EUROPEAN MIDDLEWARE INITIATIVE

SOFTWARE MAINTENANCE QUALITY CONTROL REPORT

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Abstract:
This document describes the status and performance of the quality control task which details with the availability and execution of regression tests for the supported EMI components, test unit availability and coverage and various static and dynamic metrics on released components.

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1. INTRODUCTION

1.1. PURPOSE

Quality Control (QC) verifies the application of Quality Assurance (QA) processes and procedures and, through the execution of periodic reviews, reports and measures the status and performance of the SA1 work. This document report the results of the Quality Control activity performed at PM10. It includes an aggregated view of quality check results and performance measurements, and put in evidence which changes for internal procedures should be considered to correct anomaly or nonconformity discovered during the control process. The list of change requests will be submitted to the QA team that, on the base of project's priorities and objectives, will determine which of them deserve attention and it is necessary to implement.

1.2. DOCUMENT ORGANIZATION

The document is organized as follows:

- Chapter 1 and 2 are the Introduction and the Executive Summary respectively;
- Chapter 3 presents the organization of the Quality Control activity and how it interacts with other entities, such as the Quality Assurance;
- Chapter 4 reports the results of the Quality Review scheduled for PM10;
- Chapter 5 reports the status of the EMI-1 bundle and how PTs are approaching the release deadline;
- Chapter 6 presents the status of the security assessment activity;
- Chapter 7 describes the status of the Regression Tests;
- Chapter 8 is the conclusions of the work.

1.3. REFERENCES

R1	**Quality Assurance Plan**, *https://twiki.cern.ch/twiki/bin/view/EMI/DeliverableDSA21*
R2	**Quality Assurance Metrics**, *https://twiki.cern.ch/twiki/bin/view/EMI/TSA23*
R3	**Quality Assurance Wiki Page**, *https://twiki.cern.ch/twiki/bin/view/EMI/SQAP*
R4	**Software Release Schedule - EMI-1**, *https://twiki.cern.ch/twiki/bin/view/EMI/EMI-1*
R5	**Software Release Plan**, *https://twiki.cern.ch/twiki/bin/view/EMI/DeliverableDSA12*
R6	**Software Maintenance and Support Plan**, *https://twiki.cern.ch/twiki/bin/view/EMI/DeliverableDSA11*
R7	**Technical Development Plan**, *https://twiki.cern.ch/twiki/bin/view/EMI/DeliverableDNA131*
R8	**Release Management Wiki Page**, *https://twiki.cern.ch/twiki/bin/view/EMI/TSA13*

R9	**Configuration and Integration guidelines**, *https://twiki.cern.ch/twiki/bin/view/EMI/EmiSa2ConfigurationIntegrationGuidelines*
R10	**Certification and testing guidelines,** https://twiki.cern.ch/twiki/bin/view/EMI/EmiSa2CertTestGuidelines
R11	**Change management guidelines**, *https://twiki.cern.ch/twiki/bin/view/EMI/EmiSa2ChangeManagementGuidelines*
R12	**DSA2.2.1 - QA Tools Documentation**, *https://twiki.cern.ch/twiki/bin/view/EMI/DeliverableDSA221*
R13	**Software Verification and Validation Template**, *https://twiki.cern.ch/twiki/bin/view/EMI/SoftwareVerAndValTemplate*
R14	**Quality Control Report PM6**, *https://twiki.cern.ch/twiki/bin/view/EMI/SA1QCPM6*
R15	**Software Quality Assurance Plan Documentation**, *https://twiki.cern.ch/twiki/bin/view/EMI/SQAP#SQAP_Documentation*
R16	**Firs Principles Vulnerability Assessment**, *http://www.cs.wisc.edu/mist/VA.pdf*
R17	**Review of the Software Release Plan**, *https://twiki.cern.ch/twiki/bin/view/EMI/SA1QCRSRP*
R18	**Review of the Software Release Schedule,** *https://twiki.cern.ch/twiki/bin/view/EMI/SA1QCRSRS*
R19	**Review of the Software Maintenance and Support Plan,** *https://twiki.cern.ch/twiki/bin/view/EMI/SA1QCRSMSP*
R20	**Review of the Security Assessments**, *https://twiki.cern.ch/twiki/bin/view/EMI/SA1QCRSA*
R21	**Consejo Superior de Investigaciones Cientificas**, *http://www.csic.es*
R22	**First principles vulnerability assessment,** *Proceedings of the 2010 ACM workshop on Cloud computing security workshop, James A. Kupsch, Barton P. Miller, Elisa Heymann, Eduardo César*
R23	**SA1 Quality Control Wiki Page,** *https://twiki.cern.ch/twiki/bin/view/EMI/TSA14*
R24	**Vulnerability reports,** *http://www.cs.wisc.edu/mist/includes/vuln.html*
R25	**Security Assessment Plan,** *https://twiki.cern.ch/twiki/bin/view/EMI/SA1QCSAP*
R26	**Production Release Criteria,** *https://twiki.cern.ch/twiki/bin/view/EMI/ProductionReleaseCriteria*
R27	**Security Assessment activity page,** *https://twiki.cern.ch/twiki/bin/view/EMI/SA1QCSA*

R28	**EMI Indico,** *http://indico.cern.ch/*
R29	**Software Release Schedule – EMI-0,** *https://twiki.cern.ch/twiki/bin/view/EMI/EMI-0*
R30	**Software Test plans list,** *https://twiki.cern.ch/twiki/bin/view/EMI/QCTestPlan*
R31	**Software Verification and Validation template,** *https://twiki.cern.ch/twiki/bin/view/EMI/SoftwareVerAndValTemplate*
R32	**gLExec Vulnerability Reports,** *http://www.cs.wisc.edu/mist/glexec/vuln_reports/*

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

ABI	Application Binary Interface
ACR	Approved Change Request
API	Application Programming Interface
CDS	CERN Document Server
CG	Change Request
CSIC	Consejo Superior de Investigaciones Cientificas
DCI	Distributed Computing Infrastructure
DMSU	Deployed Middleware Support Unit
EGI	European Grid Infrastructure
EMT	Engineering Management Team
ETICS	eInfrastructure for Testing, Integration and Configuration of Software
FPVA	First Principles Vulnerability Assessment
GGUS	Global Grid User Support

ITIL	IT Infrastructure Library
KPI	Key Performance Indicator
kSLOC	Kilo Source Lines Of Code
MCB	Middleware Coordination Board
NGI	National Grid Initiative
PEB	Project Executive Board
PTB	Project Technical Board
QA	Quality Assurance
QC	Quality Control
RfC	Request for Change
SLA	Service Level Agreement
SQAP	Software Quality Assurance Plan
SQC	Software Quality Control
SU	Support Unit
VC	Validated Change

2. EXECUTIVE SUMMARY

Performing Quality Control is an activity concerned with the monitoring of project outcomes to see whether they comply with quality standards set out in the SQAP (Software Quality Assurance Plan) or with internal procedures, such as those concerning the release and packaging of software components. Operating throughout the project, its aim is to identify unacceptable or non-conformable results and inform project executive boards (i.e. QA team, PEB or PTB) about their existence so that corrective actions can be undertaken to eliminate, or mitigate, possible negative impacts on project's results. The principal goal is that all EMI components, before being included in a stable EMI release, satisfy well-defined quality standards. The adoption of quality standards must be sufficient to guarantee, to a high degree of confidence, that all EMI products (software components, documentation, etcetera) meet stakeholders requirements, in term of quality parameters, and do not contain defect or bring security vulnerabilities.

As part of SA1 work-package, the QC task carries on several activities to cover different aspects of the project quality framework. Basically they consist of:

- **performing periodic reviews** that**,** scheduled every three months, aim to constantly control the performance of the SA1 team. The review action is performed through the adoption of control tools, such as check lists, control lists and metrics defined in the SQAP;
- **controlling the release process,** checking that release procedures and deadlines are met as well as the different stages of the release process are proceeding in line with the schedule;
- **controlling that all components,** marked to be included in any EMI major release, satisfy EMI Production Release Criteria [R26] and are accompanied with regressions tests if any software defect was fixed before the release date;
- **ensuring the security assessment** of software components to ensure that most critical components do not contain vulnerabilities or security holes;
- **delivering project periodic reports** to summarize and further investigate the results of periodic control activities pointing out any nonconformity or deviation from quality standards that could introduce new defects in the future.

This document provides the outcome for each of aforementioned activities, taking in consideration that at the time of writing no EMI official releases have been released yet and that developers have not completely become familiar with important project procedures, such as the Certification and Testing guidelines due to the delay introduced to get them work together. The experience matured so far, especially during the preparation of the EMI-0 release, will surely improve project performance and help overcome existing barriers.

3. THE ORGANIZATION OF THE QUALITY CONTROL

The diagram below (see Figure 1) describes how the QC and the QA activities interact and how the information flows across them.

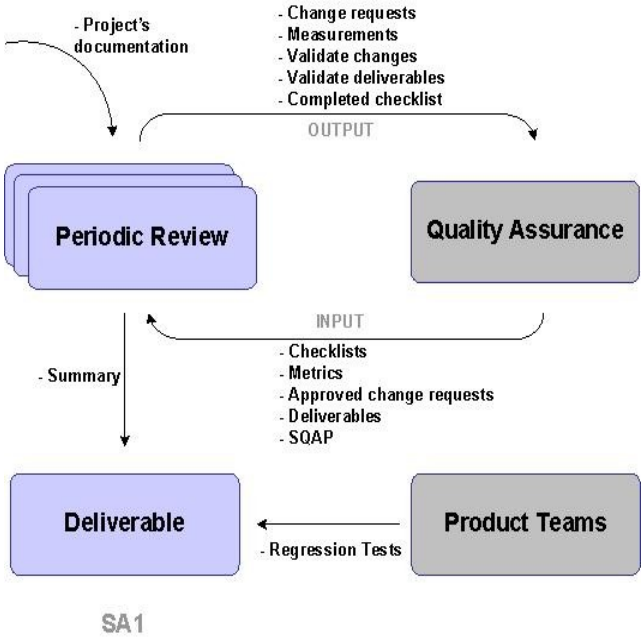


Figure 1: Quality Control Information flow

3.1. INPUTS TO REVIEW

This section presents the list of information pieces that the QC receives as input and that are indispensable to perform quality reviews.

Quality Assurance Plan

The SQAP specifies the procedures, the metrics and the manner according which the EMI project achieves its quality goals in terms of software development.

Quality Checklists

A check-list is a structured tool used to verify whether the required steps in a process have been met. As each step is completed, it is checked off the list. In accordance to the SQAP, the input checklists for the QC in SA1 are:

- Review of the Software Release Plan
- Review the Software Release Schedule
- Review the Software Maintenance and Support Plan
- Security Assessments

Quality Metrics

A quality metric is an operational definition that describes, in very specific terms, a project or product attribute and how the QC process will measure it.

The metrics defined for the QC in SA1 are:

- Review of the Software Release Plan
  - *No metric defined for this review*
- Review the Software Release Schedule
  - *Delay on the release schedule (ID: DELAYONTHERELEASE)*
- Review the Software Maintenance and Support Plan
  - *Total user incidents per user month (ID: TOTALUSERINCIDENTS)*
  - *Training and support incident per user month. (ID: TRAININGSUPPORTINCIDENTS)*
  - *Average time to deal with an incident at the 3rd level of user support (ID: AVERAGETIMEFORUSERINCIDENTS)*
- Security Assessments
  - *No metric defined for this review*

Approved Change Requests

An ACR (Approved Change Request) is a change request submitted by the QC during a previous review that, after having positively reviewed by the QA, has been granted to be applied. The list of ACRs is provided as input to the quality review in order to verify that their implementation is correct and satisfies the quality standards Approved change requests can include modifications to the work methods or to the schedule and come as a result of the change management process led by the QA in collaboration with the PEB.

Deliverables

This is the list of deliverables (i.e. documents, products) that the QC verifies

3.2. OUTPUTS FROM REVIEW

This section presents the list of the information pieces that the QC returns to the QA for further elaboration.

Change Requests

Change requests are recommended corrective or preventive actions for preventing future defects in procedures or products.

Measurements

Measurements are the documented results of the elaboration of associated quality metrics.

Validated Changes

Validated changes refer to approved change requests that have been validated with success because their implementation satisfies quality standards. Any changed or repaired procedures or products are once again verified and could be either accepted or rejected before being considered definitive.

Validated Deliverable

Validated deliverables are deliverables, among those received in input from the QA, that have successfully passed the Quality Control review. By the term deliverable is meant any verifiable product or service that is produced within the project.

Completed Checklists

Completed checklists are output of the QC activity and become part of the project's documentation.

4. QUALITY CONTROL REVIEW – PM10

4.1. REVIEW OF THE SOFTWARE RELEASE PLAN

4.1.1 Input

Checklists

- *Checklist for the Review of the Software Release Plan [R17] .*

Metrics

- *No metrics defined for this review.*

Approved Change Requests

The list of changes requested during the previous QC report, and that have been accepted by the QA team, follows:

- *define the tolerance range of positive checks for considering the deliverable validated. It is not clear how many positive checks are needed to consider the Software Release Plan validated;*
  - this request has been accepted by the QA team and the next release of the SQAP will be modified accordingly*;*

Deliverables

- *Software Release Plan [R5].*

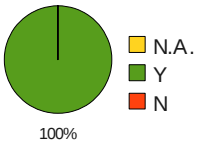
4.1.2 Output

Completed Checklist

Check Number	Question	Response
1	Does the list of supported platforms correspond to the actual set of platforms on which software components are released?	Y
	see Software Release Plan [R5]	
2	Is the installation of external dependencies well documented?	Y
	see Software Release Plan [R5]	
3	Are instructions to build the software up to date?	Y
	see Software Release Plan [R5]	
4	Is the list of supported delivery software formats up to date (source and binary packages, tarball, package lists, etc)?	Y
	see Software Release Plan [R5]	
5	Is the description of the process on how to handle changes up to date?	Y

	see Software Release Plan [R5]	
6	Are the communication channels published with updated information?	Y
	see Software Release Plan [R5]	
7	Is the process on how to deliver software to the Production Infrastructures up to date and it's aligned to what the Production Infrastructures are expecting?	Y
	see Software Release Plan [R5]	

Table 1: Review of the Software Release Plan (N.A. = Not Available)



- 100% of checks have been executed with success.

Measurements

There are no measurements defined for this review.

Comments

The table below (Table 2) reports specific comments on the executed checks that either have returned a non-satisfactory response (i.e. N.A. or N) or simply require further clarifications.

Check Number	Comments
1	Does the list of supported platforms correspond to the actual set of platforms on which software components are released?
	At the moment, there are no official components available but the release procedures clearly state which the reference platforms are and how to package components according to their specifications.
2	Is the installation of external dependencies well documented?
	The external dependencies are not directly described in the main document, but are maintained through EMI project wiki, facilitating their refinement as long as new packaging issues arise.
3	Are instructions to build the software up to date?
	The instructions to build the software are not directly described in the main document, but are maintained through the EMI project wiki system, facilitating their refinement as long as new building issues arise.

5	Is the description of the process on how to handle changes up to date?
	This process is better documented in the Software Maintenance and Support Plan [R6]
6	Are the communication channels published with updated information?
	Most of the communications among PTs take place within the EMT mailing list and all documents (e.g. minute, action lists, etc.) are maintained in the project repository [R28].

Table 2: Review of the Software Release Plan – Comments

Validated Changes

Though changes requested during the previous QC report have been approved by the QA, they have been not been reported in QA procedures and therefore no further considerations can be done on them.

Validated Deliverables

Name of the deliverable under evaluation	Validated	
	YES	NO
Software Release Plan	Y	

Variations from previous report

The previous QC report reported a negative result, the Software Release plan was not available at that time and all corresponding checks failed. Since then, a significant improvement has been observed, culminating in the achievements of quality objectives as well as the release of the plan.

Change Requests

No changes are requested for this review.

4.2. REVIEW THE SOFTWARE RELEASE SCHEDULE

The *Review of the Software Release Schedule* [R18] checks that the priorities of the project are taken into account and reflected in the scheduled releases.

The *Software Release Schedule* is a document requested by the SQAP to guide PTs towards the right packaging of EMI major releases. It outlines the different phases which compose the release process, which members are involved in each of them, and their deadlines. The scheduled for the EMI-1 release is available at this link [R4].

4.2.1 Input

Checklists

- *Checklist for the Review of the Software Release Schedule [R18].*

Metrics

- *Delay on the release schedule (ID: DELAYONTHERELEASE).*

Approved Change Requests

The list of changes requested during the previous QC report, and that have been accepted by the QA team, follows:

- ***define** the tolerance range of positive checks for considering the deliverable validated. It is not clear how many positive checks are needed to consider the Software Release Schedule validated;*
  - this request has been accepted by the QA team and it will be included in the next release of the SQAP.

Deliverables

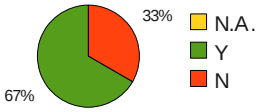
- *Software Release Schedule [R4].*

4.2.2 Output

Completed Checklist

Check Number	Question	Re-sponse
1	*Has the previous schedule been kept?*	N
	see Software Release Schedule [R1]	
2	*Does the new schedule take into account what wasn't accomplished in the previous schedule?*	Y
	see Software Release Schedule [R1]	
3	*Is the new schedule aligned to the Software Development Plan and the priorities of the project?*	Y
	see Software Release Schedule [R1]	

Table 3: Review the Software Release Schedule



- 67% of checks have been executed with success.
- 33% of checks have failed.

Measurements

In the following, the metrics defined for this review and corresponding measures are reported.

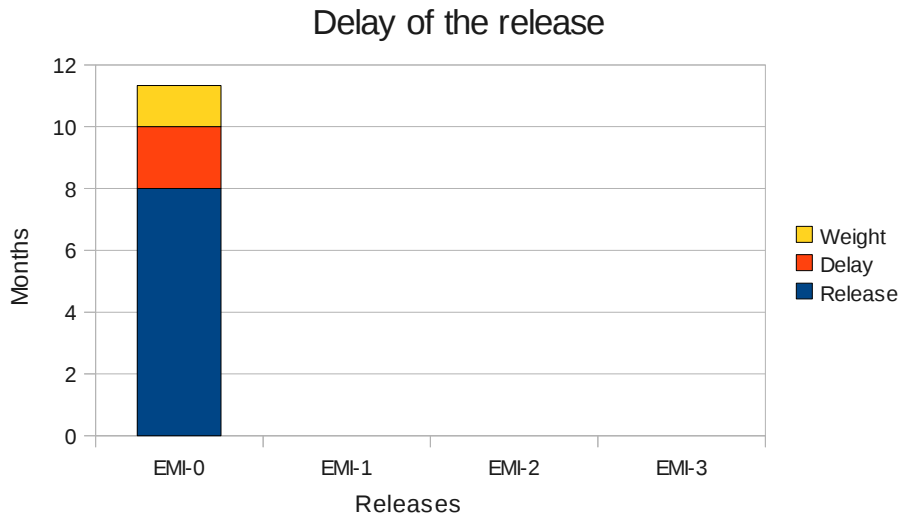
ID	**DELAYONTHERELEASE**
Name	Delay on the release schedule
Description	This metric could be provided as a histogram showing the delay time (in days) for each release, weighted using the release time
Unit	(release delay)/(release time) * 100
Measurements	
Thresholds/target value	Ideally the release deadlines should be always met, leading to 0 delays for each release. Proper thresholds have to be defined. The trend of the delays over time could provide useful hints for process optimization.
Comment	The Weight parameter represents the ratio between the number of months planned to prepare a release (8) and those of delay (2). As the project progresses, the weight should gradually decrease to demonstrate that employed quality procedures are adequate for improving the release process performance and that PTs are respecting them.

Table 4: Delay on the release schedule – Metric

Comments

The table below reports specific comments, if any, on check results.

Check Number	Comments
1	*Has the previous schedule been kept?*
	The EMI-0 was release with 2 months of delay.
2	*Does the new schedule take into account what wasn't accomplished in the previous schedule?*
	The lessons learned during the preparation of the EMI-0 release have been taken in account for improving the release procedures.

Table 5: Review the Software Release Schedule - Comment

Validated Changes

No changes can be validated for this report.

Validated Deliverables

Name of the deliverable under evaluation	Validated	
	YES	NO
Software Release Schedule	Y	

Variations from previous review

The previous QC report reported a negative result, the Software Release Schedule was not available and all checks failed. Since then, a significant improvement has been observed, culminating in the achievements of quality objectives as well as the release of the schedule.

Change Requests

No changes are requested for this review.

4.3. REVIEW THE SOFTWARE MAINTENANCE AND SUPPORT PLAN

The Review of the Software Maintenance and Support Plan [R18] checks that the plan is up to date and describes the actual maintenance and support processes and that the SLAs are respected.

The Software Maintenance and Support Plan has been released and is accessible at [R5].

4.3.1 Input

Checklists

- *Checklist for the Review the Software Maintenance and Support Plan [R18].*

Metrics

- *Total user incidents per user month (ID: TOTALUSERINCIDENTS)*
- *Training and support incident per user month. (ID: TRAININGSUPPORTINCIDENTS)*
- *Average time to deal with an incident at the 3rd level of user support (ID: AVERAGETIMEFORUSERINCIDENTS)*

Approved Change Requests

The list of changes requested during the previous QC report, and that have been accepted by the QA team, follows:

- ***define*** *the tolerance range of positive checks for considering the deliverable validated. It is not clear how many positive checks are needed to consider the Software Maintenance and Support Plan validated;*
  - this request has been accepted by the QA team and it will be included in the next release of the SQAP;
- ***define*** *the metric thresholds for considering the deliverable validated;*
  - this request has been accepted by the QA team and it will be included in the next release of the SQAP;
- ***consider*** *to aggregate the quality metrics defined for this review with the project KPIs (KSA1.1 and KSA1.2);*
  - this request has been accepted by the QA team and it will be included in the next release of the SQAP.

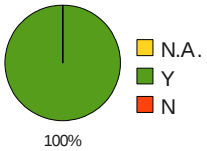
Deliverables

- *Software Maintenance and Support Plan [R5]*

Completed Checklist

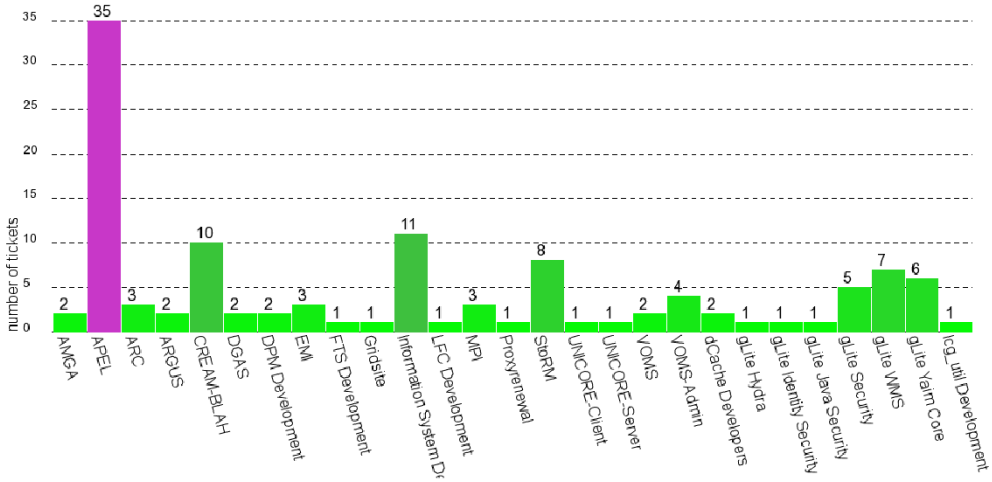
Check Number	Question	Re-sponse
1	*Is the process on how to handle incidents reported by EMI users using GGUS up to date?*	Y
	see Software Maintenance and Support Plan [R5]	
2	*Is the process on how to handle requests coming from EMI users or other PTs up to date?*	Y
	see Software Maintenance and Support Plan [R5]	
3	*Is the process on how to handle problems up to date?*	Y
	see Software Maintenance and Support Plan [R5]	

Table 6: Review the Software Maintenance and Support Plan



- 100% of the checks have been executed with success.

Measurements

ID	**TOTALUSERINCIDENTS**
Name	Total user incidents per user month
Description	This metric covers defects not only in the software but also in the documentation, training and user support processes, per user month. User month means the number of users (in our case, deployed services?) per month.
Unit	GGUS tickets per user per month
Measurement	 These measurements report the number of incidents submitted to GGUS for all EMI Support Units from November 2010 to January 2011.
Thresholds/target value	It is difficult to state a threshold valid for all the product teams, in general a decreasing trend would show positive results.

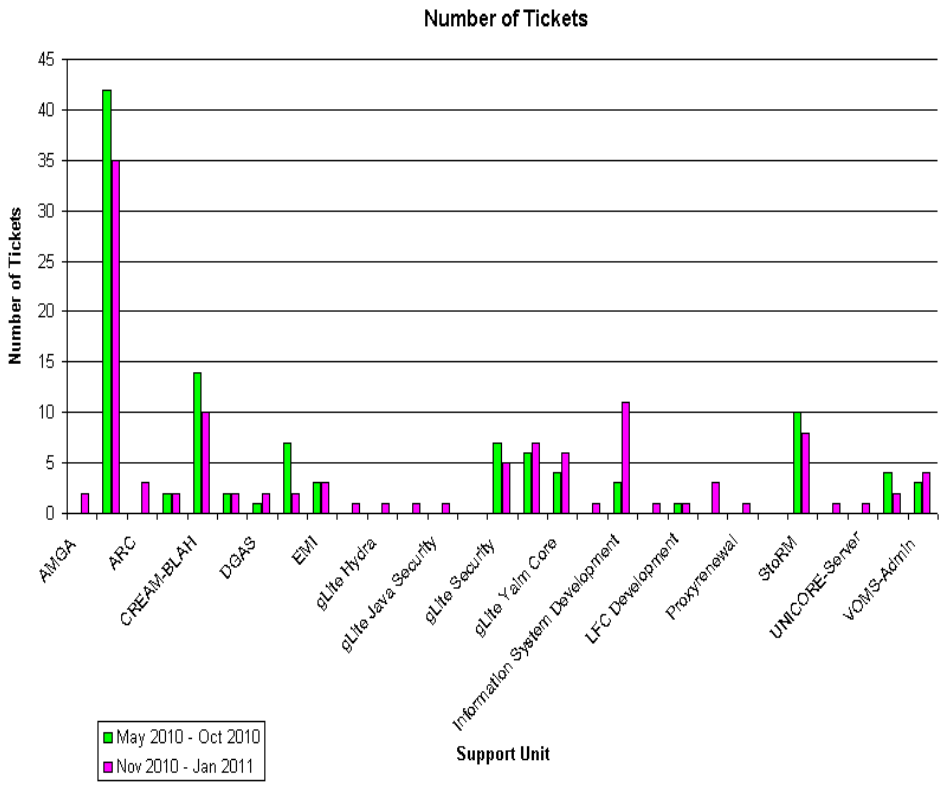
Comment	 This graph reports the number of tickets submitted from May to October 2010 (green bars), and those from November 2010 to January 2011 (fuchsia bars). Its aim is to show the trend of submitted tickets across the two reporting periods. Approximately, there is no significant improvements from the last control, in general the number of tickets has remained unchanged over the time. Particular attention should be deserved for the "*Information System*" component since its tickets has quadruplicated.

Table 7: Total user incidents per user month

ID	**TRAININGSUPPORTINCIDENTS**
Name	Training and support incident per user month.
Description	This metric covers defects in the training and user support processes, per user month. User month means the number of users (deployed services?) per month. The training and support defects can be derived by subtracting the tickets in status unsolved (ticket that generated a bug) from the total number of opened tickets. It relies on proper bug opening from GGUS tickets, especially for what concerns ambiguous or missing documentation.
Unit	Incident per user month

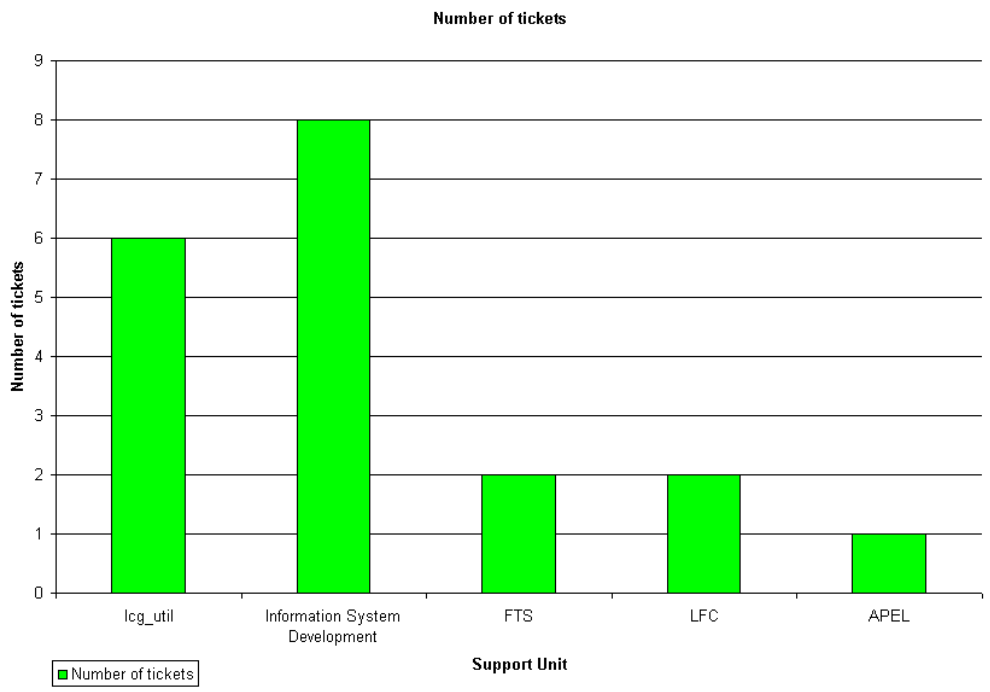
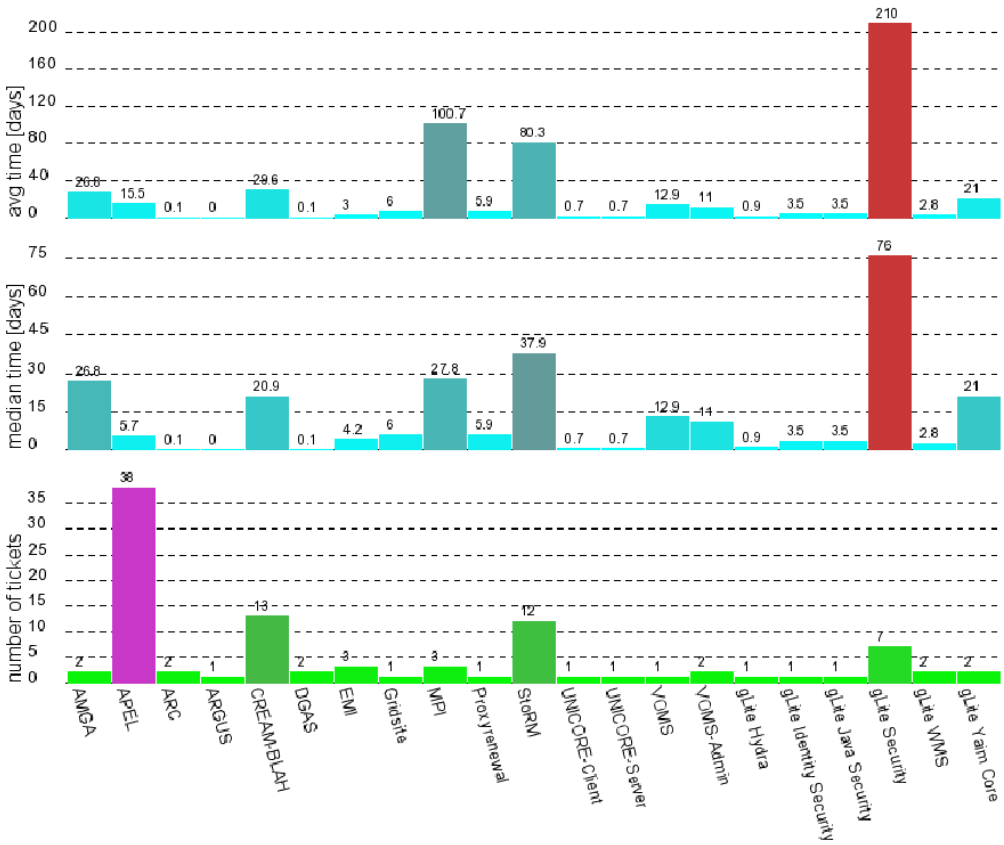
Measurement	 This graph reports the number of tickets that have been submitted in GGUS for all EMI Support Units from November 2010 to January 2011 and that are still unsolved.
Thresholds/target value	Decreasing trend.
Comment	The aim of this metric would be to measure defects in training and user support processes per user month. However, obtaining a valuable measure for it is roughly complicated at the moment. According to the assumption made by the metric definition, the number of unsolved defects, as shown in the graph, should correspond to the effective number of software bugs but – unfortunately – this number is usually bigger. The adoption of different categories for tracking bugs produces inconsistent estimations. As a possible solution, a new support unit for tracking user support defects could be created and the metric definition modified accordingly.

Table 8: Training and support incident per user month – Metric

ID	**AVERAGETIMEFORUSERINCIDENTS**
Name	Average time to deal with an incident at the 3rd level of user support
Description	This metric wants to measure the effectiveness of a product team to provide 3rd level user support. The time is measured from the time the ticket reaches a PT's 3rd level support and the time the ticket is moved to the status solved or unsolved
Unit	Days
Measurement	 This graph reports the average time to solve incidents for all EMI Support Units from November 2010 to January 2011.
Thresholds/target value	Need project wide agreement.

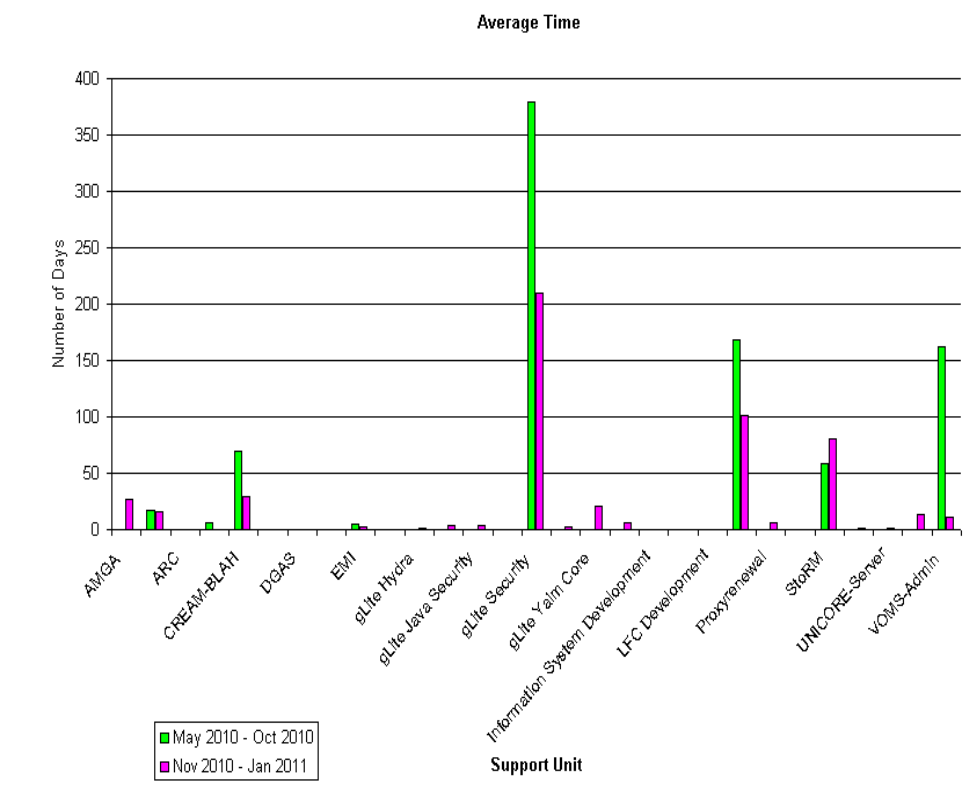
Comment	 This graph reports the comparison between the average times to resolve incidents for two time periods, from May to October 2010 (green bars) and from November to January 2011 (fuchsia bars). Its aim is to show if the number of tickets is following a decreasing or increasing trend over the reporting periods. In general, it can be asserted that the time spent to resolve EMI incidents is decreasing, expect for those support units which were not present during the previous report (e.g. AMGA, gLite Yalm Core, etc.).

Table 9:Average time to deal with an incident at the 3rd level of user support - Metric

Validated Changes

There are no previous change requests that could be verified for this review.

Validated Deliverables

Name of the deliverable under evaluation	Validated	
	YES	NO
Software Maintenance and Support Plan	Y	

Variations from the previous review

There are no variations to report from the previous review.

Change Requests

The change requested for this review is:

- ***clarify*** *the definition of metric "TRAININGSUPPORTINCIDENTS" and* ***define*** *the tool to gather measures for it; at the moment the information obtained from GGUS seems to be inconsistent*;

4.4. SECURITY ASSESSMENTS

The Review of the Security Assessment should check that the different stages described in the First Principles Vulnerability Assessment (FPVA) approach are being followed during the assessment of software components. More details on security assessment activity are described in this paragraph [6.].

4.4.1 Input

Quality Checklists

- *Checklist for the Review of the Security Assessment [R19].*

Quality Metrics

- *No metrics defined for this review.*

Approved Change Requests

The list of changes requested during the previous QC report, and that have been accepted by the QA team, follows:

- ***define*** *the tolerance range of positive checks for considering the deliverable validated. It is not clear how many positive checks are needed to consider the Security Assessment Plan validated;*
  - this request has been accepted by the QA team and it will be included in the next release of the SQAP.

Deliverables

- *Security Assessment Plan [R14].*

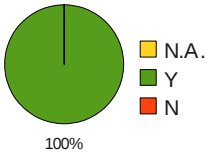
4.4.2 Output

Completed Checklist

Check Number	Question	Re-sponse
1	The Architectural Analysis has been carried out and the output contains a diagram describing the interactions among components and end users.	Y
2	The Resource Identification has been carried out and the output contains the resource descriptions.	Y
3	The Trust and Privilege Analysis has been carried out and the output contains the	Y

	trust levels and the delegation information for all the components and their interactions.	
4	The Component Evaluation has been carried out and the output contains identified vulnerabilities and their suggested fixes.	Y
5	The Dissemination of Results has been carried out.	Y

Table 10: Review of the Security Assessment Plan (N.A. = Not Available)



- 100% of checks have been executed with success

Comments

During the review of the Security Assessment plan and its implementation, it has been verified that all stages composing the security assessment process have been performed for those components whose assessment has been already completed.

Currently, the progress status for the components under evaluation is as follows:

- **Argus**: its assessment is going through the *Component Evaluation* stage;
- **gLExec**: its assessment has been completed and preliminary results will be disseminate soon. A preliminary list of vulnerabilities can be accessed at this link [R32].

Each intermediate stage of the security assessment process produces an artifact, namely a document describing the component internal details and its weakness points. Most of them need to be kept confidential until the entire assessment is complete; releasing information early could lead to security attacks. The only artifact that is currently possible to share is the architectural and resource diagram for the *gLExec* component (see Figure 2).

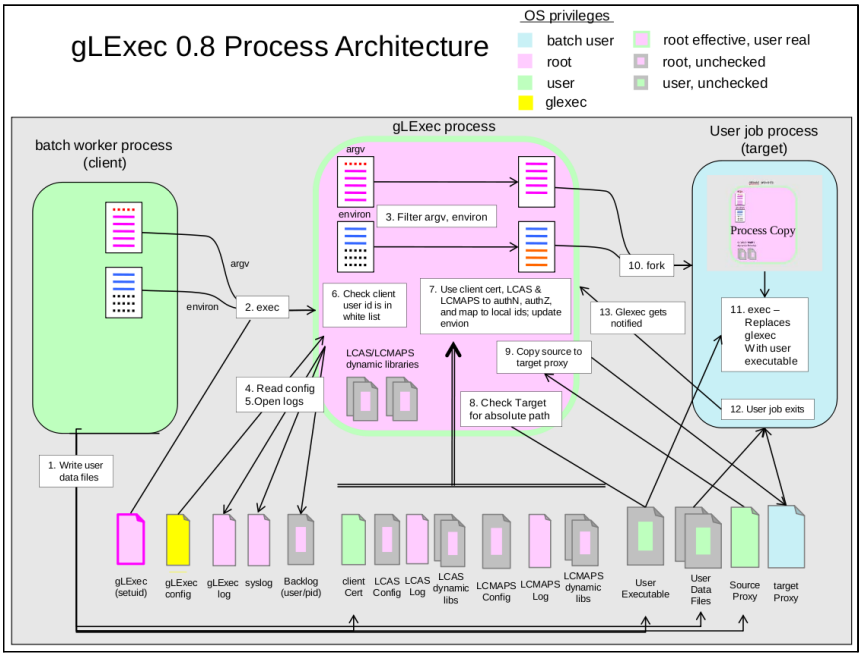


Figure 2: gLExec, architectural and resource diagram

Architectural Analysis: identify the major structural components of the system, including modules, threads, processes, and hosts. For each of these components, identify the way in which they interact, both with each other and with users. The artefact produced at this stage is a document that diagrams the structure of the system and the interactions amongst the different components and with the end users.

Resource Identification: identify the key resources accessed by each component and the operations supported on those resources. Resources include elements such as hosts, files, databases, logs, and devices. For each resource, describe its value as an end target or as an intermediate target. The artefact produced at this stage is an annotation of the architectural diagrams with resource descriptions.

Measurements

There are no measurements for this review.

Validated Changes

There are no previous change requests that require to be verified for this review.

Validated Deliverables

Name of the deliverable under evaluation	Validated	
	YES	NO
Security Assessment Plan	Y	

Variations from previous report

The previous QC report (October 2011) outlined a negative result, the Security Assessment Plan was not available at that time and all checks failed. Since then, a significant improvement has been observed, culminating in the achievements of quality objectives as well as the release of the plan.

Change Requests

No changes are requested for this review.

5. THE EMI-1 RELEASE STATUS

This section aims to give an overview of the progress status of the EMI-1 release, describing the stages of the release process, the transition from EMI-0 and EMI-1, the current status of the software development and, eventually, the degree of compliance with respect to quality acceptance criteria [R26].

5.1. THE EMI RELEASE PROCESS

According to the release plan [R5], EMI releases follow a well defined release procedure, consisting of the following steps:

1. **Release Planning** – summary of activities
   - identify requests for new features or bug fixes;
   - prioritize, plan and schedule the development and maintenance activities;
   - document and track release planning activities creating corresponding items in the User Requirements and Technical Objective Trackers and RfCs in the PTs trackers with approved priorities;
   - define the Release Schedule by creating the Components Releases items in the corresponding tracker;
2. **Release Building** – summary of activities
   - develop new features, implement required bug fixes;
   - test and certify developed components;
3. **Certification and Validation** (acceptance testing) – summary of activities
   - Component Releases are validated by the SA1 QC against the set of acceptance criteria defined by the Customers [R28] and the EMI Production Release criteria [R24];
   - components are made available for technical-preview;
   - components are deployed on the EMI test-bed for a (6 days) grace period using an automatic monitoring tool [R45];
4. **Release Preparation and Deployment** – summary of activities
   - final packaging and release of components;

QC is mainly involved during the *Certification and Validation* stage, where real controls are performed and the compliance of software components ratified.

5.2. THE FIRST RELEASE: EMI-0

The EMI-0 packaging, making up the first EMI Reference Releases list, have been finalized at the beginning of February. Packages are now present in the EMI- 0 repository. The milestone was reached with late mainly due to the delay introduced to get all PTs work together and align them to new procedures and tools set out for EMI. Many PTs had to modify their packages to comply with the new way of managing external dependencies, to adapt certain components to use packages with the versions available from the OS/EPEL repositories, like *globus* and *gsoap*, to improve conformance with EMI (Fedora/Debian) packaging guidelines. Further details can be found at the dedicated “EMI-0 Activity” twiki page [R29]. That page also contains important information on the procedures, progress status, achievements, and general issues faced during the release process.

5.2.1 Lessons learned from EMI-0

The following list presents the lessons learned during the preparation of EMI-0 release. The purpose of this list is to put together any insights experienced during the preparation of EMI-1 that can be usefully applied on EMI-1.

Lessons learned:

- PTs need to be more involved in the release process;
- communications on the EMT mailing list and participation to the EMT meetings should be improved;
- the collaboration among PTs should be improved, especially a good sharing of competencies and knowledges would be helpful during the resolution of common problems;
- QA Guidelines and Procedures have not been correctly acknowledged by PTs yet and are perceived as non-mandatory;
- PTs considered the EMI-0 milestone as an "exercise" so its importance was diminished and they put poor attention in achieving it.

5.3. EMI-1

EMI-1, codename (Zugspitze), will be the first major release of the EMI middleware, established as the combination of middleware services, client and libraries. EMI-1 is being developed under the direction of the JRA1 Work Package based on the requirements and technical objectives identified by the EMI Project Technical Board (PTB) and under the general software engineering and quality assurance procedures defined by the EMI SA2 (Quality Assurance) Work Package. The following sections present the technical objectives of the EMI-1 release, the progress status for the development of the components and if the release process is in line with the schedule.

5.3.1 EMI-1 Technical Objectives

The table below gives a brief overview of the Technical Objectives for each technical Area set out by the PTB. They are extensively described Technical Development Plan (DNA1.3.1) [R7] and included in the EMI-1 Development and Test plan. The objectives that imply software developments are marked with "Yes" for the "Dev" column.

Technical Area and Technical Objective ID	Description	Dev	Due	Components
Compute 1	Glue 2.0 support in job management services and client tools.	Yes	M12	A-REX, CREAM, U. TSI, U. XNJS, UAS-C, WSRFlite, WMS, libarcclient, arc*, UCC, HILA
Data 1	All storage elements publishing initial GLUE 2.0 storage information.	Yes	M12	DPM, dCache, StoRM, UAS-D
Data 2	Using https instead of httpg for the SRM protocol as a prototype implementation in one storage element and	Yes	M12	dCache server and one client

	client (library).			
Data 3	All storage elements offering support for the http(s) protocol.	Yes	M12	dCache, StoRM, DPM
Data 4	All storage elements offering at least a prototype-level support for the "file://" access protocol.	Yes	M12	dCache, StoRM, DPM
Data 5	File Catalogue Access from UNICORE	Yes	M12	UAS-D
Security 1	Agreement on a minimal common set of security attributes to be used in policies.	No	M12	Argus, VOMS
Infra 1	Provide early internal guidelines for integrating messaging into potential EMI target components.	No	M10	All EMI services and accounting sensors
Infra 2	Design a common EMI service registry that is required in order to discover all the service endpoints of the different middleware components.	No	M10	EMI registry (new component)
Infra 3	Investigate possible use cases for a common standard messaging system in the accounting area.	No	M12	APEL-publisher, DGAS HLR-sensors, JURA
Infra 4	Investigate possible use cases for a common standard messaging system for the service monitoring and management.	No	M12	all EMI services
Infra 5	Investigate possible use cases for a common standard messaging system for the information services and L&B.	No	M12	L&B, BDII, *EMI Registry (new)*
Cross 1	Define the Information Flow architecture describing messaging and non-messaging based information exchange of the EMI components (e.g. service registry, information	No	M9	all EMI services

	system, accounting, monitoring, and instrumentation). A common information exchange between the EMI components is preferable.			
Cross 2	Investigate possible use cases for a common standard messaging system in the computing area.	No	M12	All EMI compute area services
Cross 3	Investigate possible use cases for a common standard messaging system in the data area	No	M12	All EMI data area services
Cross 4	Evaluate integration scenarios with off-the-shelf computing cloud systems to be able to execute grid jobs on those (scaling out to clouds).	No	M12	A-REX, CREAM, WMS, UNICORE/X, U. TSI, U. XNJS, UAS-C

Table 11: list of EMI-1 technical objectives

While the table above presents the high-level project technical objectives, the following list gives a n overview of the EMI components that are affected by those objectives and the percentage of the work performed so far to develop them. The aim of this table is to provide a summary of changes performed and the rationale behind them. It is important to understand that part of the technical objectives are only about necessary preparation work (e.g. identification of use cases, etc.) which will be useful for later implementations.

Detailed Feature List is contained in the Development and Test Plans [R44] and tracked in the Release Schedule tracker [R33].

Component	Feature Summary	Status
A-REX	support of GLUE2 information providers.	75%
CREAM	support of GLUE2 information providers.	50%
U.TSI, U.XNJS, U.UAS, WSRFLite	support of GLUE2 information providers.	TBA
WMS	matchmaking module of the WMS will be enhanced to be compliant with GLUE2.	TBA
Libarcclient/ arc*	enhanced to work with GLUE2-compliant information.	TBA
UCC	enhanced to work with GLUE2-compliant in-	TBA

	formation.	
HILA	enhanced to work with GLUE2-compliant information.	TBA
DPM	enable GLUE2.0 support support of the HTTP(S) protocol support NFS4.1 (experimental version) prototype-level support for the "file://" access protocol.	TBA
dCache	enable GLUE2.0 support enable the use of HTTP(S) protocol prototype-level support for the "file://" access protocol.	TBA
UAS-D	expose GLUE2.0 compliant information about storages.	TBA
StoRM	enable GLUE2.0 support support of the HTTP(S) protocol prototype-level support for the "file://" access protocol.	TBA

Table 12: EMI 1 Key New Component Features and progress status

5.3.2 Progress status of EMI-1 release process

The release process for the EMI-1 is presented in the table below, including the progress status for each step. The status/update process occurs on a regular basis determined during the project planning process.

ID	Name	Start	Finish	Complete
1	Release Planning	May 3	Nov 1	
1.1	Identify requirements for new features, bug fixes	May 3	Aug 31	100%
1.2	Prioritize, plan and schedule the development activities	Sep 1	Sep 30	100%
1.3	Feature Submission Deadline	Oct 1	Oct 1	
1.4	Fill User Requirements, Technical Objectives & RfCs trackers	Oct 1	Oct 4	75%
1.5	Define Release Schedule	Oct 5	Nov 1	95%
2	Release Building	Oct 1	Feb 28	
2.1	Develop features, implement bug fixes	Oct 1	Dec 15	75%
2.2	Test & certify developed components	Dec 16	Feb 28	0%
2.3	Feature Freeze	Dec 31	Dec 31	100,00%
2.4	Feature Complete	Feb 1	Feb 1	80,00%

2.5	Final Change Deadline (code freeze)	Feb 28	Feb 28	50,00%
3	Certification & Validation (acceptance testing)	Mar 1	Apr 19	
3.1	Release Candidate	Mar 1	Mar 1	0,00%
3.2	CR validation	Mar 1	Mar 28	0%
3.3	Software components available for Tech. Preview	Mar 29	Apr 11	0%
3.4	CR deployment on EMI-testbed	Apr 12	Apr 19	0%
4	Release Preparation & Deployment	Mar 29	Apr 29	
4.1	Final packaging & signing of components	Apr 11	Apr 15	0%
4.2	Prepare & publish release documentation	Mar 29	Apr 29	0%
4.3	Components uploaded in the official EMI Software Repository	Apr 18	Apr 19	0%
4.4	Announce the Release to Customers	Apr 29	Apr 29	

Table 13: progress status of EMI-1 release

This QC report is taking a snapshot when the project is transitioning from phase 2.4 to 2.5 (highlighted in green). The purpose of the schedule is to provide a useful 'road map' that can be used by the release manager to assist PTs in completing the project successfully. The schedule model reflects when activities are supposed to start and finish and reacts appropriately to changes in progress, scope, etc., as they are added to the schedule model over the life of the project.

5.4. VERIFICATION OF THE SCHEDULE

The progress status for the EMI-1 release (see 5.3.2) presents a negative deviation from the schedule, the planned baseline differs from the reality. The extent to which this deviation occurs is difficult to measure, but if no changes are applied to the process, the probability that a delay will be introduced in the software release process is high. More precisely, the activities (1.4, 1.5, 2.1, 2.2) are late with regards to the schedule and result still open.

5.5. VERIFICATION OF THE COMPLIANCE WITH THE RELEASE PLAN PROCEDURES

As reported in the release process (see 5.1.), all user and technical objectives should be reported in form of RfC in EMI tracking tool (Savannah). Even if the number of technical objectives and developments is relevant (see Table 11, Table 12), the only few RfCs currently defined in Savannah seem to not reflect the real status of the development activities and the impact that the technical objectives have on EMI software components.

The table below reports the list of components that comply with the release procedures, the changes that will affect their code are correctly described through RfCs. RfC descriptions are maintained in external trackers but public available.

Item ID	Summary	Assigned to
#18734	UNICORE security libraries release v.2.0.0	emi-rel-sched-unicore
#18733	UNICORE AIP release v.2.0.0	emi-rel-sched-unicore
#18732	UNICORE XACML PDP release v.2.0.0	emi-rel-sched-unicore
#18731	UVOS release v.1.4.0	emi-rel-sched-unicore
#18729	UNICORE Gateway release v.6.4.0	emi-rel-sched-unicore
#18728	UNICORE/X release v.6.4.0	emi-rel-sched-unicore
#18685	jobwrapper release v.3.3	emi-rel-sched-jobman
#18684	CEMon release v.1.13	emi-rel-sched-jobman
#18683	BLAH release v.1.16	emi-rel-sched-jobman
#18587	VOMS release v.2.0.0	emi-rel-sched-voms
#18575	UNICORE XNJS release v.1.4.0	emi-rel-sched-unicore
#18568	WMS release v.3.3.0	emi-rel-sched-jobman
#18534	CREAM release v.1.13	emi-rel-sched-jobman

Table 14: components accompanied with RfCs

Among 89 components, only 13 of them contain the list of corresponding RfCs.

5.6. *EMI-1 RELEASE DATA FORECAST*

At this moment the prevision is that the release date (29 April) will be met. For this reason, in this period, the PTs should concentrate all their efforts on components packaging, testing and certification, in order to be able to provide to SA1 release candidates that meet the production release criteria [R26]

6. STATUS OF THE SECURITY ASSESSMENT ACTIVITY

The middleware security and testing groups of the University of Wisconsin (UWM) and Universitat Autònoma de Barcelona (UAB) have developed and are continuing to develop the First Principles Vulnerability Assessment (FPVA) methodology for assessing software for critical vulnerabilities. FPVA is a primarily analyst-centric (manual) approach to assessment whose aim is to focus the analyst's attention on the parts of the software system and its resources that are mostly likely to contain vulnerabilities. FPVA is designed to find new threats to a system. It's not dependent on a list of known threats.

Assessments of several major middleware systems have been carried out, significant vulnerabilities found in many of them, and the developers helped with remediation strategies. FPVA is being applied to various security related middleware packages supplied by EMI as part of the SA1 Quality Control process.

A Security Assessment Plan was discussed and agreed with the EMI software providers. As FPVA is a manual methodology, it is slow and we can only estimate how much time we will need to assess a software package. And those estimations may experience changes depending on the length and complexity of the piece of software to assess. Nevertheless we defined a scheduling for the assessments to be carried out for EMI. It included mainly 2.5 years and 6 pieces of software, and the remaining 6 months were left for re-assessing the same software after the reported vulnerabilities will be fixed. The last version of the Security Assessment plan is available at this link [R25], while the reference activity page is available here [R27].

Of the EMI components, so far VOMS Admin 2.0.15 has been assessed using FPVA. Serious vulnerabilities were found and reported to the development team, together with possible fixes. The development team is currently working on fixing the vulnerabilities found. The vulnerabilities are not disclosed yet, but will be after they are fixed and the different user groups have had time to update to the new security release.

The picture below presents one of the artifacts produced during the assessment of VOMS Admin component. More precisely, it gives an overview of the system architecture, describing how various components interact together and which are their privileges.

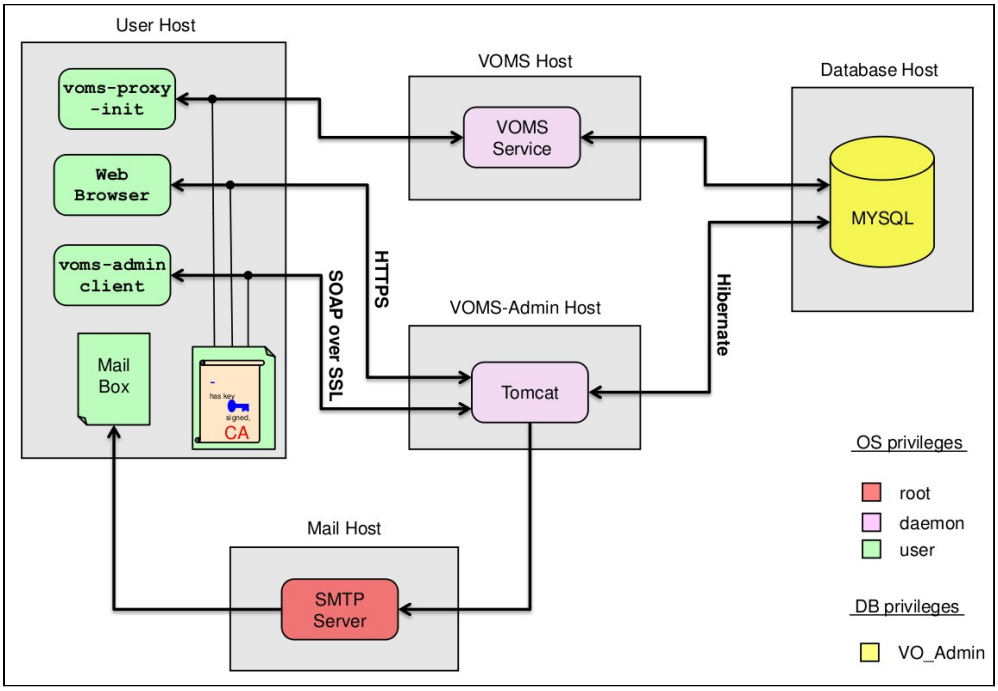


Figure 3: VOMS Admin – system architecture and privileges analysis

Currently Argus[1] 1.2 and gLexec[2] 0.8 are being assessed. These assessments are expected to be finished at the end of March 2011. Argus is being assessed by Manuel Brugnoli from the UAB and gLexec by Daniel Crowell from the UWM. An independent assessment is a key issue in security, so we keep an absolute discipline, which means that no details on the current assessment can be leaked. There is one way communication between the assessment and development teams. That means that the assessment team asks question to the development team, but does not provide information about the assessment process. The outcome of the assessment will be vulnerability reports to be delivered to the person responsible for the piece of software being assessed. Some vulnerability reports for already assessed components can be accessed here [R24].

1 **Argus** is the gLite Authorization Service. It is intended to provide consistent authorization decisions for distributed services (e.g. compute elements, portals). Argus consists of 3 main components: (a) the Policy Administration Point (PAP) to manage policies; (b) the Policy Decision Point (PDP) to evaluate policies; and (c) the Policy Enforcement Point (PEP) to enforce policy decisions.

2 **gLexec** provides and identity mapping service. It has been assessed in the past and has since undergone a rewrite, mainly to address some of the problems found by these assessments. It is necessary to re-assess the new version, and this is already in progress.

7. STATUS OF THE TEST

This paragraph reports the status of testing activity, including the availability of test plans for software components and regression tests for fixed bugs. According to the software release plan [R5], the test plans should have been provided 4 months before the release of the software. Being the release of EMI-1 planned for the end of April 2011, the deadline for providing test plans was December 2010. The list of test plans is available at this link [R30]. PTs have been informed about this deadline and encouraged to link the test plans for their components through announcements made during the EMT meetings.

7.1. TEST PLANS

Currently, not all the components have been associated to a test plan as it is shown on the corresponding Wiki page set out for collecting this information (R30). On that page only 37 entries are present, while, according to the release tracker, Savannah, they should be 89, namely one for each component. Among those 37 entries, only 29 are really linked to a test plan, but none of them have been reported in the release tracker (Savannah), failing to comply with what is stated in the software release plan. In the following table, the status of test plans availability is reported.

Component name	Test plan	Component name	Test plan
AMGA	Yes	UNICORE TSI	Yes
Apel	Yes	UNICORE XNJS	Yes
Argus	Yes	UNICORE UAS (Job Management)	Yes
BDII	Yes	UNICORE Service Registry	Yes
BLAH	Yes	UNICORE UAS (Data Management)	Yes
CREAM and CEMon	Yes	UNICORE Gateway	Yes
DPM	Yes	UVOS	Yes
FTS	Yes	XUUDB	Yes
Hydra	Yes	UNICORE PDP (XACML entity)	Yes
LB	Yes	UNICORE AIP (authz data providers)	Yes
LFC	Yes	UNICORE Security Libraries	Yes
VOMS	Yes	dCache	Yes
WMS	Yes	DGAS	NO
A-Rex	NO	MPI	Yes
ARC Compute Elements	NO	SAGA	Yes
ARC Data Clientlibs	NO	StoRM	NO
ARC Infosys	NO	GridSite	Yes
ARC Security utils	NO	ProxyRenewal	Yes
ARC Container	NO		

Table 15: components accompanied with test plans

If a component is marked with “Yes”, it means that the corresponding test plan is available and complies with the template defined by QA [R13].

7.2. REGRESSION TESTS

Regression tests are useful to retest a previously tested program following modification to ensure that faults have not been introduced as a result of the changes made especially for fixing bugs. When a new regression test is implemented, its output must be documented and included in a report. As set out in the Certification and Testing guidelines [R6], all regression test reports should be linked in the RfC tracking tool, Savannah, to the related components. At the moment the number of components for EMI-1 is 89 but the number (14) of associated RfCs, either for new features or bug fixings, is still too small and does not reflect the real status of the development activities (see table 14). In addition, only for 6 of them, a regression test has been executed and its output available.

Although the certification and testing activity officially ends at the end of February 2011, and more information will be made available until that date, the current scenario deserves attention and corrective actions should be taken to get the measurements confined in an acceptance range; the number of components which are compliant with QA guidelines is really too small to hope that project performance will improve in so few days.

The table below reports the list of components which comply with release plan procedures, RfCs concerning bugs have been successfully tested and the corresponding reported linked to Savannah. Test reports are maintained on middleware specific trackers and are public available.

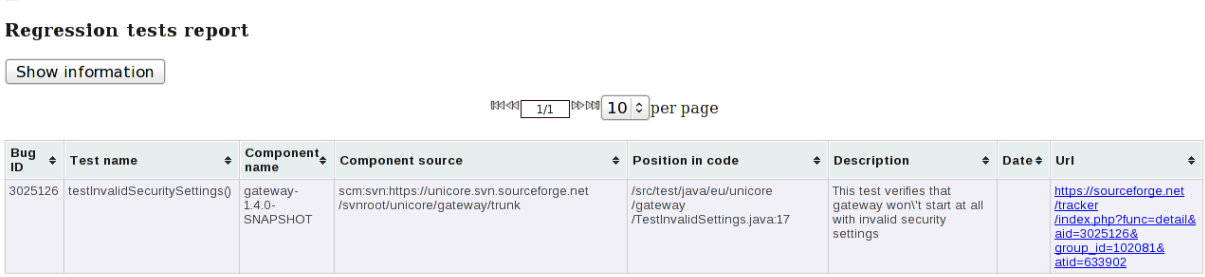
Item ID	Summary	Assigned to
#18734	UNICORE security libraries release v.2.0.0	emi-rel-sched-unicore
#18733	UNICORE AIP release v.2.0.0	emi-rel-sched-unicore
#18732	UNICORE XACML PDP release v.2.0.0	emi-rel-sched-unicore
#18731	UVOS release v.1.4.0	emi-rel-sched-unicore
#18730	XUUDB release v.1.3.1	emi-rel-sched-unicore
#18729	UNICORE Gateway release v.6.4.0	emi-rel-sched-unicore

Table 16: components accompanied with test reports

Inside each test report there is a section on regression tests. According to the QA guidelines, that section should contain a small set of data:

- RfC unique ID;
- description of the test that will prove that the RfC has been properly implemented and that the problem it fixes is indeed not present any more in the component;
- input needed for the test;
- criteria for considering the test successful (PASS) or failed (FAIL).

As example of generated report, in the following a test report for the UNICORE Gateway component is presented:



UNICORE

Regression tests report

Show information

1/1 10 per page

Bug ID	Test name	Component name	Component source	Position in code	Description	Date	Url
3025126	testInvalidSecuritySettings()	gateway-1.4.0-SNAPSHOT	scm:svn:https://unicore.svn.sourceforge.net/svnroot/unicore/gateway/trunk	/src/test/java/eu/unicore/gateway/TestInvalidSettings.java:17	This test verifies that gateway won\'t start at all with invalid security settings		https://sourceforge.net/tracker/index.php?func=detail&aid=3025126&group_id=102081&atid=633902

Figure 4: sample regression test report for the UNICORE Gateway

In this case the input for the test is included in the Java test class code ("Position in the code" field) and the successful criteria is the successful execution of the test, only reports for successful tests are generated.

8. CONCLUSIONS

This document reports the organization of the QC activity in SA1 and the results of quality activities performed after ten months of project work.

While the execution of periodic reviews (see chapter 4.) has reported notable results, as well as the security assessment activity is progressing with success, the release process is performing under the expected level and acceptance criteria are not met at the moment. Although final considerations could not be taken now, the release process is still progressing and improvements are still possible, the number of PTs satisfying release procedures is really tool small, around 10% of components, for not taking any corrective action. Since there is a decisive distinction from who is fully complaint and who is totally not, one could conclude that, on one hand, the quality procedures are feasible to apply, on the other, that PTs can reach the compliance level only if start-up conditions are present. Basically, if a PT was adopting similar procedures before joining EMI, the possibility for it to be still complaint would be much higher with respect to its colleagues. The same conclusion also applies to the activity concerning the regression tests where non-satisfactory results have been reported. It is highly probable that PTs already used to write regression tests to verify their bug fixings would report better level of compliance than others.

To summarize, according to the results reported in this document, it is evident that many PTs are not prepared to comply with quality procedures, or did not correctly evaluate the effort needed to implement them with the consequence of being late in the release process. On the QA side, effort is still needed to get PT familiar with quality procedures and set up appropriate tools for helping QC in performing checks. An in-reach training event has been organized to cover topics of interest to members of the EMI. During the event, scheduled at the beginning of March 2011, quality procedures will be deeply explained to PTs and real user-scenario analyzed. In the meantime, with the collaboration of QA them, the QC task will keep monitoring the progress of the release process and report any-nonconformity during the upcoming Certification and Validation stage (see paragraph 5.1.).

Due to the delay introduced for the preparation of the EMI-0 release and considering that some QA procedures have not been finalized yet, it has been agreed that for the EMI-1 release, the QC will not enforce any component to comply with procedures to enter the final release; only non-blocking feedbacks will be reported to PTs.