encoding of special characters 44
4.3 Embedded objects 45
4.3.1 Multiple representations of embedded objects 45
4.3.2 Embedded objects in RIF 46
4.4 Packaging 46
4.5 Tool Interfaces 47
4.5.1 Guide to implement a user interface 47
4.5.1.1 Sample export process 47
4.5.1.2 Sample import process 48
4.5.1.3 Warnings and error handling 48
Appendix A: Additional Resources 48
4.6 RIF XML Schema (rif.xsd) 48
4.7 RIF XHTML Schema 48
4.8 RIF Test Data 48
Appendix B: Glossary 49
Appendix C: RIF model history 61

Figures

Figure 1: Exchange of requirements between two RM databases using RIF 3
Figure 2: Use of RIF for the interchange of requirements between different tools 4
Figure 3: Aggregation of information types 14
Figure 4: Generaliziation of information types 14
Figure 5: Associations between information types 14
Figure 6: The information type "RIF" 15
Figure 7: General structure of a RIF document 16
Figure 8: The RIFHeader type 16
Figure 9: The aggregation relationships of the RIFContent type 17
Figure 10: The abstract information type "Identifiable" 19
Figure 11: The abstract information type "SpecElementWithUserDefinedAttributes" 20
Figure 12: Container-role of "SpecElementWithUserDefinedAttributes" 21
Figure 13: SpecObject derived from the abstract SpecElementWithUserDefinedAttributes 22
Figure 14: Association between SpecGroup and SpecObject 22
Figure 15: Context of the SpecHierarchy element 23
Figure 16: Context of the SpecGroupHierarchy element 24
Figure 17: The abstract classes of data-types 25
Figure 18: Aggregation of AttributeDefinition by SpecType 25
Figure 19: The AttributeDefinition class hierarchy 26
Figure 20: UML diagram of SpecRelation 26
Figure 21: The RIF data types and their relations 27
Figure 22: Class-hierarchy of DataTypeDefinitionSimple 28
Figure 23: The AttributeValueSimple class 29
Figure 24: The AttributeDefintionEnumeration element and it's relations 29
Figure 25: Illustration of the relations of complex data in RIF 30
Figure 26: The wrappers for the complex data types 31
Figure 27: Overview of class-references of AccessPolicy 32
Figure 28: Example of the notation of the name of a modelled RIF element 37
Figure 29: Example RIFHeader element with attributes 38
Figure 30: Example of inheritance 39
Figure 31: Example of a composition 40
Figure 32: EnumValue nested inside DatatypeDefinitionEnumeration 40
Figure 33 Order of RIF subelements 41
Figure 34 Order of RIFContent subelements 42
Figure 35: Example for an assosciation between two classes 43
Figure 36: Example of how tagged-values are used to enrich the RIF metamodel with information 44
Figure 37: Multiple references of OLE objects 45