EUROPEAN MIDDLEWARE INITIATIVE

DJRA1.5.1 – STANDARDIZATION WORK PLAN AND STATUS REPORT

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Abstract:
This deliverable contains the detailed work plan of the standardization activities and objectives compliant with the overall EMI Technical Development Plan. The plan is released early in the project life and updated every year including a status report on the achievements of the past 12 months compared to the planned objectives. The status report at M03 will cover the state-of-the art while the work plan at M36 will provide recommendations for further work.

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1. INTRODUCTION

1.1. PURPOSE

The purpose of this document is to describe the EMI standardization activities in general and of its middleware in particular. It covers the state-of-the-art standards adoptions at the beginning of the EMI project. It further provides the year one work plan activities in the context of component standardization that are in-line with the overall Technical Development Plan [R1].

This document defines the EMI Standardization Plan that shall apply for all activities within the project for the first year. The purpose of this plan is to identify common open standards whose adoption can significantly increase the level of interoperability both among EMI products and to third-party solutions. It is also meant to identify shortcomings of existing standards and plans for solving issues by either providing feedback to standardization communities or by launching own standardization initiatives.

1.2. DOCUMENT ORGANISATION

Chapter 1 - Introduction: this section, explaining the purpose, scope and organization of the document

Chapter 2 - Executive Summary: this section contains a high-level description of the document. It gives a summary of the most important points described in each main section.

Chapter 3 – Overall EMI Standardization Strategy: this overview section explains the general principles of the EMI standardization approach.

Chapter 4 – Very brief overviews of relevant standards with pointers to more information.

Chapter 5 – State-of-the-art: this section describes the actual outcome of the standardization tasks in the previous development cycle. The status report in the first cycle is replaced by an overview of the state of the art and as such an assessment of the current situation.

Chapter 6 – Standardization work plan for the first EMI project year and towards the first EMI release.

Chapter 7 – Provides a short conclusion.

1.3. REFERENCES

R1	DNA1.3.1 Technical Development Plan, https://twiki.cern.ch/twiki/bin/view/EMI/DeliverableDNA131
R2	OASIS – Security Services (SAML) TC, http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=security
R3	OASIS – Extensible Access Control Markup Language (XACML), http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=xacml
R4	OGF – GLUE Specification Version 2.0, http://www.ogf.org/documents/GFD.147.pdf
R5	OGF – Storage Resource Manager (SRM) Version 2.2, http://www.ogf.org/documents/GFD.129.pdf
R6	OGF – GridFTP Specification, http://www.ogf.org/documents/GFD.20.pdf
R7	OGF - OGSA-BES Version 1.0 Specification,

	http://www.ogf.org/documents/GFD.108.pdf
R8	OGF – JSDL Version 1.0 Specification, http://www.ogf.org/documents/GFD.136.pdf
R9	OASIS – WS-RF Framework, http://www.oasis-open.org/committees/wsrf/
R10	IETF – WebDAV http://tools.ietf.org/html/rfc2518

1.4. DOCUMENT AMENDMENT PROCEDURE

This document can be amended by the authors further to any feedback from other teams or people. Minor changes, such as spelling corrections, content formatting or minor text re-organisation not affecting the content and meaning of the document can be applied by the authors without peer review. Other changes must be submitted to peer review and to the EMI PEB for approval.

When the document is modified for any reason, its version number shall be incremented accordingly. The document version number shall follow the standard EMI conventions for document versioning. The document shall be maintained in the CERN CDS repository and be made accessible through the OpenAIRE portal.

1.5. TERMINOLOGY

DCI	Distributed Computing Infrastructures
DPM	Disk Pool Manager
EMI	European Middleware Initiative
FTS	File Transfer Service
GLUE	Grid Laboratory Uniform Environment
JSDL	Job Submission Description Language
OGSA	Open Grid Services Architecture
OGSA-BES	OGSA – Basic Excution Service
SAML	Security Assertion Markup Language
SDO	Standardization Development Organization
SIENA	Standards and Interoperability for e-Infrastructure Implementation Initiative
SRM	Storage Resource Manager
PT	Product Team
WS-RF	Web Services Resource Framework
WMS	Workload Management System

2. EXECUTIVE SUMMARY

The EMI project brings together all key European middleware providers and one of its important activities is the adoption and development of common open standards via active participation in the standard development process.

Relevant open standards for EMI are released from so-called Standardization Development Organizations (SDOs) like the Open Grid Forum (OGF), the Organization for the Advancement of Structured Information Standards (OASIS), and the Internet Engineering Task Force (IETF). But standardization is not a straightforward task since it involves in many cases the agreement of different stakeholders (user communities, administrators, technology providers, etc.) to a common strategy.

This document starts with a short description of the overall standardization strategy emphasizing important principles for EMI standardization endeavours. The adoption of existing open standards should be performed whenever possible and where it makes sense in order to satisfy user requirements. Moreover, EMI is actively contributing to the SIENA standardization roadmap, ensuring the EMI strategy is in-line with the greater community strategies in general and the other five DCI project standardization roadmaps in particular.

The most relevant standards within the context of Compute, Data, Infrastructure and Security technical areas are given, followed by the state of the art of EMI products' standards adoption.

Key standardization activities during the first year include:

- The broad adoption of the GLUE2 information model, increasing the quality and semantic richness of information.
- Standardized access to data services based on WebDAV (over HTTPS), facilitating collaboration between users in editing and managing data. This approach makes EMI components such as dCache competitive with industry solutions.
- Agreement on common security attributes, ie VOMS is already able to release signed SAML assertions via the standardized SAML request interface in parallel to its current production interface.
- EMI execution service for the compute services of ARC, gLite and UNICORE, to have a standard mechanism for computational job description and management
- EMI storage account record, to enable shared storage infrastructure

EMI is actively adopting and improving nine open standards through three distinct SDOs in four technical areas.

3. OVERALL STANDARDIZATION STRATEGY

This section explains the general principles of the EMI standardization approach.

3.1. ADOPTION OF EXISTING OPEN STANDARDS

The primary responsibility of EMI is to produce working solutions in response to requirements of the user communities using the EMI middleware components. Following that statement the primary objective in the field of standardization is to improve the user experience by simplifying the EMI middleware and adopting common open standard specifications across four major contributing technologies – ARC, dCache, gLite and UNICORE.

This first principle underlines that the adoption of suitable open standards should be performed where possible and where it makes sense in order to satisfy user requirements. This also includes the monitoring of SDO and their working group activities as well as active contributions from EMI members.

3.2. STANDARDIZATION STUDIES AND FEEDBACK

In some cases, the adoption of existing standards may not always be possible or a practical solution for existing needs is of higher importance. In that case a definition of common EMI specifications is considered to be a primary way to first reach consensus within the EMI project itself. It should not be underestimated that EMI is an 'umbrella project' of four distinct middleware technologies meaning that an agreement between those is already a major step forward compared to the time before EMI.

We refer to this principle as 'standardization study' within EMI before providing it as a consistent set of possible standardization solution as feedback to the community via relevant SDO working groups.

In the first year of the EMI project, the compute area performs one standardization study named as 'EMI Execution Service'. This study aims to define and agree on a common job submission and management interface among ARC, gLite, and UNICORE. The results of this study will be given as an input to the relevant working groups in OGF such as JSDL, OGSA-BES, and most notably PGI.

Another standardization study in the area of data is about storage accounting records. This study aims to define and agree on a common storage usage record among dCache, StoRM, and DPM. The results of this study will be given as an input to the usage record working group of OGF.

3.3. SIENA STANDARDIZATION ROADMAP ACTIVITIES

EMI was funded within a larger project ecosystem of six so-called 'DCI projects'. The SIENA project is one activity that seeks to develop a long-term standardization roadmap of Grid and Cloud standards. EMI members actively contribute to this project with its expertise in the field of middleware.

4. RELEVANT OPEN STANDARDS OVERVIEW

This section provides a brief overview of relevant open standards and points to more pieces of information such as normative specifications.

Name	SDO	EMI Area
GLUE2	OGF	Infrastructure
GridFTP	OGF	Data
JSDL	OGF	Compute
OGSA-BES	OGF	Compute
SAML	OASIS	Security
SRM	OGF	Data
WebDAV	IETF	Data
WS-RF	OASIS	n/a
XACML	OASIS	Security

Table 1: List of relevant open standards with SDO and corresponding EMI area.

4.1. GLUE2

The OGF GLUE Specification Version 2.0 [R4] is an information model covering the specific needs of the Grid community. It is used within EMI as the core information model relevant to many EMI components.

4.2. GRIDFTP

The OGF GridFTP specification [R6] is based on a FTP protocol that has been optimized for its use in massively distributed systems such as Grids. It enables large-scale data transfers.

4.3. JSDL

The OGF Job Submission and Description Language (JSDL) specification [R8] defines a schema that enables the exact definition of job characteristics.

4.4. OGSA-BES

The OGF OGSA-BES specification defines a normative interface specification that enables the submission, control, and management of Grid job submissions to middleware technologies. OGSA-BES uses the OGF JSDL language for job descriptions submitted to this interface.

4.5. SAML

The OASIS Security Assertion Markup Language (SAML) [R2] provides a set of specifications that are used in the security area of EMI in the context of attribute-based authorization and authentication. It not only defines the fundamental framework of attribute statements in SAML assertions, but also defines protocol interfaces implemented by a number of EMI components.

4.6. SRM

The OGF Storage Resource Manager (SRM) specification 2.2 [R5] provides a management interface for storage and data components. Among other functions, it is able to initiate data transfers, being still decoupled from the underlying data transfer mechanisms.

4.7. WEBDAV

The IETF WebDAV standard [R10] is a protocol based on the HTTP protocol that enables the standardized management of Web-based resources.

4.8. WS-RF

The OASIS Web Services Resource Framework (WS-RF) [R9] provides a set of specifications for resource management aspects (e.g. resource properties, lifetime, etc.).

4.9. XACML

The OASIS eXtensible Access Control Markup Language (XACML) [R3] provides a policy language that is used in the security area of EMI in the context of enabling policy-based authorization with end-user attributes.

5. STATE-OF-THE-ART STANDARD ADOPTIONS (BEFORE EMI)

This section describes the status of standard adoptions that existed before the start of the EMI project.

We neglected those standards that are adopted from the majority of the components such as the PKI based on X.509 and access protocols such as HTTP(S).

	DPM	FTS	A-REX	ARC Grid FTP Server	dCache	gLite Information System	CREAM	WMS	ARGUS	UNICORE XNJS	UNICORE- BES	StoRM	UNICORE XACML Entity	UNICORE Security Libs
SRM	X				X							X		
GridFTP		X		X	X									
OGSA-BES			X								X			
JSDL			X				X			X	X			
WS-RF			X								X			
GLUE2						X								
XACML									X				X	
SAML									X					X
WebDAV														

Table 2: State-of-the-art overview of EMI components standard adoptions before EMI.

5.1. PT CERN DATA MANAGEMENT

This PT manages the following components with relevance to standardization: DPM, FTS

5.1.1 DPM

5.1.1.1 SRM interface adoption

DPM adopts the SRM interface specification 2.2 [R5] in order to support standardized storage control management.

5.1.2 FTS

5.1.2.1 GridFTP protocol integration

The FTS integrates a GridFTP client and thus supports this standard data transfer protocol.

5.2. PT ARC COMPUTING ELEMENT

This PT manages the following components with relevance to standardization: A-REX

5.2.1 A-REX

5.2.1.1 OGSA-BES interface adoption

A-REX adopts the OGSA-BES specification [R7] to enable a standardized job submission.

5.2.1.2 JSDL schema adoption

As part of the OGSA-BES adoption, A-REX also adopts the JSDL schema specification [R8] in order to support standardized job submission descriptions.

5.2.1.3 WS-RF Resource Model

A-REX is based on the OASIS WS-RF Resource Model [R9].

5.3. PT ARC CLASSIC SE

This PT manages the following components with relevance to standardization: ARC GridFTP Server

5.3.1 ARC GridFTP Server

5.3.1.1 GridFTP protocol integration

The ARC GridFTP server is based on the GridFTP specification.

5.4. PT DCACHE

This PT manages the following components with relevance to standardization: dCache server and client.

5.4.1 dCache Server

5.4.1.1 SRM interface adoption

The dCache server adopts the SRM interface specification 2.2 [R5] in order to support standardized storage control management.

5.4.1.2 GridFTP protocol integration

The dCache server integrates a GridFTP client and thus supports this standard data transfer protocol.

5.5. PT GLITE INFORMATION SYSTEM

This PT manages the following components with relevance to standardization: BDII

5.5.1 BDII

5.5.1.1 GLUE2 schema adoption

The BDII component supports the GLUE2 information model.

5.6. PT GLITE JOB MANAGEMENT

This PT manages the following components with relevance to standardization: CREAM and WMS.

5.6.1 CREAM

5.6.1.1 JSDL schema adoption

CREAM has adopted the JSDL schema specification [R8] in order to support standardized job submission descriptions in parallel to the proprietary job descriptions.

5.7. PT ARGUS

This PT manages the following components with relevance to standardization: ARGUS.

5.7.1 ARGUS

5.7.1.1 XACML adoption

The ARGUS authorization service adopts the XACML specification for security policies definitions.

5.7.1.2 SAML adoption

ARGUS adopts parts of the SAML protocol that enables standardized authorization queries from clients.

5.8. PT UNICORE TARGET SYSTEM ACCESS

This PT manages the following components with relevance to standardization: UNICORE XNJS

5.8.1 UNICORE XNJS

5.8.1.1 JSDL schema adoption

The UNICORE XNJS has adopted the JSDL schema specification [R8] and is responsible for transforming this abstract job description into specific target system commands.

5.9. PT UNICORE WEB SERVICE INTERFACES

This PT manages the following components with relevance to standardization: UNICORE-BES

5.9.1 UNICORE-BES

5.9.1.1 OGSA-BES interface adoption

The UNICORE-BES service adopts the OGSA-BES specification [R7] to enable a standardized job submission.

5.9.1.2 JSDL schema adoption

As part of the OGSA-BES adoption, UNICORE-BES also adopts the JSDL schema specification [R8] in order to support standardized job submission descriptions.

5.9.1.3 WS-RF Resource Model

UNICORE-BES is based on the OASIS WS-RF Resource Model [R9].

5.10. PT STORM

This PT manages the following components with relevance to standardization: StoRM

5.10.1 StoRM

5.10.1.1 SRM interface adoption

Storm implements the SRM interface specification 2.2 [R5] in order to support standardized storage management operations on top of filesystem-based technologies (e.g. GPFS).

5.11. PT UNICORE SECURITY

This PT manages the following components with relevance to standardization: StoRM

5.11.1 UNICORE XACML Entity

5.11.1.1 XACML adoption

The XACML entity of UNICORE adopts the XACML specification for security policies definitions.

5.11.2 UNICORE Security Libs

5.11.2.1 SAML adoption

The UNICORE Security Libs are largely based around SAML.

6. STANDARDIZATION WORK PLAN (TOWARDS EMI 1)

This work plan is a high-level view on the standardization adoption activities scheduled for the first year of EMI. The results are therefore expected to be part of the EMI 1 release (April 2011).

One of the major activities in terms of standardization is the adoption of the GLUE2 information model [R4]. These activities are related to several technical objectives listed as part of the overall technical development plan [R1]. Tests will be developed that check the functionality of this functionality, including the use of an information model validation tool developed in EMI.

	DPM	FTS	A-REX	dCache	CREAM	WMS	VOMS	UNICORE CIP	SToRM
SRM	X			X					X
GridFTP		X		X					
OGSA-BES			X						
JSDL			X		X				
WS-RF			X						
GLUE2	N	N	N	N	N	N		N	N
XACML									
SAML							N		
WebDAV				N					

Table 3: Standardization work plan and expected new standard adoptions (marked as 'N').

6.1. PT CERN DATA MANAGEMENT

This PT manages the following components with relevance to standardization: DPM, FTS

6.1.1 DPM

6.1.1.1 GLUE2 schema adoption

The DPM will be extended to support the GLUE2 information model in parallel to the already existing GLUE1.3 information model. An information provider will be developed that is able to expose the data storage related information from the DPM component to BDII components.

These developments will be part of EMI 1.

6.1.2 FTS

6.1.2.1 GLUE2 schema adoption

Information publishing according to GLUE2 will be also done for the FTS component in parallel to the already existing GLUE1.3 functionality. A suitable information provider needs to be developed that is able to expose necessary information for using the FTS components.

These developments will be part of EMI 1.

6.2. PT ARC COMPUTING ELEMENT

This PT manages the following components with relevance to standardization: A-REX

6.2.1 A-REX

6.2.1.1 GLUE2 schema adoption

A-REX will be enabled to work with information providers compliant with the GLUE2 information model in parallel to GLUE1.3. Necessary batch system adapters need to be developed or extended to support a sophisticated use of the GLUE2 information model

These developments will be part of EMI 1.

6.3. PT GLITE JOB MANAGEMENT

This PT manages the following components with relevance to standardization: CREAM and WMS

6.3.1 CREAM

6.3.1.1 GLUE2 schema adoption

The CREAM component needs to support the information publishing according to GLUE2 and GLUE1.3 in parallel. Therefore, necessary pieces of information need to be extracted from underlying local resource management systems or local batch subsystems. In order to support this, the CREAM need will develop together with several partners adapters and information publisher components for a wide variety of batch systems (Condor, SGE, etc.).

These developments will be part of EMI 1.

6.3.2 WMS

6.3.2.1 GLUE2 schema adoption

As being a broker, the WMS component takes advantage of the richer set of information provides by the GLUE2 model. Therefore, the WMS component will improve their matchmaking functionality in order to support the GLUE2 model-based information in parallel to its already existing GLUE1.3 support. This requires substantial work since the information model (i.e. GLUE1.3) is currently part of the job description elements used by the WMS.

These developments will be part of EMI 1.

6.4. PT VOMS

This PT manages the following components with relevance to standardization: VOMS-Admin

6.4.1 VOMS-Admin

6.4.1.1 SAML adoption

The VOMS-Admin component will be enabled to release signed SAML assertions with attribute statements (e.g. VO and project membership and role possession) about end-users.

These developments will be part of EMI 1.

6.5. PT UNICORE WEB SERVICE INTERFACES

This PT manages the following components with relevance to standardization: CIP

6.5.1 Common Information Provider

6.5.1.1 GLUE2 schema adoption

The Common Information Provider (CIP), as part of the collection of UNICORE Web service interfaces, will be able to publish information in the GLUE2 schema format.

These developments will be part of EMI 1.

6.6. PT STORM

This PT manages the following components with relevance to standardization: SToRM

6.6.1 StoRM

6.6.1.1 GLUE2 schema adoption

StoRM will be augmented with an information publisher that is able to expose GLUE2 information in parallel to GLUE1.3.

These developments will be part of EMI 1.

6.7. PT DCACHE

This PT manages the following components with relevance to standardization: dCache

6.7.1 dCache

6.7.1.1 GLUE2 schema adoption

dCache will extend their information provider functionality towards the support of GLUE2 while preserving the support for GLUE1.3.

These developments will be part of EMI 1.

6.7.1.2 WebDAV adoption

dCache will create support for WebDAV on top of their already established HTTP-based access methods.

These developments will be part of EMI 1.

7. CONCLUSIONS

With four major middleware providers following different standardization roadmaps, the EMI standardization activity is a complex and challenging task.

EMI, with a broad internal agreement, speaks with one voice presenting a common standardization strategy to the wider community. As EMI represents several major providers, the impact of EMI's position is viewed as notable by the standardization community. However, it is worth adding the significant effort, much more than initially planned, was spent in discussing and eventually agreeing on a common way forward. The delay in the delivery of this document is largely due to this.

The effort will not ease in the next periods. Strategic guidance to development teams and clearer standardization roadmap are essential for EMI to continue to produce noteworthy standards adoption results, as it has done in the first year.