EGI-InSPIRE

ROADMAP FOR THE MAINTENANCE AND DEVELOPMENT OF THE DEPLOYED OPERATIONAL TOOLS

EU MILESTONE: MS710

Document identifier:	EGI-MS710-FINAL
Date:	**22/03/2013**
Activity:	**JRA1**
Lead Partner:	**KIT**
Document Status:	**Final**
Dissemination Level:	**PUBLIC**
Document Link:	https://documents.egi.eu/document/1501

Abstract

This milestone document records the planned technical changes for the operational tools and the use cases they are designed to support



I. COPYRIGHT NOTICE

II. DELIVERY SLIP

	Name	Partner/Activity	Date
From	Helmut Dres	KIT / JRA1	30.01.2013
Reviewed by	**Moderator:** Tiziana Ferrari **Reviewers:** Franck Michel	SA1 CNRS	15.02.2013 21.02.2013
Approved by			

III. DOCUMENT LOG

Issue	Date	Comment	Author/Partner
1	30.01.2013	First draft; with input from all tool developer teams	Helmut Dres / KIT
2	13.02.2013	Second draft; internally revised by the tool developer teams	Helmut Dres / KIT
3	15.02.2013	Third draft; further corrections by the tool developer teams	Helmut Dres / KIT
4	01.03.2013	Changes according to comments from the moderator and the reviewer	Helmut Dres / KIT
5	11.03.2013	Minor amendment according to a comment from a reviewer	Helmut Dres / KIT

IV. APPLICATION AREA

This document is a formal deliverable for the European Commission, applicable to all members of the EGI-InSPIRE project, beneficiaries and Joint Research Unit members, as well as its collaborating projects.

V. DOCUMENT AMENDMENT PROCEDURE

Amendments, comments and suggestions should be sent to the authors. The procedures documented in the EGI-InSPIRE "Document Management Procedure" will be followed: https://wiki.egi.eu/wiki/Procedures

VI. TERMINOLOGY

A complete project glossary is provided at the following page: http://www.egi.eu/about/glossary/.

PROJECT SUMMARY

To support science and innovation, a lasting operational model for e-Science is needed – both for coordinating the infrastructure and for delivering integrated services that cross national borders.

The EGI-InSPIRE project will support the transition from a project-based system to a sustainable pan-European e-Infrastructure, by supporting 'grids' of high-performance computing (HPC) and high-throughput computing (HTC) resources. EGI-InSPIRE will also be ideally placed to integrate new Distributed Computing Infrastructures (DCIs) such as clouds, supercomputing networks and desktop grids, to benefit user communities within the European Research Area.

EGI-InSPIRE will collect user requirements and provide support for the current and potential new user communities, for example within the ESFRI projects. Additional support will also be given to the current heavy users of the infrastructure, such as high energy physics, computational chemistry and life sciences, as they move their critical services and tools from a centralised support model to one driven by their own individual communities.

The objectives of the project are:

1. The continued operation and expansion of today's production infrastructure by transitioning to a governance model and operational infrastructure that can be increasingly sustained outside of specific project funding.
2. The continued support of researchers within Europe and their international collaborators that are using the current production infrastructure.
3. The support for current heavy users of the infrastructure in earth science, astronomy and astrophysics, fusion, computational chemistry and materials science technology, life sciences and high energy physics as they move to sustainable support models for their own communities.
4. Interfaces that expand access to new user communities including new potential heavy users of the infrastructure from the ESFRI projects.
5. Mechanisms to integrate existing infrastructure providers in Europe and around the world into the production infrastructure, so as to provide transparent access to all authorised users.
6. Establish processes and procedures to allow the integration of new DCI technologies (e.g. clouds, volunteer desktop grids) and heterogeneous resources (e.g. HTC and HPC) into a seamless production infrastructure as they mature and demonstrate value to the EGI community.

The EGI community is a federation of independent national and community resource providers, whose resources support specific research communities and international collaborators both within Europe and worldwide. EGI.eu, coordinator of EGI-InSPIRE, brings together partner institutions established within the community to provide a set of essential human and technical services that enable secure integrated access to distributed resources on behalf of the community.

The production infrastructure supports Virtual Research Communities (VRCs) – structured international user communities – that are grouped into specific research domains. VRCs are formally represented within EGI at both a technical and strategic level.

VII. EXECUTIVE SUMMARY

The development of the deployed operational tools is an on-going activity that concerns the common tools that are currently used to support Grid operations. This work ensures:

- The continuing and correct functionality and interoperation of the tools with the deployed middleware;
- The developing of new features in response to the new scenarios that arise in a so dynamic world like Grid;
- The developing of new features to satisfy the new requirements coming from its users, primarily the NGI/EIRO Operation Centres and the EGI.eu Operations Team.

The first activity is fundamental to avoid a degradation of tools capabilities that could decrease the quality of the services offered by EGI. The other two activities allow us to provide EGI community with up-to-date tools able to satisfy a growing numbers of end-users requirements and the most recent use-cases increasing the ability of EGI to keep and attract users. User requirements and new scenarios are collected and prioritised by the Operational Tools Advisory Group (OTAG). OTAG provides a forum to discuss the future evolution of the operations tools and to agree tool roadmaps that meet the expressed needs of the EGI community. It has representation from the tool users, and the software product teams located within or external to the project.

To monitor this work there is a series of milestones labelled “Roadmap for the maintenance and development of the deployed operation tools”. One is planned for the beginning of each project year. The aim of the milestone is to give an overview of the plans for the developments for the operational tools in the following 18 months, describing the general direction of the development and give estimations of the timeframe for these developments. Of course the plans have to be adapted to changes to the operations model and procedures. Decisions taken by the OTAG might also alter the foreseen roadmaps. This is the last milestone of the series and the plans described here cover the interval between now and the end of the project.

The tools in the scope of the milestone are:

- Operations Portal
- GGUS
- GOCDB
- Accounting Repository
- Accounting Portal
- Service Availability Monitoring (including support for messaging)
- Metrics Portal

For each of these tools the current status, highlighting the features developed in the last year, and their dependencies to other tools are described. The deviations from the roadmap planned in the previous milestones of the series will be listed and motivated. This is meant to provide the background on which the new developments and plans will be realised. It can be seen that there are lots of interdependencies between the tools. Some of the tools are of utmost importance for the functioning of the overall operations infrastructure. For those tools sophisticated fail over mechanisms should be in place to make sure that the availability and reliability of the tools can be maximised.

All development teams have detailed plans for the last project year and beyond. Nevertheless it is important that the respective advisory bodies (OTAG, USAG) steer and monitor this activity. The requirements coming from the users of the various tools need to be channelled and prioritised by these groups and discussed with the developers, to make sure that changes could be well harmonized in all the tools preserving the integrity of the interplay between them.

TABLE OF CONTENTS

1 INTRODUCTION

As described in last year's milestone MS 708 [R 1] this document summarises the current status of implementation and the development plans of critical operational tools till the end of the EGI-InSPIRE project in April 2014. These operational tools are essential to achieve the objective of providing a large scale and resilient pan-European distributed computing infrastructure supporting a diverse range of scientific disciplines.

Section 2 sequentially looks at the current status of each of the operational tools highlighting the features developed in PY3 and the contingent deviations from the roadmap planned in MS 708. It also lists the functional dependencies of that tool on other operational tools and on specific data sources and reviews the status of regionalisation.

Section 3 outlines the development plans and each tool development team presents a roadmap summary for PY4.

2 EGI OPERATIONAL TOOLS - STATUS AND DEPENDENCIES

2.1 Operations Portal

The Operations Portal [R 2] is providing information to various actors (NGI Operations Centers, VO managers, etc.) along with related facilities, such as the VO administration tool and the VO management module, the different dashboards (Operations dashboard, security dashboard, VO Operations dashboard) and different communication tools: broadcast tool and downtime system announcement.

2.1.1 Current Status

The Operations Portal is described in detail in the EGI-InSPIRE milestone document MS705 [R 21]. In this section we describe the main developments performed during PY3.

2.1.1.1 Monitoring of unsupported middleware version

A campaign has been launched by the EGI Operations team to detect obsolete version of the middleware components. The security dashboards and the operations dashboards have been modified consequently to expose the alarms raised in such cases.

The developments have been focused on

- Modifications of access rights and authentication on the existing tool
- Development of specific reports per NGI, sites
- Modification of ticket templates
- Integration of a new view for COD staff
- Integration of alarms into the regular dashboard
- CVS exports for metrics and for the summary of alarms

2.1.1.2 Availabilities/Reliabilities into the Operations Portal

A new module has been developed to provide availabilities and reliabilities for Top-BDII and sites. This module has been designed to compute and expose the availabilities and reliabilities of the TOP-BDII of a NGI.

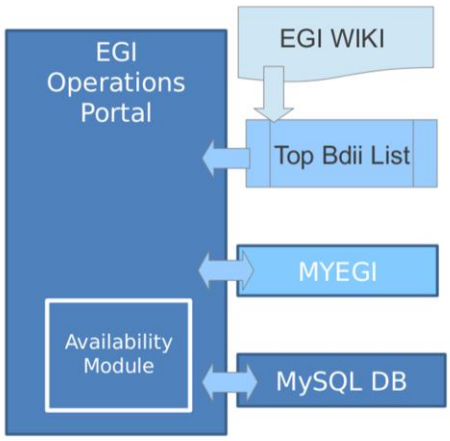

Figure 1: Method to obtain the numbers and figures

The method to obtain the numbers and figures is described in the previous picture and is done in different sequences:

- Parse the EGI SA1 wiki
- Build a list of Top-BDII per NGI
- Query the programmatic interface of MyEGI for each Top-BDII services
- Compute the summary with the algorithm designed with SA1 team
- Store the summary of A/R and also the details in the database
- Expose the summary and the details into the portal by providing tables, charts and the possibility to export data.

A similar module has been developed to expose availabilities and reliabilities for the sites.

The concept is the same except that we build a list of sites per NGI from the GOC DB programmatic interface instead of a list of Top BDII.

2.1.1.3 Dashboards

Different improvements have been made for the dashboards. A new dashboard has been designed dedicated to VO Operations. And more generally an important refactoring has been initiated to improve performances and usability. This part is explained in details further in the document.

2.1.1.4 Tasks described in MS708

Task	Status	Comments
Security dashboard	In production	
VO Operations Dashboard	In production	
Major Upgrade of the regional package	In production	
Refactoring of the Operations Dashboard	On going	Partially done
Availability / reliability module	In production	
Mobile version	On going	Partially done with the integration of bootstrap

2.1.2 Dependencies

Directly dependent on	Comments
GGUS	Display, create and update tickets via SOAP calls
Indirectly dependent on	
GOCDB	Use of information: user, NGI, site, downtimes, services Views in cache in Lavoisier
SAM PI	Use of information: Availabilities and reliabilities raw data Views in cache in Lavoisier
ActiveMQ broker network Regional Nagios Services	Use of information: Nagios results The use of virtual queues ensure the persistence of the

	information
GSTAT	Use of metrics about storage and CPU Views in cache in Lavoisier
BDII	All dynamic information about services Views in cache in Lavoisier
Pakiti	Use of information: security vulnerabilities Views in cache in Lavoisier
The security Nagios Box	Use of information: security vulnerabilities Import stored into our DB
The EGI SSO system	User list - used to refined the authentication mechanism Views in cache in Lavoisier
VOMS servers	Users and VO information Views in cache in Lavoisier
Tools which are dependent on the Operations Portal	
Accounting Portal	List of VO and discipline
AppDB	List of VO and the associated information
GOCDB	The downtime visualisation tool.

The most critical dependency is to GGUS. GGUS tickets are created and updated via SOAP calls. If GGUS is unavailable we can't ensure a correct behaviour of the application.

2.1.3 Regionalisation

As announced in previous work plan the regional instances have been removed and we are providing regional views of the different features when it is meaningful.

Some NGIs have expressed the interest to deploy the Operations Portal and customize it but they are not interested by all the features.

Consequently a standalone package could be delivered in the second semester of the year. The main idea is to propose this package deliverable through bundles and the end users will be able to choose the different features or services they want to install.

The features will be limited to the scope of a NGI:

- the broadcast will be enabled to contact only the sites of the NGI
- the dashboards will show only the sites of the NGI

2.2 GGUS

The EGI helpdesk also known as GGUS (Global Grid User Support) [R 3] is described in detail in MS410 [R 4].

2.2.1 Current Status

One of the major development tasks during PY3 was the redesign of the report generator from scratch. All metrics reports which used to be created manually and made available for download from the GGUS website can now be created on the fly.

Regarding the high availability solution the following steps have been taken.

- Implemented High Availability solution for Web Front-ends
- Implemented High Availability solution for the AR Server (BMC Remedy Action Request System), which executes the workflow rules and performs the main tasks. AR Server is accompanied by the email-engine that completes the server functionality of the system.
- Implemented on call duty service integration:
  GGUS is being monitored by ICINGA [R 22]. In case of a service incident ICINGA will send a text message onto the mobile phone of the on call engineer (OCE). After acknowledging the alarm message the OCE tries to fix the problem according to instructions described in a wiki. A GGUS expert can be called in case the OCE does not succeed to fix the problem.
- Intrusion prevention system implemented

Further achievements and tasks that were completed and that are part of the current implementation:

- On-going improvements and adaptations to new requirements for the interface to the CERN ServiceNow ticketing system
- The interface with the NGI France ticketing system went in production.
- Integration in the GGUS helpdesk system of new support units for the VOs israelvo.isragrid.org.il, shiwa-workflow.eu, snoplus.snolab.ca, vo.cta.in2p3.fr, t2k.org, neurogrid.incf.org, comet.j-parc.jp
- Review of the VO mail boxes and enabling a stable email interface to GGUS through migration to a new mail infrastructure.
- Reviving of the GGUS Advisory Board, a body to collect, discuss and prioritise requirements by the users. Meeting frequency is once per months directly after the monthly GGUS releases.

2.2.2 Dependencies

Directly dependent on	For
GOCDB	Site names, email contacts, downtime information
OIM (OSG Information Management System)	Site names, email contacts
VOMS	Rights for Team/Alarm tickets
Two way dependency	
xGUS instances [R 5] NGI Helpdesks based on xGUS (NGI_AEGIS, NGI_CH, NGI_DE, NGI_SI, ROC_IGALC)	GGUS server infrastructure
Helpdesks interfacing with GGUS: NGI_IT, NGI_FRANCE, NGI_CZ, NGI_PL, ROC_RUSSIA, NGI_GRNET, ROC_CERN, OSG	Synchronisation of ticket data
Tools which are dependent on GGUS	
Operations Portal	Display, create and update tickets via SOAP calls

Accounting Repository	GGUS ticket data
Metrics Portal	GGUS ticket data
LHCOPN helpdesk	Dedicated view on tickets in GGUS

2.2.3 Regionalisation

In PY3 all the remaining NGI helpdesk instances could be integrated in GGUS, so the regionalisation task for GGUS can be considered as finalised.

2.3 GOCDB

As already described in [R 1] many aspects of operations rely on the availability of information from NGIs about service nodes, contact details, security contacts, certification status, scheduled downtimes of resources (i.e. topology data). The GOCDB [R 6] provides all such information through a central database. The GOCDB topology data is categorised per operations region, and is managed by the regions themselves through the GOCDB Web portal interface.

2.3.1 Current Status

2.3.1.1 General Status

GOCDB v4.4 is the current production release. This version harmonized the separate read-only and read/write instances into a single portal. Version 4.4 has addressed many small RT requirements for GUI enhancements. A complete list is maintained in the change log [R 7]. A separate GOCDB instance has also been deployed within the EUDAT project, and has been tailored for use using the provided GOCDB abstractions/extension-points.

2.3.1.2 Failover

The failover instance is hosted at Fraunhofer Institute [R 8] and monitored by STFC Nagios. A number of downtimes throughout the year exposed weaknesses with the failover which have largely been addressed. Automatic DNS switching to dynamically re-point the ‘goc.egi.eu’ domain to either the central instance or failover still needs to be investigated.

2.3.2 Dependencies

As a primary source of information GOCDB doesn’t depend on any other tool.

Tools which are dependent on GOCDB
Operations Portal and Operations Dashboard (IN2P3)
ATP (CERN)
Top-BDII config generator (CERN)
MyEGI
NCG (SRCE)
Regional Nagios (CERN)
GGUS (KIT)
GSTAT (ASGC)

APEL (STFC)
Accounting Portal (CESGA)
Metrics Portal (CESGA)
Grid Resource Bazaar (Cyfronet)

The list is not exhaustive. Some VO specific tools are using the GOCDB programmatic interface (e.g. to feed downtime calendars), and the information may also be used by regional tools (local monitoring, local helpdesks etc.).

2.3.3 Regionalisation

It was agreed at the EGI Technical Forum 2012 (Prague) that the Regional-Publishing GOCDB should be dropped. This can be justified since:

- There was limited effort/interest by NGIs to host and manage a separate regional GOCDB. This was revealed after more detailed NGI polling.
- The use of local scoping in the central GOCDB instance addressed the majority of NGI requirements for adding non-EGI sites and services within the central GOCDB. To date, there are 20 local scoped sites hosting 157 locally scoped service endpoints and two locally scoped Service Groups (Virtual Sites).
- The effort required to develop, deploy and support the Regional-Publishing GOCDB would be considerable (for example, regionalisation of the Operations Portal generated a significant increase in the level of user support).
- The scope for data inconsistencies between central and regional instances would be significantly increased.

2.4 Accounting Repository

The EGI accounting repository (APEL) stores information relating to the usage of resources within the EGI production infrastructure. It receives data on individual jobs and summaries of collections of jobs records from information providers, sites and other infrastructures, and exports accounting information to consumers of usage records. [R 9]

2.4.1 Current Status

2.4.1.1 APEL – CPU Accounting

The APEL Accounting Repository [R 10] and Portal were kept working reliably throughout 2012. The APEL Accounting Repository was taken out of service in February when the servers were all upgraded to Scientific Linux 5.

The new SSM (Secure Stomp Messenger) [R 11] based APEL Accounting Repository was brought into service in June 2012:

- CERN and NIKHEF now send Job Records to this repository.
- OSG/Gratia, INFN/DGAS, NDGF/SGAS and Switzerland/SGAS have migrated to sending Summary Records (for 97 sites) to the new APEL Accounting Repository.

These records are integrated with the summaries from the old Accounting Repository which are updated daily and retrieved by the Accounting Portal. This has established a stable method for other accounting implementations to interface their different solutions with central accounting.

2.4.1.2 Other Types of Accounting

The SSM and associated record loading/unloading methods created for publishing CPU accounting records were modified to collect new types of accounting record, including storage and cloud accounting records.

- Cloud Accounting - eight resource providers participating in the EGI Federated Cloud Task now publish cloud accounting records using this method.
- Storage accounting database has been installed and initial testing carried out to receive storage records.

In addition, initial work with the Accounting Portal team to receive summaries from the repository databases using SSM via the EGI Message Broker network has begun.

A new Application Accounting package is also under development in Hannover and the same method will be used to send/receive application accounting records.

2.4.2 Dependencies

Directly dependent on	For
EGI Message Broker Network	Transport of data from client to server
Operations Dashboard & Operations Broadcast	Shows APEL client Publication/Synchronisation Status. Service availability/maintenance broadcasts
GGUS	Managing support workflow
BDII	Benchmark data for normalisation used in accounting
GOCDB	Used to identify production APEL sites, for permission to publish and for APEL client Nagios tests.
SAM	Monitors APEL availability
Functional dependency on	
Accounting Portal	Repository provides the accounting summaries which the portal manipulates and visualises

2.4.3 Regionalisation

A regional version of the APEL Accounting Repository has been developed. Germany has indicated they require this and agreed to participate in testing.

2.5 Accounting Portal

The EGI accounting infrastructure is a complex system that involves various sensors in different regions, all publishing data to a central repository. The data is processed, summarized and displayed in the Accounting Portal, which acts as a common interface to the different accounting record providers and presents a homogeneous view of the data gathered and a user-friendly access to understanding resource utilisation.

2.5.1 Current Status

The current production version (v4.2 Fomalhaut) of the Accounting Portal is available here [R 10]. The regional Accounting Portal is ready, pending support from APEL regionalization.

2.5.1.1 Remarkable Changes during PY3

- Change to new codebase and code repository.
- View reorganization
- Query optimization
- Corrected Tier2 reporting
- Extension and maintenance of the VO Manager views.
- Portal machine updated to SL6, 64 bits, PHP 5.3, Mysql 5, Apache 2.2
- Changed HTML interface from frames to CSS based
  - PDA & Mobile support
  - Pages are now addressable
- User data views now show all user entries.
- New country user record breakdown by country, with unknown DN detection.
- Graphs made bigger and easier to read.
- Server & VMM (Virtual Machine Manager) maintenance
- Support of RFC2254 DNs
- Nationality code improved
- Miscellaneous query improvement and index optimization
- Better HTML output
- Testing with several browsers
- Tweaks on the graph engine
- IP migration to new domain
- InterNGI usage reports

2.5.2 Dependencies

Directly dependent on	Comments
GOCDB:	List of sites and NGIs in production, list of available services in production.
Operations Portal:	VOMS endpoints and VO list.
Accounting Repository:	Accounting records and summarized accounting data.

2.5.3 Regionalisation

The code base is being greatly simplified and rewritten to make easier for regional deployment. This includes translating to English some legacy documentation and source code.

2.6 Service Availability Monitoring Framework

The Service Availability Monitor (SAM) [R 12] is the system that is used to monitor EGI resources within the production infrastructure. It consists of the following components:

- Probes

- Submission framework: a test execution framework (based on the Nagios open source monitoring framework) and the Nagios Configuration Generator (NCG)
- Transport layer: a message broker network to distribute monitoring results
- Storage layer: the Aggregated Topology Provider (ATP), the Profile Management Database (POEM) and the Metric Result Store (MRS)
- Visualization layer: MyEGI

2.6.1 Current Status

- The following summarizes the current status per component:
  - Database components: The Aggregated Topology Provider (ATP), the Profile Management Database (POEM) and the Metric Result Store (MRS)
  - ATP is currently running in a distributed setting on all the regional instances and synchronizes from multiple source including GOCDB, GStat, BDII and VO feeds. In addition, it provides a Web based interface for browsing the synchronized data stored in the database.
  - POEM component was deployed to describe existing metrics and group them in order to run tests. In addition it defines actions that can either configure the way the availability and reliability is computed or allow notifications to messaging system.
  - Metric Result Store (MRS) is currently running in production on all regional instances. It supports computation of service statuses on the regional instances. The central instance aggregates data from NGI instances and provides status of the services.
- The submission framework customized by the Nagios Config Generator (NCG)
  - The system fully supports the EGI regionalization plan and all the NGIs are running their local SAM regional instance.
  - The NCG is one of the core components of the SAM Framework and it is part of the deployed regional instances.
  - Full integration with all database components (ATP, POEM, MRS). All NGI instances are configured to use ATP as topology source.
  - Support for failover SAM instances. The failover instance is configured to execute tests but does not raise alarms or report results to the central database while it's not activated.
  - A Central OPS-Monitor instance has been deployed for monitoring operational tools. It publishes results to the central monitoring service where the status of the OPS services is computed.
  - The metric configuration has been redesigned with the introduction of the Profile Management Database (POEM).
- The visualization tool: MyEGI
  - The visualization portal of the central monitoring service has been improved and is currently providing the following views: Metric Status, Availability and Reliability, Treemap, and Topology description.
  - The new version of the MyEGI portal is also deployed on the regional instances.
  - A web service API is available to pull information from the DB and supports XML/JSON serialization
- Messaging
  - Transport Layer: A message broker network to distribute monitoring results

- Currently the broker network is consisted of 4 message brokers in Greece (GRNET/AUTH), Croatia (SRCE) and Switzerland (CERN) and it is used by EGI operational tools infrastructures (i.e. the SAM infrastructure for the distribution of monitoring results).
- Authenticated connection on the production broker endpoints has been enabled and failover resiliency of broker endpoints has been tested to work.
- The foreseen evolution regarding the production EGI message broker network and in relation to the SAM activities involves:

  - Security implementation with respect to authentication (preferably usage of x509 credentials)
    - Implementation of failover capability with respect to the delivery of results from SAM probes (i.e. when a broker endpoint is not functional the probe should be able to deliver its results onto another broker endpoint within the network).

2.6.1.1 How the roadmap specified in MS708 has been implemented

- POEM component has been included and fully integrated in SAM Update-17 (Release notes available at [R 13])
- MyEGI has been reviewed and improved as part of SAM Update-19 (Release notes available at [R 14])
- SAM instance for monitoring operational tools (OPS-MONITOR) has been deployed as part of SAM Update-20 (Release notes available at [R 15])

2.6.2 Dependencies

Directly dependent on	Comments
GOCDB	Provides GRID topology information for sites, services and downtimes
BDII	Provides GRID topology information to define mapping between services and VOs supported
GStat	Provides GRID topology information to define mapping between sites and Tiers
Tools which are dependent on SAM	
Operations portal	Via messaging
Metrics portal	

2.6.3 Regionalisation

SAM fully supports the EGI regionalization plan and all the NGIs are running their local SAM regional instance.

2.7 Metrics Portal

The Metrics Portal [R 16] displays a set of metrics that will be used to monitor the performance of the infrastructure and the project, and to track their changes over time. The portal automatically collects all the required data and calculates these metrics before displaying them in the portal. The portal aggregates information from different sources such as GOCDB, GGUS, etc.

2.7.1 Current Status

The Metrics Portal has been used for the last year to gather metrics from the project tasks. Depending on changes of the structure and scope of the projects and its tasks and activities, the portal will be updated while keeping the old metrics in their validity periods.

Remarkable Changes during PY3

- Per country metrics (only on requested NGIs).
- Heavy query optimization.
- XLS output support.
- Aggregated metrics (sum of all NGI predicted metrics + entered metrics).
- Internal documentation and re-factorization.
- Cosmetic fixes
- Optimization
- IP migration to new domain
- Server & VMM maintenance

New requirements:

- Deprecable metrics.
- Deprecable activities (NA3 was removed from QR9 onwards)
- New Quarterly report (All common metrics for all activities in a quarter)
    - Cumulative NA2 metrics
- Many metric fixes and modifications.

The metrics portal in the PQ9 quarter has been expanded with new metrics for the SA2, NA2, SA1 and NA3 tasks. Some of these metrics needed to be available only from a specific quarter, or superseded the semantics of previous metrics, so new functionality to make metrics accessible depending on several variables was implemented. These metrics will also promote the development of connectors for next information sources.

2.7.2 Dependencies

Directly dependent on	Comments
Accounting Portal	To display accounting metrics, most active VOs, Number of submitted jobs, etc.
BDII	Number of CPUs and Cores in production, online and near-line storage, MPI sites.
GGUS	Number of tickets created/closed. Tickets response times, Number of tickets created by priority, etc.
GOCDB	Sites in production, number of countries and NGIs in EGI.
ACE	Availability and reliability metrics.

3 OPERATIONAL TOOLS ROADMAPS

3.1 Operations Portal

3.1.1 Operations Portal Plan

3.1.1.1 Refactoring of the different dashboards

To increase the efficiency and the maintainability of the different dashboards (security dashboard, VO Operations Dashboard, Operations Dashboard) the code is currently reviewed and improved. This work has been initiated during summer and will last at least until the middle of the year 2013.

We use Bootstrap - CSS framework used and developed by Twitter - to complete this work.

The benefits of this refactoring and framework will be:

- New portal look and feel with a homogenization of the display
- Improvements on efficiency, on reactivity and visibility

A first prototype has been delivered in December to ROD Operators and they will deliver feedback about this version.

We will use this feedback to implement a second version that we will deliver in production within the first semester of 2013.

The main new features are:

- A complete history is available for an issue
- Automatic removal of alarms with ok status in the main view
- Alarms grouping mechanism with possibility to add /remove alarms after the ticket creation
- The possibility to detect issues on local or non EGI resources

In parallel we have initiated the refactoring of the helpdesk module.

The use of a ticketing system through the dashboard has been reviewed. The connection is done with the use of adaptors and configuration files. This enables to manage different workflows and helpdesk systems without changing the whole code. So currently it is being used with GGUS, RT via tickets created from the dashboard. But it can be extended with short developments to any other application of the portal and to a new helpdesk system if needed.

This refactoring has 4 main goals:

- Use the standard GGUS helpdesk instead the specific one developed to interact with the portal
- Avoid to put the specificities of the different tickets into the code but in configuration files
- Be flexible for the different use of tickets: different templates and different workflows
- Be ready to integrate any new helpdesk

3.1.1.2 Availabilities and reliabilities report system

Different comments have been made during last review that availability statistics should reflect more the experience of a VO. Consequently a new module and system should be implemented as an availabilities/reliabilities reporting system in the operations portal according to the following guidelines:

- VO specific reports are generated monthly, using the OPS VO

- Only reports for "high activity" VOs are generated. With high activity we can follow the definition of the accounting portal, i.e. high activity week if
  - CPU time consumed > 1 year/week
  - CPU time consumed/month > 4 year/week

- The list of service end-points supporting VO x needs to be extracted from top-BDII
- Availability results are summarized on daily, weekly and monthly basis apply the A/R calculation algorithm described below.

The algorithm can be summarized in the following points:

- For every service groups calculate the availability/reliability value by ORing the A/R values of the services contained in the group;
  - The requested time granularity of this computation has to be assessed, in principle a daily granularity is acceptable (hourly would be optimal);
  - For the first implementation a plain OR is what is requested, for future implementations a 'threshold conditioned OR' would be more suitable to implement VO SLAs;
- Perform a plain AND of the groups availability and reliability to calculate the overall availability of the infrastructure
  - This will require to be computed with the same time granularity used in the OR step

Using this algorithm we don't obtain information about the perceived status from an user point of view, but just to a re-aggregation of the data on a VO basis.

In the future we will adopt a more complex algorithm taking in consideration averages and weights in a proper way for different kind of resources.

3.1.1.3 Continuous integration

In the middle term plans we will extend and continue the continuous integration with:

- A modular tool providing interfaces but also services (API, RSS, widgets)
- Version for mobiles phones and tablets
- The last Web technologies and/or frameworks to improve the efficiency and the usability

3.1.2 Operations Portal Roadmap Summary

Tasks inherited from MS708	Planned completion time
Refactoring of the different dashboards	Jun 2013
Continuous integration	Nov 2013
New Tasks	**Planned completion time**
Availabilities and reliabilities report system	Apr 2013
Package	Feb 2014

3.2 GGUS

3.2.1 GGUS plan

Regarding the new GGUS Report Generator some fine tuning is still to be done. A special reporting type ETA accuracy will be implemented.

The functionality to open team and alarm tickets is intensively used by the WLCG community. To keep the authorized users up to date the VOMS-to-GGUS synchronization interface will be restructured to make it fail safe.

New interfaces to PRACE/MAPPER, DANTE and to the NGI Ibergrid are still under discussion as well as the implementation of specific work flows for CSIRT/Security.

For the EGI central operations tools an alarm process will be developed and integrated.

Currently access to GGUS and xGUS is granted through X.509 certificates and through login and password. Some NGIs have expressed interest in having alternative authentication methods integrated. Shibboleth seems to be one of the most used and most promising federated identity management technologies that could be of interest in the EGI environment. Integrating Shibboleth based authentication in GGUS and xGUS is part of the roadmap.

To finalize the high availability solution the GGUS architecture will be changed into following directions:

- All system components (Web Frontend, Logic and DBMS) will be moved into two independent stacks of Virtual Machines
- One VM stack will be located around 12 kilometers away from the other by implementing Replication from Master stack into Slave stack
- Procedures for manual switching between Master and Slave stacks will be implemented.
- All GGUS interfaces will be migrated independently into both stacks.
- Appropriate disaster recovery plan will be designed (processes, policies and procedures related to preparing for recovery or continuation of GGUS after a natural or human-induced disaster).

3.2.2 GGUS Roadmap Summary

Tasks inherited from MS708	Planned completion time
Integration of the last remaining NGI (Russia)	On going
New interfaces to PRACE, MAPPER, DANTE	Still under discussion
Specific work flows for CSIRT/Security	Still under discussion
New Tasks	**Planned completion time**
Restructure VOMS GGUS synchronization	Jan 2013
GGUS Report Generator (final version depends on external requirements)	Mar-Jun 2013
Adapt interface to GOC DB/Doctrine	Jun 2013
Implementation of alarm processes for EGI tools	Jul 2013
High availability for GGUS components (switching between stacks)	Aug/Sep 2013
High availability for all GGUS interfaces	Dec 2013
Disaster recovery plan	Dec 2013
Additional authentication through shibboleth	Dec 2013

3.3 GOCDB

3.3.1 General Direction of Development

GOCDB v5 [R 17]: In the first quarter of 2013 development is focusing on GOCDB v5 which will replace the existing GOCDB PROM database with a new Object Relational Mapping layer. This is a significant development and is scheduled for release ~May. It will allow GOCDB to be deployed on different RDBMS platforms (MySQL, Postgres, Oracle) and will involve dropping the existing proprietary PROM database which is heavily tied to Oracle. This will simplify the DB logic/queries considerably, and will simplify future developments making GOCDB more attractive for adoption by other projects. Doctrine query performance is also greater compared to PROM queries. The move to v5 will cause changes to the Programmatic Interface (PI), which will have to be acceptance tested by dependent PTs.

Extending GOCDB Scoping [R 18]: This will involve extending the current 'EGI' and 'Local' data scoping logic to introduce multiple, non-exclusive scope tags to enable hosting multiple projects within a single GOCDB instance. The current scoping implementation provides only 'Local' and 'EGI' scopes which are mutually exclusive; a site/service can only be tagged with a single scope. The enhancements would build upon the current data-scoping logic to introduce non-exclusive scope tags. This would allow a single object, such as a site, service, or virtual-site to be tagged by multiple projects. In doing this, a single data object could be defined once and associated with more than one project without duplication of information. This is essential in helping to maintain the integrity of topology information across different target infrastructures. This will involve updates to the PI 'scope' parameter so that a comma separated list of target scopes can be specified rather than exclusive Local or EGI.

Extensibility Mechanism [R 19]: Post v5 release this will allow the core GOCDB entities (NGIs, Sites, Services, ServiceGroups, Endpoints) to define an optional set of custom key-value pairs (i.e. custom property bags). This would allow additional parameters be specified in the PI to limit the returned entities to those that define selected properties. This could potentially be used for VOs and other custom/domain-specific fields.

GLUE2 XML [R 20]: Post v5 release we are aiming to support GLUE2 by extending the GOCDB PI with new methods that would marshal the Doctrine entities to GLUE2 XML. This would also include some new PI methods for inputting data using a standard GLUE2 XML message format (e.g. posting downtime information constrained by the GLUE2 XSD).

Dissemination: The above development plans are documented extensively at the GOCDB wiki [R 19]. These developments will be discussed within OTAG and JRA1.

Foreseen Issues:

- The GOCDBv5 will introduce changes to the current PI. Dependent tools will need to accommodate these updates. Inevitably, this will require a period of acceptance testing by dependent PTs prior to production release.
- The GOCDB failover instance will need to simultaneously upgrade to v5.
- For the GLUE2 XSD, modifications are possible during 2013 until the GFD has been finalized. These are expected to be minor however, focusing on small formatting refinements rather than on core XSD design choices.

3.3.2 GOCDB Roadmap Summary

Tasks inherited from MS708	Planned completion time
GLUE2 compatibility	See below
Support for VOs	See Extensibility Mechanism below
New Tasks	**Planned completion time**
GOCDB v5	May 2013
Extending Scoping	Jul 2013
Extensibility Mechanism	Aug 2013
Glue2 XML Rendering and add Glue2 Downtime	Sep 2013

3.4 Accounting Repository

3.4.1 Plans for 2013

A new EMI-APEL client will be released as part of EMI 3. This is a complete rewrite of the APEL client which will use SSM v2 for communication between clients and the APEL Accounting Repository and includes support for local jobs and MPI accounting. The old APEL system will continue to run to support clients running the previous versions of the EMI APEL clients until support for these ends in line with the published EMI dates. Data from the new EMI-APEL client will be stored in the new APEL Accounting Repository which uses the EGI Message Brokers to receive data. The two APEL Accounting systems will run in parallel whilst the old client is supported with one set of daily summaries retrieved by the Accounting Portal until the old APEL server system is retired. CPU Accounting data will be sent to the Accounting Portal via the new method using the EGI Message Broker network, once the old APEL server system is no longer in use, this will be when all sites running the APEL client have updated to EMI-APEL 3.

Work will continue with sites running alternative accounting clients who will use SSM to send their records to the APEL Accounting Repository.

The Regional APEL server will be released.

Other types of accounting will continue to be supported and Cloud Accounting and Storage Accounting data will be published to the EGI Accounting Portal.

3.4.2 Accounting Repository Roadmap Summary

New Tasks	Planned completion time
EMI-APEL 3 Client released	Mar 2013
Regional APEL Server released	Apr 2013
Cloud Accounting Summaries to Accounting Portal	Apr 2013
Application Accounting usage record defined	Apr 2013
Storage Accounting Summaries to Accounting Portal	Sep 2013
Publishing summaries from Accounting Repository to other sites (OSG/DGAS)	Dec 2013

3.5 Accounting Portal

3.5.1 General direction

The general direction of the Accounting Portal development is to improve the current code, replace the central Accounting registry connector by a message system and implement the new features requested by the NGIs, VOs, PMB and OMB. The re-factoring should also make possible the creation of new improved XML endpoints that would be documented and made public, since the current version was not meant to be used by the general public. A functional view of the cloud accounting is being implemented. The provisioning of Storage, MPI and Application accounting views will be completed during PY4. The GOCDBv5 changes do not affect the accounting portal.

New production releases will be available every 6 months but any change will be discussed before within JRA1 and OTAG. The scheduled roadmap for the next 18 months will be available as a DocumentDB space from the Accounting Portal web page.

3.5.2 Accounting Portal Roadmap Summary

Tasks inherited from MS708	Planned completion time	Revised version
Contributed CPUs by site	Oct 2013	Apr 2014
Preliminary support for parallel (MPI) jobs	Oct 2013	Apr 2014
Provisioning of Storage accounting (DB implementation)	Oct 2013	Apr 2014
Provisioning on Storage accounting (View Implementation)	Oct 2013	Apr 2014
Provisioning of MPI accounting (DB implementation)	Oct 2013	Apr 2014
Provisioning of MPI accounting (View Implementation)	Oct 2013	Apr 2014
Provisioning of Application accounting (DB implementation)	Oct 2013	Apr 2014
Provisioning of Application accounting (View implementation)	Oct 2013	Apr 2014
New Tasks	Planned completion time	
EGI User usage accounting	Apr 2013	Apr 2014
Provisioning of Cloud Accounting (Preliminary support)	Apr 2013	Apr 2014
Regional portal codebase improvements	Apr 2013	Apr 2014
XML endpoints generalization and improvement	Apr 2013	Apr 2014
SSM implementation for normal Accounting	Jun 2013	Apr 2014
EGI Usage VT Report Improvements	Apr 2013	Apr 2014
EGI Usage VT Publishing Improvements	Apr 2013	Apr 2014

Scientific Disciplines VT Interface Support	May 2013	Apr 2014
Scientific Disciplines VT final Implementation	Jun 2013	Apr 2014
Provisioning of Cloud Accounting (Improvements)	Oct 2013	Apr 2014

3.6 Service Availability Monitoring Framework

3.6.1 General direction

A general direction of the development will focus on maintenance and bug fixing of the existing components. This would primarily involve MyEGI, DB components and NCG.
Regarding the GOCDBv5 changes, there will be some tests to ensure that the changes introduced in the GOCDB PI doesn't affect any components.

MyEGI

- Maintenance and bug fixing.

DB components and NCG

- Integration of EMI probes in SAM: This currently involves rearranging and validating meta-packages to support dependencies provided by EPEL/EMI. This will also involve any dependency changes in all SAM components to reflect this arrangement as well as any development fixes that can pop-up during this transition.
- Maintenance and bug fixing.

3.6.2 SAM Roadmap Summary

New Tasks	Planned completion time
Integration of some EMI probes	Sep 2013
Messaging: Implementation of SAM probes failover capabilities	Dec 2013

3.7 Metrics Portal

New sets of metrics are included each month from different data providers. The scheduled dates for the Metrics Portal are described in the next table:

3.7.1 Metrics Portal Roadmap Summary

New Tasks	Planned completion time
Manual metrics expansion and refinement Manual metrics are metrics that are introduced manually by the users, as opposed to automatic metrics, which are estimated and then validated or corrected by the users.	Feb 2013
Views enhancement and optimization	Feb 2013

The enhancement refers to the improvement and refinement of the presentation of the editing, reporting and charting views, their presentation on multiple devices, including several browsers and mobile versions. This includes changes to the HTML and CSS coding and templates, tabulation, layout, new fields, colour scheme, search engine ranking and corporate identity.	
Regional portal codebase improvements	Feb 2013
GGUS metrics improvement and new A/R metrics	Feb 2013
Access Control improvements	Feb 2013
Manual metrics expansion and refinement	Aug 2013
New customized reports with Excel support	Aug 2013
Views enhancement and optimization	Aug 2013
GGUS metrics improvement and new A/R metrics	Aug 2013

4 SUMMARY

This document presents the current status of the operation tools one year before the end of the project and describes how the roadmap showed in MS708 [R 1] has been implemented.

Still it is important that the status of the tools and the requirements coming from the users are regularly assessed by the OTAG and JRA1. But it begins to show that the phase of consolidation has begun.

During the last years of the project and its predecessor projects the development plans were driven by the requirements coming from the users of the various scientific communities. Original plans and ideas had to be corrected, adapted or even to be dropped to fulfill the deviating or changed demands regarding a distributed computing infrastructure.

Now the presented roadmaps for the last year draws a clear picture for each tool of what has to be done to bring the project to a successful end.

5 REFERENCES

R 1	MS 708 Roadmap for the maintenance and development of the deployed operational tools https://documents.egi.eu/public/ShowDocument?docid=962
R 2	Homepage of the Operations Portal http://operations-portal.egi.eu/
R 3	Homepage of the GGUS Portal https://ggus.eu
R 4	MS410 EGI Helpdesk and the NGI support units: https://documents.egi.eu/document/522
R 5	xGUS homepage: http://xgus.scc.kit.edu
R 6	Homepage of the GOCDB https://goc.egi.eu/
R 7	GOCDB change log https://www.sysadmin.hep.ac.uk/svn/grid-monitoring/tags/gocdb/GOCDB-4.4/changeLog.txt
R 8	GOCDB failover instance https://goc.itwm.fraunhofer.de/portal/
R 9	MS706 Operational Tools Accounting Work Plan https://documents.egi.eu/public/ShowDocument?docid=531
R 10	EGI Accounting Portal: https://accounting.egi.eu
R 11	APEL/SSM https://wiki.egi.eu/wiki/APEL/SSM
R 12	Central SAM documentation https://wiki.egi.eu/wiki/SAM
R 13	SAM Update-17 Release notes https://tomtools.cern.ch/confluence/display/SAMDOC/Update-17.1
R 14	SAM Update-19 Release notes https://tomtools.cern.ch/confluence/display/SAMDOC/Update-19
R 15	SAM Update-20 Release notes https://tomtools.cern.ch/confluence/display/SAMDOC/Update-20
R 16	EGI Metrics Portal: https://metrics.egi.eu
R 17	GOCDB/Doctrine https://wiki.egi.eu/wiki/Doctrine
R 18	GOCDB/Release4/Development/conditionalCertificationStatusRules https://wiki.egi.eu/wiki/GOCDB/Release4/Development/conditionalCertificationStatusRules

R 19	GOCDB/Release4/Development/ExtensibilityMechanism https://wiki.egi.eu/wiki/GOCDB/Release4/Development/ExtensibilityMechanism
R 20	GOCDB/Release4/Development https://wiki.egi.eu/wiki/GOCDB/Release4/Development
R 21	MS705 - Operations Portal Roadmap https://documents.egi.eu/public/ShowDocument?docid=525
R 22	Homepage of Icinga https://www.icinga.org