

EUROPEAN MIDDLEWARE INITIATIVE

DJRA1.6.1 – INTEGRATION 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 and aligned with the work-plans of other tasks within this work package. 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.



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TABLE OF CONTENTS

1 INTRODUCTION.....	7
1.1 PURPOSE.....	7
1.2 DOCUMENT ORGANISATION.....	7
1.3 REFERENCES.....	8
1.4 DOCUMENT AMENDMENT PROCEDURE.....	8
1.5 TERMINOLOGY.....	9
2 EXECUTIVE SUMMARY.....	10
3 STATUS REPORT	12
3.1 STATUS OF THE IMPLEMENTATION OF THE STANDARDIZATION STRATEGIES.....	12
3.1.1 Status of Standardization Pre-Studies.....	12
3.1.2 Status Towards the use of Common Profiles and Technologies.....	14
3.1.3 Status of the Participation to the Open Grid Forum.....	18
3.1.4 Status of the Contributions to the SIENA Roadmap	19
3.2 STATUS OF THE STANDARDIZATION AND STANDARD COMPLIANCE TASKS.....	20
3.2.1 GLUE2 Adoption Tasks.....	20
3.2.2 XACML Adoption Tasks.....	25
3.2.3 SAML Adoption Tasks.....	26
3.2.4 POSIX I/O Adoption Tasks.....	27
3.2.5 GSI Removal Tasks.....	30
3.2.6 EMI 1 Standard Adoption Summary.....	32
4 OVERVIEW OF REQUIRED WORK.....	33
4.1 EMI RELEASE TIMELINES.....	33
4.2 EMI STANDARDIZATION OBJECTIVES.....	33
4.2.1 Computing Area.....	34
4.2.2 Data Area.....	35
4.2.3 Security Area.....	36
4.2.4 Infrastructure Area.....	36
4.2.5 Cross-area Area.....	36
5 SOFTWARE STANDARDIZATION STRATEGIES.....	37
5.1 STANDARDIZATION PRE-STUDIES	37
5.1.1 EMI Execution Services (EMI-ES) Specification.....	37
5.1.2 Common Storage Accounting Record Specification.....	38
5.1.3 Common Delegation Specification.....	39
5.2 TOWARDS THE USE OF COMMON PROFILES AND TECHNOLOGIES.....	40
5.2.1 Common SAML Profile.....	40
5.2.2 Common XACML Profile.....	41
5.2.3 Common Authentication Libraries.....	42
5.2.4 Common Attribute Authority.....	43
5.2.5 Common Information Exchange.....	44
5.2.6 Common Cloud Profile.....	46
5.2.7 Common Compute Resource Usage Tracking.....	48
5.2.8 Common Access Methods to EMI Storage elements.....	49
5.2.9 Common Adoption of the SRM Standard.....	50

5.3 PARTICIPATION IN THE OPEN GRID FORUM.....	51
5.3.1 Grid Interoperation Now (GIN) Community Group.....	51
5.3.2 Production Grid Infrastructure (PGI) Working Group.....	52
5.3.3 Usage Record (UR) Working Group.....	53
5.3.4 Delegation Working Group.....	54
5.3.5 Storage Resource Manager (SRM) Working Group.....	55
5.3.6 GLUE2 Working Group.....	56
5.3.7 Follow emerging working groups.....	57
5.4 CONTRIBUTIONS TO THE SIENA STANDARDIZATION ROADMAP.....	58
6 PLANS FOR PERFORMING SOFTWARE STANDARDIZATION ACTIVITIES.....	59
6.1 STANDARDIZATION AND STANDARD COMPLIANCE TASKS.....	59
6.1.1 GLUE2 Adoption Tasks.....	59
6.1.2 XACML Adoption Tasks.....	75
6.1.3 SAML Adoption Tasks.....	77
6.1.4 POSIX I/O Adoption Tasks.....	79
6.1.5 GSI Removal Tasks.....	83
6.1.6 WebDAV Adoption Tasks.....	86
6.1.7 SRM Adoption Task.....	90
6.1.8 UR (Storage) Adoption Tasks.....	92
6.1.9 UR (Compute) Adoption Tasks.....	95
6.1.10 WS-Trust Adoption Tasks.....	98
6.1.11 EMI-ES / PGI Adoption Tasks.....	100
6.1.12 EMI 2 Standard Adoption Summary.....	105
6.1.13 EMI 3 Standard Adoption Summary.....	106
7 GANTT.....	107
8 CONCLUSIONS.....	108

1 INTRODUCTION

1.1 PURPOSE

This document describes the current EMI Standardization Plan for the EMI project. It is applicable to the standardization activities within JRA1 that lead to the availability of software products conformant to the EMI technical objectives and compliant with the EMI Software Quality Assurance Plan and related procedures. This document outlines a clear roadmap of activities ^{which} ~~w.r.t.~~ standardization and takes activities from the four major technical areas within EMI ^{into account} ~~into account~~.

1.2 DOCUMENT ORGANISATION

This document is organized as follows:

Chapter 1 - Introduction: this section, ^{explains} 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 – Status Report: this section ^{details} describes the ~~actual~~ outcome of the standardization tasks in the previous development cycle mainly related to EMI 1 and already ongoing activities.

Chapter 4 - Overview of Required Work: this section ^{activities} describes the overall goals and timelines of the EMI development activities in the context of standardization.

Chapter 5 - Software Standardization Strategies: this section describes the processes, tools and constraints applicable to the EMI standardization activities. ^{Should this be Chapter 3?}

Chapter 6 - Plans for Performing Detailed Software Standardization Activities: this section describes the ~~actual~~ implementation of the general processes and the detailed tasks to be performed by each Product within the scope of the EMI standardization activities.

Chapter 7 – GANTT Chart: Note about associated GANTT chart.

Chapter 8 – Conclusions: Some concluding remarks. ^{closing}

Ref missing URLs

1.3 REFERENCES

R1	https://twiki.cern.ch/twiki/bin/view/EMI/MilestoneJRA12
R2	https://twiki.cern.ch/twiki/pub/EMI/StorageAccounting/StAR-EMI-tech-doc-v7.doc
R3	https://twiki.cern.ch/twiki/pub/EMI/DeliverableDNA131/EMI-DNA1.3.1-1277540-Technical_Plan-v1.0.pdf
R4	https://edms.cern.ch/document/1078881
R5	https://twiki.cern.ch/twiki/bin/view/EMI/EmiJra1T4CaNIRequirements
R6	https://twiki.cern.ch/twiki/bin/view/EMI/EmiJra1T4CaNIComponents
R7	https://twiki.cern.ch/twiki/bin/view/EMI/EmiJra1T4CaNIAPI
R8	https://twiki.cern.ch/twiki/bin/view/EMI/CommonProfileStrawmanProposalV3
R9	https://twiki.cern.ch/twiki/bin/view/EMI/EmiJra1SecCompRemoval#UVOS_VOMS
R10	https://twiki.cern.ch/twiki/bin/view/EMI/EmiJra1T4DelegationInEmi
R11	http://www.gridsite.org/
R12	SRM interpretation by the different storage software provides – editor Andrea Sciaba
R13	NFS 4.1 / pNFS : Consortium web page : http://www.pnfs.com/
R14	LHC data analysis using NFSv4.1 (pNFS): A detailed evaluation; Dmitry Ozerov et al.; CHEP 2010; Taipei, Oct 2010
R15	http://cdsweb.cern.ch/record/1277582
R16	Compute Deliverable DJRA1.1.2
R17	Data Deliverable DJRA1.2.2
R18	Security Deliverable DJRA1.3.2
R19	Infrastructure Deliverable DJRA1.4.2
R20	DNA1.3.2 - Overall Technical Development Plan
R21	Cloud Task Force Report https://twiki.cern.ch/twiki/pub/EMI/EmiJra1T5TaskForceCloudandVirtualization/EMIVirtCloudReport-v0.7.doc

1.4 DOCUMENT AMENDMENT PROCEDURE

This document can be amended by the EMI JRA1 Standardization Task Leader 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 JRA1 Standardization Task Leader without peer review. Other changes must be submitted to peer review and to the EMI PTB 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, OVM, OCC1, UVOS, SNIA

BES	Basic Execution Service
CDMI	Cloud Data Movement Interface
EMI-ES	EMI Execution Service
GIN	Grid Interoperation Now
GPFS	Global Parallel File System
JSDL	Job Submission and Description Language
OGF	Open Grid Forum
PDP	Policy Decision Point
PEP	Policy Enforcement Point
PIP	Policy Information Point
PGI	Production Grid Infrastructure
SAML	Security Assertion Markup Language
SDO	Standard Development Organization
SRM	Storage Resource Manager
UR	Usage Record
XACML	Extensible Access Control Markup Language

This is just a list of acronyms without any explanation. Should include a 1 sentence summary and a reference where to get more information.

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) ^{such as} 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 providing an overview of the standardization activities performed during the first year of the project, including one table that illustrates the overall standard adoption of the EMI 1 release.

After the status report, the document provides a short overview of the required work. The four technical areas of EMI (compute, data, infra, security) work on quite a significant number of technical objectives that are directly or indirectly related to standardization. We identify those relevant technical objectives including a few that are cross-area technical objectives.

Having an overview of the required work in terms of technical objectives, we define the overall standardization strategy that emphasizes on important principles for EMI standardization endeavours. Moreover, EMI is actively contributing to standardization bodies like OGF or 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 document focuses on the adoption of existing open standards and provides a work plan where standardization is performed whenever possible and where it makes sense in order to satisfy user requirements. This includes the provisioning of standard compliance test. The most relevant standards within the context of compute, data, and infrastructure and security technical areas are given, followed by roadmaps of standards adoption towards the EMI-2 and EMI-3 releases.

Key standardization activities during the second and third 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.
- Agreement on common security attributes used in XACML and SAML profiles enabling a consistent attribute-authorization across the different middleware stacks
- 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 and computing account record, to enable a consistent resource usage tracking within compute and storage elements
- EMI delegation methods in order to enable working storage and compute elements that do not require anymore the proprietary GSI.

suggest rephrasing

infrastructure

What are they?

what are the other 5 DCI Projects?

Exec summary should have information not pointers.

protocol



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While the associated GANTT chart of this deliverable provides an overview of the dependencies of all the EMI standardization tasks, we offer at the end of this document a conclusion that points to the fact that EMI is a major contributor to international standardization activities in general. Also, EMI products adopt a wide variety of standards enabling end-users to choose the technologies they want.

4 OVERVIEW OF REQUIRED WORK

4.1 EMI RELEASE TIMELINES

This section briefly outlines the overall planned EMI release timelines of the project, including feature freezes and hand-overs of release candidates from JRA1 to SA1 (final code freeze). This timeline affects the general standardization strategy actually pointing to deadlines where product teams can be actually supported (e.g. guiding, SDO participation, researching, etc.) in standard adoptions.

rephrase to avoid bracket in the middle of the sentence.

Date	Description
28.02.2011 (M10)	EMI 1 Release Candidate (code freeze)
30.04.2011 (M12)	EMI 1 Release
31.12.2011 (M20)	EMI 2 Feature Freeze
28.02.2012 (M22)	EMI 2 Release Candidate (code freeze)
30.04.2012 (M24)	EMI 2 Release
30.10.2012 (M30)	EMI 3 Feature Freeze
31.12.2012 (M32)	EMI 3 Release Candidate (code freeze)
28.02.2013 (M34)	EMI 3 Release

Table 4: EMI Timelines with feature freeze and release candidates for the EMI 1, 2 and 3 releases.

4.2 EMI STANDARDIZATION OBJECTIVES

This section gives a brief overview of the EMI technical objectives for each technical area as described within DNA1.3.2 [R20] with a particular focus on their standardization aspects.

4.2.1 Computing Area

The following objectives in the computing area are relevant in the context of standardization:

ID	Objective	Standards	Due	Status
C-	Agreement on common job submission and management methods	EMI-ES Pre-study	M12	achieved
C1	Glue 2.0 support in job management services (LDAP and/or XML rendering).	GLUE2	M16	Partially delivered with EMI 1
C2	Agreements over an EMI compute accounting record (UR)	UR	M16	Ongoing
C5	Implementation of the agreed common job submission and management methods (EMI-ES interface) in all the CEs.	EMI-ES Pre-study	M19	Ongoing
C6	Implementation of the agreed common job submission and management methods (EMI-ES interface) in compute clients.	EMI-ES Pre-study	M20	Starts later
C8	GLUE2.0 support in matchmaking modules and client tools	GLUE2	M22	Ongoing
C9	Support for the EMI compute accounting record (UR) by compute area services	UR	M22	Starts later
C11	Implement the EMI cloud strategy within compute area	OCCI	M32	Starts later

4.2.2 Data Area

The following objectives in the data area are relevant in the context of standardization:

ID	Objective	Standards	Due	Status
D-	All storage elements publishing initial GLUE 2.0 storage information.	GLUE2	M12	Delivered with EMI 1
D-	Using https instead of httpg for the SRM protocol as a prototype implementation in one storage element and client (library).	SRM, HTTP(S)	M12	Delivered with EMI 1
D-	All storage elements offering at least a prototype-level support for the file:// access protocol.	POSIX I/O (file://)	M12	Delivered with EMI 1
D-	All EMI storage elements must offer a production level support for the file:// access protocol.	POSIX I/O (file://)	M24	Partly delivered in EMI 1
D-	Overall consolidation of data area by adopting a consistent interpretation of SRM	SRM	M12	achieved
D-	Agreement over a common storage accounting record including the refinement definition and adoption (if/when applicable) of relevant standards	STAR Pre-study	M12	achieved
D1	A storage client is capable consuming GLUE 2.0 information published by storage elements.	GLUE2	M16	Ongoing
D2	Investigate the possibility to support http/WebDAV for LFC in order to provide a standard user-friendly access method to catalogues.	HTTP(S), WebDAV	M16	Preparatory investigation
D3	SRM-capable clients and services should add file:// to the already supported access protocols.	POSIX I/O (File://)	M18	Partially delivered in EMI 1
D6	All storage elements publishing full set of GLUE 2.0 storage information and the EMI data client is capable consuming that.	GLUE2	M22	Ongoing
D7	Integration of SRM-based access into UNICORE storage management	SRM	M22	Starts later
D11	Storage elements offering support for the WebDav protocol.	WebDAV	M25	Partially delivered with EMI 1
D12	Using https instead of httpg for the SRM protocol as a production implementation in all the storage elements and clients utilizing the EMI delegation.	SRM	M25	Ongoing
D16	Add support for storage space usage accounting to SEs/FTS based on the agreed record	STAR	M32	Starts later
D17	Implement the EMI cloud strategy within data area	CDMI	M32	Starts later

4.2.3 Security Area

The following objectives in the security area are relevant in the context of standardization:

ID	Objective	Standards	Due	Status
S-	Agreement on a minimal common set of security attributes to be used in policies.	XACML	M12	achieved
S2	Simplified management of security credentials by reducing the complexity of handling certificates and integrating different security mechanisms like Shibboleth and Kerberos across the EMI stack that allows users to use their own authentication system to access a "Grid".	WS-Trust	M12	ongoing
S3	Provide common authentication libraries supporting X.509 and optionally SAML (EMI_authlib).	X.509, SAML	M22	Ongoing
S4	Agreement and full support for a common single X.509 and SAML based Attribute Authority Service integrated with all EMI components	X.509, SAML	M25	Ongoing

4.2.4 Infrastructure Area

The following objectives in the infrastructure area are relevant in the context of standardization:

ID	Objective	Standards	Due	Status
I4	Deliver the EMI cloud architecture and strategy	OVM	M18	Ongoing
I5	Fully utilize and support the GLUE2 model in information components including the development of validation tools	GLUE2	M20	Ongoing
I9	Implement or adapt the accounting record publishers of compute and data area services to use the common messaging system.	UR	M28	Starts later

4.2.5 Cross-area Area

The following cross-area objectives are relevant in the context of standardization:

ID	Objective	Standards	Due	Status
X1	Publish coherent GLUE2-based version information as part of service description in order to facilitate service discovery and monitoring	GLUE2	M16	Preparatory Investigation
X2	Definition of a common SAML profile all over the middleware stacks.	SAML	M16	Partially achieved
X3	Agreement on common EMI delegation method	New delegation standard	M18	Ongoing
X5	Integration of the compute area services with the ARGUS authorization framework	XACML	M18	Ongoing
X11	Implementation of the EMI SAML profile all over the middleware stacks	SAML	M28	Starts later
X12	The legacy Globus security infrastructure (GSI) will be replaced with a common security solution based on TLS/SSL and EMI delegation method.	New delegation standard	M30	Partially delivered with EMI 1

5 SOFTWARE STANDARDIZATION STRATEGIES

One of the major cornerstones of standardization work is to plan and implement long-term standardization strategies. This section describes the plans for the progress in the second and third year towards the implementation of these strategies. In the majority of the cases, we continue and adapt the strategies introduced in Section 3.

5.1 STANDARDIZATION PRE-STUDIES

Standardization Pre-Studies stand for the work towards a project-wide agreement about a particular specification between the different middleware consortia within EMI. Once the pre-study is in place, the goal is to have a more consistent input to the standardization development organizations. EMI aims to work on the following standardization pre-studies in the remaining years of the project.

5.1.1 EMI Execution Services (EMI-ES) Specification

Traditionally, all the three middleware consortia ARC, gLite, and UNICORE adopted proprietary job submission and management interfaces (including proprietary job description languages) before EMI.

Based on different initial experiences with a common specification like OGSA-BES, the goal of the EMI Execution Services (ES) specification is to come to an agreed of a common interface (and its language) within EMI that was achieved in the first year (see [R1]).

ID	Objective	Standards	Due	Status
C-	Agreement on common job submission and management methods	EMI-ES Pre-study	M12	Achieved
C5	Implementation of the agreed common job submission and management methods (EMI-ES interface) in all the CEs.	EMI-ES Pre-study	M19	Ongoing
C6	Implementation of the agreed common job submission and management methods (EMI-ESinterface) in compute clients.	EMI-ES Pre-study	M20	Starts later

In the meanwhile, the specification has been given as an input to the PGI working group in order to have a community-agreed specification. The specification and its impact on existing specifications are discussed within OGF.

Within the project, the EMI execution service specification will be implemented within ARC, gLite and UNICORE, and as such this planned work is part of the work plans within Section 6. For more details, please refer to the compute work plan [R16].

Working solutions that leverage the EMI execution services specification are considered for the EMI 2 release.

5.1.2 Common Storage Accounting Record Specification

The storage elements within EMI, dCache, DPM, and StoRM, do not implement a common storage usage record format for storage accounting purposes. Therefore, significant work in the first year of EMI was achieved that resulted in the definition of a specification named as Storage Accounting Record (StAR) [R2]. *achievement during*

is defining the specification

ID	Objective	Standards	Due	Status
D-	Agreement over a common storage accounting record including the refinement definition and adoption (if/when applicable) of relevant standards	StAR Pre-study	M12	Achieved
D16	Add support for storage space usage accounting to SEs/FTS based on the agreed record	StAR	M32	Starts later
19	Implement or adapt the accounting record publishers of compute and data area services to use the common messaging system.	UR	M28	Starts later

In the meanwhile, the specification has been given as an input to the UR working group in order to have a community-agreed specification. The specification and its impact on existing specifications are discussed within OGF. *presented*

Within the project, the StAR specification will be implemented within dCache, DPM, and StoRM, and as such ~~this planned work~~ *this* is part of the work plans within Section 6. For more details, please refer to the data work plan [R17] or in terms of publishers to the infrastructure area work plan [R19]. *described in*

Working solutions that leverage the common storage accounting record are considered for the EMI 3 release. *will be*

5.1.3 Common Delegation Specification

In several EMI components, the delegation of end-user rights is an important concept ^{that} to enable ~~different functionalities, e.g. like third-party transfers via the SRM interface adoptions.~~ ^{responsibility} Therefore, during year one of the project, significant effort has been made to analyze the use of delegation within EMI components where outcomes are available under [R10].

Nevertheless, the different EMI middleware stacks adopted different delegation strategies over time. Therefore, one major work item in year two of the project is the agreement on a common EMI delegation method that takes the experience from existing solutions (e.g. GridSite) into account.

ID	Objective	Standards	Due	Status
X3	Agreement on common EMI delegation method	New delegation standard	M18	Ongoing
X12	The legacy Globus security infrastructure (GSI) will be replaced with a common security solution based on TLS/SSL and EMI delegation method.	New delegation standard	M30	Partially delivered with EMI 1
D12	Using https instead of httpg for the SRM protocol as a production implementation in all the storage elements and clients utilizing the EMI delegation.	SRM	M25	Ongoing

~~In the meanwhile,~~ ^{on} the work ~~around~~ the new delegation method, which is directly related to the GSI removal work within EMI, is part of the technical objectives of the overall technical plan [R20] to be considered in each technical area.

Working solutions that leverage the common delegation method ^{will be} are considered for the EMI 3 release.

5.2 TOWARDS THE USE OF COMMON PROFILES AND TECHNOLOGIES

This section describes the planned standardization activities that are not necessarily directly related to one EMI product but rather to a common profile to be adopted from several EMI products at the same time.

Hence, these activities include the work towards common specifications and open standard profiles that should be adopted during year two and three of the EMI project. These activities are ~~thus~~ different from standardization pre-studies since these profiles ~~in turn~~ are ~~using~~ open standards but are not ~~itself~~ given as an input to standardization activities. *based on*

5.2.1 Common SAML Profile

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
X2	Definition of a common SAML profile all over the middleware stacks.	SAML	M16	Partially achieved
X11	Implementation of the EMI SAML profile all over the middleware stacks	SAML	M28	Starts later

This work represents the foundation for the adoption of VOMS as central common attribute authority across the different middleware stacks. In this sense, VOMS offers the retrieval of attribute certificates via its proprietary protocol, but also offers signed SAML assertions with attribute statements via the open standard SAML request protocol.

Task goal: Common SAML profile across the middleware systems

The SAML group within the security area collaborated with the respective compute area product teams and achieved the common EMI SAML profile [R8]. *— StrawMan proposal!*

Contributions from the different middleware stacks, most notably in the area of compute, are required in order to have a profile that can be actually used by them. These components are the A-REX-based ARC CE and the CREAM CE as well as UNICORE compute services.

EMI-1

In EMI, VOMS was already enabled with the SAML request protocol. During the second and third year of the project it is foreseen that other EMI products (e.g. UNICORE) take advantage of this protocol including the common SAML profile. Therefore, this work is already part of the work plans described in Section 6. Please refer to the security work plan [R18] for more details.

5.2.2 Common XACML Profile

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
S-	Agreement on a minimal common set of security attributes to be used in policies.	XACML	M12	Achieved
X5	Integration of the compute area services with the ARGUS authorization framework	XACML	M18	Ongoing

This work represents the foundation for the adoption of ARGUS as central common authorization system across the different middleware stacks. Contributions from the different middleware stacks, most notably in the area of compute, are required in order to have a profile that can be actually used by them. These components are the A-REX-based ARC CE and the CREAM CE as well as UNICORE compute services.

Task goal: Common XACML authorization profile across the middleware systems

The XACML group within the security area collaborated with the respective compute area product teams and achieved the common EMI XACML authorization profile [R4] in year one of the project.

During the second and third year of the project, the XACML profile and ARGUS needs to be integrated with EMI products. This work is already part of work plans described in Section 6. Please refer to the security area work plan [R18] or the compute area work plan [R16] for more details.

5.2.3 Common Authentication Libraries

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
S3	Provide common authentication libraries supporting X.509 and optionally SAML (EMI_authlib).	X.509, SAML	M22	Ongoing

All the middleware systems share that they have different components that perform authentication of end-users based on X.509 certificates. In terms of standardization, we argue that a common X.509 authentication solution is nothing new in terms of standard adoptions, ~~but still~~ the reduction of maintaining code is ~~worthwhile to consider this approach relevant.~~ *ed* *significant.* *Make* *however, resulting*

More interesting in terms of standardization is the common adoption of SAML for authentication within these libraries. SAML is a widely used industry standard and ~~as such~~ would enable EMI components to work with a larger set of non Grid components in distributed systems.

Task goal: Common X.509 & SAML authentication library across the middleware systems

The common authentication libraries group within the security area made significant progress towards this goal. It collected requirements [R5] for a common library and surveyed existing code that used Authentication code [R6]. Based on this the group agreed on API definitions for C/C++ as well as Java available at [R7]. With contributions of all middleware systems, this API definition of the common authentication library fulfils the need for each system.

The planned prototype of this library implementation was planned for M8 in the EMI project, but was not performed due to higher priorities. Hence, the results of these standardization activities are not in ~~EMI-1~~, but are planned to play a role within ~~EMI-2~~ (or potentially even earlier). *EMI-1* *EMI-2*

Finally, given the low efforts as part of the common authentication library and its implementation, the group was also not able to work towards a SAML version of it as planned. The X.509 is more generally usable and as such a higher priority, therefore, the SAML version of the common authentication library and its API definition was postponed in year 1 to year 2. More details can be found in the security area work plan [R18].

The common authentication library is foreseen to be available for the ~~EMI-2~~ release. *EMI-2*

5.2.4 Common Attribute Authority

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
S4	Agreement and full support for a common single X.509 and SAML based Attribute Authority Service integrated with all EMI components	X.509, SAML	M25	Ongoing

An Attribute Authority (AA) releases trusted attributes that describe the role possession or the project and/or VO membership of end-users. Before EMI, gLite and ARC adopted the VOMS technology as the central AA while UNICORE used the UVOS component. As both components largely overlap with respect to their functionality, we consider replacing UVOS by VOMS during the course of the project without functionality drops.

loss of

Therefore, it is important to understand which interfaces and profiles, largely build on SAML, are used to work with a standardized AA in the middleware stacks.

Task goal: Common AA interface across the middleware systems

The SAML Profile group within the security group has made significant progress towards this task by taking into account numerous different aspects of existing work (OMII-Europe, Chemomentum, etc.).

Based on the initial work performed in other projects, the SAML profile group has defined ^{during year 1} its profile document that is available under [R8]. Complementary to this standardization endeavour, the planning of the replacement of UVOS with VOMS has been analyzed providing an initial report that is available under [R9].

No it doesn't. It affects only UNICORE

Performing the replacement of UVOS with VOMS is an endeavour that affects many components from different technical areas, while the adoption of a common SAML profile across the EMI software systems helps towards the convergence of these solutions.

In year two and three of the EMI project, EMI products will leverage the SAML support of the VOMS system in order to use a common AA interface across the middleware systems. The work related to this is part of the work plans described in Section 6. Please refer to the security area work plan for more details [18].

The broad use of the common AA VOMS will be provided as part of the EMI 3 release.

EMI-3

5.2.5 Common Information Exchange

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
C1	Glue 2.0 support in job management services (LDAP and/or XML rendering).	GLUE2	M16	Partially delivered with EMI 1
C8	GLUE2.0 support in matchmaking modules and client tools	GLUE2	M22	Ongoing
D-	All storage elements publishing initial GLUE 2.0 storage information.	GLUE2	M12	Delivered with EMI 1
D1	A storage client is capable consuming GLUE 2.0 information published by storage elements.	GLUE2	M16	Ongoing
D6	All storage elements publishing full set of GLUE 2.0 storage information and the EMI data client is capable consuming that.	GLUE2	M22	Ongoing
I5	Fully utilize and support the GLUE2 model in information components including the development of validation tools	GLUE2	M20	Ongoing
X1	Publish coherent GLUE2-based version information as part of service description in order to facilitate service discovery and monitoring	GLUE2	M16	Preparatory Investigation

A consistent common adoption of an information exchange methods across the different EMI technical areas is necessary to ensure that pieces of information, when flowing from one component to another, are not undergoing semantic loss. This is the case when systems adopt, for instance, different information models (e.g. NorduGrid schema, GLUE1.3, or CIM in the past).

Hence, before EMI, the different middleware consortia focussed on their own needs for information exchange methods leading to a diverse set of information models and exchange mechanisms. One of the most crucial areas in this context is surely the adoption of different information models.

Task goal: Common information model across all different middleware stacks

The derived aforementioned task is focussed on the information model given its major importance although a milestone of the infrastructure area [R15] outlines the requirements for a common information exchange mechanism more broadly including non-standards-based mechanisms being not relevant in this document. As a consequence of this overall standardization activity, the compute and data area needs to address the GLUE2 support as part of their component set. To establish a common information exchange in terms of information models it is crucial that all components in the data and compute area adopt the same GLUE2 specification.

The adoption of different GLUE2 renderings is basically not a problem (i.e. LDAP vs. XML Renderings) since the key is the information stored in the formats that are compliant with the overall GLUE2 specification. In other words, semantic loss is not likely to happen when different ‘transportation formats’ are used, but the same set of information is used.

The work around GLUE2 is part of the work plan that is described in Section 6 in detail. For more details please refer to the work plans of corresponding areas [R16, R17, R18, R19].

already *EMI-2 will*
It is foreseen that ~~EMI-2~~ *EMI-2* ~~already~~ provides a fully GLUE2-based information ecosystem, including security and information systems, as well as storage elements and compute elements.

5.2.6 Common Cloud Profile

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
I4	Deliver the EMI cloud architecture and strategy	OVM	M18	Ongoing
D17	Implement the EMI cloud strategy within data area	CDMI	M32	Starts later
C11	Implement the EMI cloud strategy within compute area	OCCI	M32	Starts later

Clouds are seen as one of the possible evolutions paths of Grids, or perhaps they just represent possible complementary infrastructures alongside Grids. As this last sentence reveals, the adoption of the clouds is still not fully understood in our given production infrastructures setups. We not neglect the potentials of cloud technologies, but in order to provide mature and stable services to end-users on infrastructures, the move towards cloud technologies within EMI is rather moderate.

Clouds may be a possible evolution path for
the EMI stakeholders
At delay? ignore
cautious
while not ignoring
to be used alongside
enabled
deprecate

Task goal: Common adoption of standard-based Cloud Approaches

Nevertheless, during the first year of the project, possible cloud approaches for EMI have been explored and documented [R21] by a dedicated cloud task force. As these efforts have been rather limited, the work to continue the follow-up of these approaches is now considered as part of technical objectives.

Interesting in the context of standardization is that several open standards together might be used to define a kind of 'Cloud profile' following several discussions within the OGF recently. Standards in context are OVM, OCCI and CDMI while we expect that others will continue to emerge from different standardization organizations. We therefore foresee the following task as part of the standardization work:

if interesting
together
this
This possibility has been the topic of
(as common)

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 1	All	I4, D17, C11	OVM, CDMI, OCCI	Explore the potential of emerging open cloud standards and provide a report to the cloud activities within EMI	Plan in place;	M13	M16

Std 2	All	I4, C11	D17,	Emerging cloud standards	Observe and participate when reasonable in emerging cloud standard activities	Reports that indicate the usefulness of emerging open cloud standards	M13	M30
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5.2.7 Common Compute Resource Usage Tracking

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
C2	Agreements over an EMI compute accounting record (UR)	UR	M16	Ongoing
C9	Support for the EMI compute accounting record (UR) by compute area services	UR	M22	Starts later
I9	Implement or adapt the accounting record publishers of compute and data area services to use the common messaging system.	UR	M28	Starts later

An accurate compute resource tracking across different middleware is essential to allow precise accounting without semantic loss in interoperability setups where more than one middleware is used.

The foundation for this work is the UR standard of OGF, which will be augmented with the requirements of production experience from the EMI middleware (e.g. VO support). The compute area will ensure that the compute elements will correctly work with UR publishers provided by the infrastructure area.

Task goal: Common adoption of an standard-based compute usage record format

The work around these technical objectives is part of the work plans and described in Section 6. Please refer to the compute area work plan [R17] and infrastructure work plan [R19] for more details.

Results of these standardization activities are considered to be part of the EMI 3 release.

EMI-3

5.2.8 Common Access Methods to EMI Storage elements

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
D-	Using https instead of httpg for the SRM protocol as a prototype implementation in one storage element and client (library).	SRM, HTTP(S)	M12	Delivered with EMI 1
D-	All storage elements offering at least a prototype-level support for the file:// access protocol.	POSIX I/O (file://)	M12	Delivered with EMI 1
D-	All EMI storage elements must offer a production level support for the file:// access protocol.	POSIX I/O (file://)	M24	Partly delivered in EMI 1
D2	Investigate the possibility to support http/WebDAV for LFC in order to provide a standard user-friendly access method to catalogues.	HTTP(S), WebDAV	M16	Preparatory investigation
D3	SRM-capable clients and services should add file:// to the already supported access protocols.	POSIX I/O (File://)	M18	Partially delivered in EMI 1
D11	Storage elements offering support for the WebDav protocol.	WebDAV	M25	Partially delivered with EMI 1

During the first year of the project, single EMI products already adopted several standards such as WebDAV or the POSIX I/O (i.e. file:// protocol) to have an easier access to EMI storage elements. As part of the second and third year of the project, EMI works on adopting these standards more broadly across the different EMI products in order to provide end-users the possibility to switch technologies or simply to choose the technology they want.

Task goal: Common adoption of an standard-based access methods to storage elements

Another aspect of this ~~for mentioned~~ task and its related objectives is that the adoption of some of these tasks makes EMI products competitive with business solutions (e.g. the adoption of WebDAV).

The work around these objectives is part of the work plans described in Section 6. Please refer to the data area work plan [R17] for more details.

The majority of standard adoptions in this field are expected to be part of the EMI 2 release.

5.2.9 Common Adoption of the SRM Standard

The standardization work described in this section is related to the following given technical objective (see DNA1.3.2 [R20]):

ID	Objective	Standards	Due	Status
D-	Overall consolidation of data area by adopting a consistent interpretation of SRM	SRM	M12	achieved
D7	Integration of SRM-based access into UNICORE storage management	SRM	M22	Starts later

A consistent interpretation of the SRM standard and in turn its adoption is crucial to ensure the interoperability between the various involved EMI components. The fundamental challenge is here that the SRM specification leaves some room for interpretations that might lead to non interoperable solutions.

Task goal: Common adoption of the SRM specification for storage management

The check of consistency among the EMI SRM adoptions has been achieved in year one of the project. Year two will focus on the integration of SRM-based access into UNICORE.

The work around the ~~above mentioned~~ technical objectives is part of the work plans described in Section 6. Please refer to the data area work plan [R17] for details.

The result of the UNICORE integration is foreseen to be part of the ~~EMI2~~ release.

EMI-2

5.3 PARTICIPATION IN THE OPEN GRID FORUM

EMI members contribute significantly in various forms to the different groups within OGF. We highlight the most significant contributions in this section planned for year two and year three and provide tasks for the standardization activities in context.

5.3.1 Grid Interoperation Now (GIN) Community Group

The GIN community group is an integral part of the international interoperability and interoperation activities that also brought the EMI project members together. EMI members steering the activities within this group to not only disseminate the EMI project results, but also to link the European-driven activities with activities performed in the US, Australia, or Japan.

Task goal: Chairing the Grid Interoperation Now (GIN) Community Group

Hence, the major goal of this participation is to disseminate project results and to liaise with significant external project activities in the context of production Grids and their interoperation.

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 3	All	-	All	Participate and organize GIN sessions at OGF events in order to provide feedback to the standardization activities.	OGF Trip reports indicating content and relevance of GIN Sessions to the EMI project	M13	M36

5.3.2 Production Grid Infrastructure (PGI) Working Group

Several results of the standardization activities within EMI will be given as an input to the PGI WG for further standardization purposes in the relevant OGF groups. Here, the role of PGI is important to differentiate which topics from practical production needs out of EMI and others need to be addressed from the various different working groups in OGF in the areas of computing, data, information, and security.

Task goal: Chairing the Production Grid Infrastructure (PGI) Working Group

The major goal of this participation is to steer the standardization around the EMI Execution Service (ES) specification (see above).

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 4	A-REX, CREAM CE, UNICORE	-	EMI – ES (pre-study)	Standardize elements of the EMI – ES within OGF as part of the PGI group or its related groups	Report about standardization progress within PGI	M13	M16
Std 5	A-REX, CREAM CE, UNICORE	-	EMI – ES (pre-study)	Standardize elements of the EMI – ES within OGF as part of the PGI group or its related groups	Report about the standard adoption potential of the PGI set of specifications	M17	M24

5.3.3 Usage Record (UR) Working Group

EMI members not only drive the recent UR working group sessions in OGF, also one member has been recently appointed as chair of this group. This particular OGF group is dedicated to track resource usage for Grid resources that, more recently, goes beyond compute including storage.

Task goal: Chairing the Usage Record (UR) Working Group

The major goal of this participation is to steer the standardization around the storage accounting pre-study StAR specification (see above).

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 6	dCache, DPM, StoRM	-	StAR (pre-study)	Standardize elements of the StAR within OGF as part of the UR group or its related groups	Report about standardization progress within UR	M13	M16
Std 7	dCache, DPM, StoRM	-	StAR (pre-study)	Standardize elements of the StAR within OGF as part of the UR group or its related groups	Report about the standard adoption potential of the UR storage specification	M17	M24

Sof

5.3.4 Delegation Working Group

At the last OGF31 in Taipei, the delegation bof led to the creation of the delegation working group that is driven by EMI members.

Task goal: Chairing the newly established delegation Working Group

Apart from the initiative and initial goals towards the standardization of a delegation method (e.g. around GridSite [R11]), no real outcomes can be reported yet.

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 8	All	-	New delegation method	Standardize delegation methods taking the EMI experience in this field into account	Report about standardization progress within the delegation group	M13	M16
Std 9	All	-	New delegation method	Standardize delegation methods taking the EMI experience in this field into account	Report about the standard adoption potential of the delegation specification	M17	M24

5.3.5 Storage Resource Manager (SRM) Working Group

The EMI software distribution has three different adoptions of the standard specification SRM within dCache, DPM, and StoRM. This experience is fed back to the OGF SRM working group driving also its evolution based on lessons learned of the past. New topics are also discussed such as the integration of new cloud interfaces (e.g. CDMI from SNIA). The major goal of this participation is ~~the~~ to disseminate project results and to discuss potential evolutions of the SRM interface specifications.

Task goal: Driving the Storage Resource Manager (SRM) Working Group

One particular task in the data area was to refine the SRM specification according to the experience from different production adoptions that all show slightly different behaviour. While a document has been created that lists the differences (see [R12]), the consensus of the OGF group (EMI and other vendors) was to leave the specification as is to not influence the broadly established production Grid interoperability in this area today. Nevertheless, the work is useful towards a next generation of SRM or subsequent standards in the cloud area (e.g. CDMI from SNIA).

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 10	All	-	SRM	Observe group progress and evolutions around the SRM interface	Report about standardization progress within the SRM group	M13	M16
Std 11	All	-	SRM	Feedback of SRM implementation experience to the SRM group	EMI contributions to an OGF SRM experience document	M17	M24



5.3.6 GLUE2 Working Group

adapters

The EMI software distribution consists of many EMI products that directly or indirectly adopt the GLUE2 specification using the LDAP or XML rendering. EMI is thus one of the major ~~users~~ ^{adapters} of this specification within the Grid community and should feed back experience to the standardization process and steer its evolution.

Task goal: Chairing the GLUE2 Working Group

One of the particular activities is around the XML-based GLUE2 rendering where no specification still exists. Initial work has been done in the first year on such a document, but these activities should be further continued until a rendering specification exists.

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 10	All	-	GLUE2	Observe group progress and evolutions around the GLUE2 interface	Report about standardization progress within the GLUE2 group	M13	M24
Std 11	All	-	GLUE2	Observe group progress and evolutions around the GLUE2 interface	Report about standardization progress within the GLUE2 group	M25	M36
Std 12	All	-	GLUE2	Contribute to the XML-based rendering to finish the specification document.	GLUE2 XML rendering exists as official OGF document	M13	M16
Std 13	All	-	GLUE2	Contribute to an GLUE2 experience document capturing the experience from GLUE2 adoptions within EMI	GLUE2 experience document exists as official OGF document	M13	M24

5.3.7 Follow emerging working groups

The EMI software provides a suite of products that cover a wide range of technical areas. During the course of the project, it is expected that new standardization groups will emerge that might become relevant to the EMI project. EMI members of the standardization task need to observe such endeavours and consider active participation if useful to the project.

Task goal: Participating in relevant standardization groups to push middleware position

At the time of writing, the DRMAA working group of the OGF has started to work on a revised specification. This is an example of a potentially interesting open standard, which might play a role for EMI after a thorough analysis. We expect that also other groups will become interesting to the project.

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 14	All	-	DRMAA, and other new groups	Observe group progress and evolutions. Consider active participation if useful	Report about standardization progress within interesting groups.	M13	M24



5.4 CONTRIBUTIONS TO THE SIENA STANDARDIZATION ROADMAP

The standardization task needs also to contribute to the SIENA EU Roadmap for Grid and Cloud standards. Numerous events and discussions via telephone conferences are already planned without concrete dates being known yet. EMI continues to provide inputs in various forms such as written material or participation to important discussion events. In this sense, EMI contributes with its enormous experience in the field of standardization and interoperability within the field of distributed systems (Grids and Clouds) in general and middleware in particular.

Task goal: Participating in roadmap to represent European middleware activities

The goal of the participation in the SIENA efforts is to represent the needs of middleware in general and the position of EMI in particular in the context of the other 5 DCI projects that are EDGES, IGE, EGI, VENUS-C and StratusLab.

reference
projects: EDGES, IGE, ...

One of the major last events was the Cloud-Scape III event in Brussels organized by SIENA with active EMI contributions in written form and via participation on a panel on interoperability and standards. At this event, EMI also clarified its position ^{on} Grid and Cloud standardization in a position paper that was published at Cloud-Scape III in Brussels.

by publishing

EMI members will continue to support the ~~creation process of the~~ SIENA standardization roadmap. *process.*
The next telecon calls are already scheduled and next iterations of the roadmap are being discussed.

teleconference ?

Std. Task #	EMI Product(s)	Technical Objective	Standard Adoption	Task Description	Result	Task Start	Task End
Std 15	All	-	Existing standards and emerging open cloud standards	Contribute with standardization experience within middleware to the roadmap evolution.	Contributions to the SIENA EC Roadmap	M13	M24

