EGEE-III

SLA ROADMAP

EU MILESTONE: MSA1.5

Document identifier: EGEE-III-MSA1.5-945524-v1_6.doc
Date: 16/09/2008
Activity: SA1: Grid Operations, Support and Management
Lead Partner: GRNET
Document status: DRAFT

Abstract: This document describes the plan for the implementation of Service Level Agreements (SLAs) within the EGEE-III project. It describes the current status of SLAs existing at National Grid Infrastructures, as well as the Service Level Agreement (SLA) that was developed in EGEE-II, the roadmap for a fully-implemented SLA in EGEE-III, and the possibilities of introducing new ones.
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</tr>
<tr>
<td>1-4</td>
</tr>
<tr>
<td>1-5</td>
</tr>
<tr>
<td>1-6</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

1 INTRODUCTION .......................................................................................................................... 5  
1.1 PURPOSE ................................................................................................................................. 5  
1.2 DOCUMENT ORGANISATION ................................................................................................. 5  
1.3 APPLICATION AREA ............................................................................................................... 5  
1.4 REFERENCES .......................................................................................................................... 5  
1.5 DOCUMENT AMENDMENT PROCEDURE ............................................................................... 5  
1.6 TERMINOLOGY ...................................................................................................................... 5  

2 EXECUTIVE SUMMARY ............................................................................................................ 7  

3 BACKGROUND ........................................................................................................................... 8  

4 STATUS OF SLA IN NATIONAL AND INTERNATIONAL GRID INFRASTRUCTURES ................. 8  
4.1 EGEE- CURRENT STATUS .................................................................................................... 8  
3.1.1 Status of SLA adoption in the EGEE ROCs ...................................................................... 9  
4.1.1.1 Asia Pacific ROC ........................................................................................................... 9  
4.1.1.2 Central European ROC ............................................................................................... 10  
4.1.1.3 CERN ROC .................................................................................................................. 10  
4.1.1.4 French ROC ................................................................................................................ 10  
4.1.1.5 German/Swiss ROC ................................................................................................... 10  
4.1.1.6 Italian ROC ................................................................................................................ 10  
4.1.1.7 Nordic Federation ROC ............................................................................................. 10  
4.1.1.8 Russian ROC .............................................................................................................. 11  
4.1.1.9 South East Europe ROC ............................................................................................. 11  
4.1.1.10 South West Europe ROC .......................................................................................... 11  
4.1.1.11 UK/Ireland ROC ........................................................................................................ 11  
4.2 Status of SLAs in Regional and National Grid Infrastructures ........................................... 11  

5 EGEE - SLA IMPLEMENTATION ................................................................................................ 12  
5.1 METRICS ............................................................................................................................... 12  
5.2 SERVICE REPORTING AND REVIEWING ......................................................................... 13  

6 FUTURE SLAS ............................................................................................................................ 14  
6.1 SLAs between VOs and sites ............................................................................................... 14  
6.2 SLAs between ROCs and Central Monitoring Tools Providers .......................................... 14  

7 ROADMAP FOR EGEE-III SLA IMPLEMENTATION ................................................................. 14  
7.1 IMPLEMENTATION AIMS ..................................................................................................... 14  
7.2 WORK ORGANIZATION ..................................................................................................... 15  
7.3 TIMEPLAN AND MILESTONES ......................................................................................... 16  

8 CONCLUSIONS .......................................................................................................................... 17
1 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to provide a roadmap for the definition and implementation of possible Service Level Agreements (SLAs) or Memorandum of Understandings (MoUs) for the operations of sites within the EGEE-III project. The purpose of Service Level Agreements is to establish a partnership between the infrastructure management structures and the resource centres (sites) in order to provide a specified quality of service to the users of resources. There are several aims when implementing and enforcing Service Level Agreements, namely: to ensure mutual understanding of the principles of cooperation between parties; to define the responsibilities of each party, to set the procedures for monitoring the fulfillment of commitments defined in the SLA; to define a set of requirements that satisfy the users and the operators of the infrastructure; and to establish reporting and problem solving procedures.

We describe the SLAs that are in place as well as the plans for implementation of SLAs within EGEE-III with the aim to create mechanisms to monitor and satisfy these SLAs as reliably as possible. The implementation details and the details of other possible SLAs are not given, since these will be defined during the project, based on practical experience.

1.2 DOCUMENT ORGANISATION

Following the executive summary (section 2), section 3 provides background information related to the existing SLA between ROCs and Sites and the terminology used to describe it. Section 4 provides a brief description of the status of SLAs in various national and international grid infrastructures, including the EGEE-II ROC-Site SLA, its rollout and monthly evaluation. Section 5 provides a description of the metrics implementation, the existing issues with their accuracy and the plans for implementing the metrics that are not yet measured. Section 6 describes the possibility of introducing new types of SLAs in the course of the EGEE-III project and the rational behind such activities. Section 6 provides a time plan for the implementation and improvement of the metrics calculation of the existing SLAs and also a time plan for the possible introduction of new types of SLA. Finally, Section 7 provides the conclusions of this document.

1.3 APPLICATION AREA

This document is aimed at various operations groups, site administrators, but also users within EGEE to describe the framework of collaboration and the offered level of quality of grid services.

1.4 REFERENCES

Table 1: Table of references

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<thead>
<tr>
<th>Reference</th>
<th>Description</th>
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<td>EGEE-II Service Level Description <a href="https://edms.cern.ch/file/860386/0.6/EGEE-ROC-Site-SLD-v1.5.pdf">https://edms.cern.ch/file/860386/0.6/EGEE-ROC-Site-SLD-v1.5.pdf</a></td>
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<tr>
<td>R 4</td>
<td>The UK NGS Service Level Description <a href="http://www.e-">http://www.e-</a></td>
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</tbody>
</table>
R 5 The INFN GRID MoU [http://egee-docs.web.cern.ch/egee-docs/list.php?dir=./sla/Example%20SLAs/Italian_ROC_MoU]/

R 6 The BALTIGRID SLA [https://edms.cern.ch/document/808844]

R 7 NETWORK SLS AND DRAFT SLA [https://edms.cern.ch/document/808844]

R 8 GridView Availability and Reliability Calculations [https://twiki.cern.ch/twiki/pub/LCG/GridView/Gridview_Service_Availability_Computation.pdf]

R 9 Monitoring and Visualization Tool for LCG [http://gridview.cern.ch/GRIDVIEW/]

1.5 DOCUMENT AMENDMENT PROCEDURE

Amendments, comments and suggestions should be sent to the authors. The procedures documented in the EGEE “Document Management Procedure” will be followed: [http://project-EGEE-III-na1-qa.web.cern.ch/project-EGEE-III-NA1-QA/EGEE-III/Procedures/DocManagmtProcedure/DocMngmt.htm].

1.6 TERMINOLOGY

This subsection provides the definitions of terms, acronyms, and abbreviations required to properly interpret this document. A complete project glossary is provided in the EGEE glossary [http://egee-technical.web.cern.ch/egee-technical/documents/glossary.htm].

**Definitions**

| SLA | An SLA ("Service Level Agreement") usually refers to a formally negotiated agreement between two parties. It is a contract that exists between customers and their service provider, client or between service providers. It records the common understanding about services, priorities, responsibilities, guarantee, and such — collectively, the level of service. For special restrictions on the use of this term in EGEE, please see the "background" section of this document. |
| SLD | Name given to the initial EGEE-II ROC-Site agreement, where “D” stands for Description. |
| OLA | An operational level agreement (OLA) defines the interdependent relationships among the internal support groups working to support a Service Level Agreement. The agreement describes the responsibilities of each internal support group toward other support groups, including the process and timeframe for delivery of their services. The objective of the OLA is to present a clear, concise and measurable description of the service provider's internal support relationships. |
Glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>OAT</td>
<td>Operations Automation Group</td>
</tr>
<tr>
<td>CE</td>
<td>Computing Element</td>
</tr>
<tr>
<td>GOCDB</td>
<td>Grid Operations Centre Database</td>
</tr>
<tr>
<td>ROC</td>
<td>Regional Operations Centre</td>
</tr>
<tr>
<td>SE</td>
<td>Storage Element</td>
</tr>
<tr>
<td>SLA</td>
<td>Service Level Agreement</td>
</tr>
<tr>
<td>SLD</td>
<td>Service Level Description</td>
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<tr>
<td>OLA</td>
<td>Operational Level Agreement</td>
</tr>
<tr>
<td>VO</td>
<td>Virtual Organization</td>
</tr>
<tr>
<td>WN</td>
<td>Worker Node</td>
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</table>

2 EXECUTIVE SUMMARY

Service Level Agreements facilitate the establishment of a partnership between the infrastructure management structures and the resource centres (sites) in order to provide a defined level of quality of services to the users of resources. There are several aims when implementing and enforcing Service Level Agreements. Such aims are: to ensure mutual understanding of the principles of cooperation between parties; to define the responsibilities of each party, to set the procedures for monitoring the fulfilment of commitments defined in the SLA; to define a set of requirements that satisfy the users and the operators of the infrastructure; and to establish reporting and problem-solving procedures.

Within EGEE-III, the Service Level Agreement defined in EGEE-II will be carefully implemented to ensure reliable metrics collection, full implementation of all metrics defined in this SLA and, finally, rollout of the SLA to almost all the EGEE sites. The SLA between ROCs and sites will be evaluated on a monthly basis, thus ensuring progress in reporting and corrective actions towards sites that do not fulfil the SLA, but also towards the accurate implementation of the metrics calculations mechanisms.

Furthermore, a set of new SLAs will be defined and provided as guidelines for the relevant parties to implement at their own discretion. These are the SLA between VOs or applications and sites, and the SLAs between the ROCs and Monitoring tools providers. The first SLA will ensure that individual VO requirements are satisfied as different applications have specific needs from the infrastructure. The second SLA will ensure that metrics calculations are provided accurately, and will ease the deployment and enforcement of SLAs between ROCs and sites or between VOs and sites.

To fulfil the above objectives, this roadmap defines the work plan of the SLA working group within EGEE-III and a time-plan for the implementation of the work of this group.

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1 In EGEE-II, it was initially decided to call the document a Service Level Description because there was concern, from some ROCs, about the legal implications of signing an SLA. Please refer to Section 3 for a detailed description of the EGEE SLA background and the terminology used.
3 BACKGROUND

In the early days of EGEE-II, the SA1 Activity leader decided that it would be useful to define in detail an agreement between ROCs and Sites, in view of gradually improving site reliability over time. Several EU Reviews had reported that there was a general lack of data concerning EGEE grid availability, and the Service Level Agreement working group (SLAG) and Metrics Implementation Group (MIG) were formed in early 2007 to address this issue.

One underlying goal of the envisaged Service Level Agreement was to define certain minimum thresholds that had to be met in order to become a member-site of the EGEE production infrastructure. It was also hoped that by creating an agreement with input from both parties, the following would be achieved:

- foster better communication between the two parties
- eliminate misunderstandings or ambiguities
- allow a better understanding of the roles and responsibilities of the respective parties
- identify Key Performance Indicators

It was clear from the outset, that it was not envisaged to introduce penalties for missing targets. Instead, it was thought that the publishing of a league table showing availability data would provide sufficient incentive for sites and ROCs to strive for improved service availability.

The structure of the document was modeled on the service management recommendations of ITIL (a widely-adopted collection of IT best practices), and drafts were circulated to ROCs and sites for comment. The SLAG also reviewed various existing agreements and Memoranda of Understanding used in other infrastructure projects.

Several regions, notably UK and Ireland, expressed concern that the name SLA had legal ramifications in their countries, and that the term "Service Level Description" could be used to work around this problem. This was agreed to, in the hope that it would ease the acceptance process and result in a faster rollout. The downside was that it resulted in confusion whenever the term was used outside the group of ROCs - especially in deliverables and presentations to the European Union.

In EGEE-III, we would like to use the industry-standard term SLA for the ROC-Site agreements. However, for those regions where this might pose a problem, they may choose to amend the name and continue to call it a Service Level Description, or other appropriate name. In any case, whatever its title, the document explicitly says that it is not legally binding.

Most occurrences of the term SLA in this document are used in this special sense, on the understanding that there is no legally binding agreement, and that it also includes the SLDs already signed by many ROCs and sites in EGEE-II.

4 STATUS OF SLA IN NATIONAL AND INTERNATIONAL GRID INFRASTRUCTURES

This section describes the current status of SLA implementations in both the EGEE infrastructure and in other regional and/or National Grid Infrastructures. It is intended to provide a summary of the status, the problems and the adoption of SLAs in Grid Infrastructures serving as a starting point for the definition of the SLA roadmap within EGEE-III.

4.1 EGEE- CURRENT STATUS

EGEE-II defined and partly implemented a Service Level Agreement (SLA) [R1] that defines the relationships between Regional Operations Centres (ROCs) and the Resource Centres (Sites) that the ROCs are responsible for. The motivation for defining this SLA was to ensure that a well-defined set of obligations for both the ROCs and Sites was defined for the benefit of the quality of the
infrastructure delivered to the end users. This SLA is generic enough to cover the basic metrics for ensuring the quality of the infrastructure and the support mechanisms and procedures that will provide an acceptable level of service for all Grid users and especially the ones from Virtual Organizations that do not have the resources to monitor and enforce their own quality criteria to sites that support them.

The main contents of the EGEE-II SLA are summarised below.

The parties of this Service Level Agreement are the EGEE ROCs and the Sites that belong to the corresponding ROC. The agreement is valid as long as a site is part of the EGEE infrastructure and is registered in GOCDB as production and certified. The SLA can be amended at any time by mutual agreement of the ROC and the site that have signed the SLA. The SLA defines obligations for both ROCs and Sites.

In summary, ROCs have to:

- Provide a Help Desk facility to facilitate trouble-ticketing resolution for the supporting sites
- Ensure that the appropriate site managers will be provided with trouble ticketing information.
- Follow-up of tickets and provision of advice to site administrators in a timely manner.
- Manage and support the deployment of middleware in sites.
- Provide all relevant information to sites regarding operations and follow up the specific site issues in the weekly operations meetings.

In summary, the Sites have to:

- Adhere to EGEE-specified policies and procedures
- Maintain accurate details for their resources, site administrators and security contacts
- Provide a minimum set of hardware resources and services to the infrastructure
- Define the service hours for their sites.
- Conform to availability and reliability criteria
- Conform to incident response time requirements
- Support certain types of Virtual Organizations, i.e. the ops VO used for operational tests and at least one more user community VO.

Service reporting and reviewing is done on a monthly basis and it is important to note that there are no penalties associated with this SLA. However, the results of the service reporting and reviewing are made public to the EGEE community and management structures.

### 3.1.1 Status of SLA adoption in the EGEE ROCs

The EGEE-II SLA in its current format has been accepted by the sites and ROCs at the end of 2007 and its application and monitoring started in January 2008. Although service reviewing is done on a monthly basis, none of the sites or ROCs had signed the SLA by January 2008. At the time of writing this milestone document, the process of signing is ongoing, with some EGEE sites having already signed. The following sections provide a summary of the status of signing the EGEE SLA from the EGEE ROCs.

#### 4.1.1.1 Asia Pacific ROC

Asia Pacific SLA deployment has been delayed. They have recently defined the process and sent out all relevant information to sites in the region to sign the SLA. They plan to have the majority of sites to complete the SLA signing process by the end of August. So far there has been no major issues raised, but some of the sites are still evaluating the situation. They currently expect to have the first SLA signed soon. The Asia Pacific ROC has made two modifications to the SLA. First is to clarify
that the 4 hour response time refers specifically to business hours, and the second modification is to add the support for dteam VO at each site to facilitate regional operations support.

4.1.1.2 Central European ROC
At the last CE regional meeting, sites disagreed to start at this stage a procedure of signing SLAs. They worried about the accuracy of SLA metrics monitoring and the possibility to comment when the values are not met. Instead, a preparatory step was proposed and accepted, to agree metrics level and check monitored values against them. After the testing period, if the outcome is that monitoring tools are mature, the SLA will be signed. Currently, the process of agreeing SLA metrics between sites and the ROC is in progress.

4.1.1.3 CERN ROC
The CERN ROC initiated the signing of the SLA using PDF documents with digital signatures. So far, four out of fifteen sites supported by ROC CERN, have signed the SLA.

4.1.1.4 French ROC
The large majority of sites in France are already bound by the LCG MoUs, and the remaining ones are either (very) small or not EGEE sites. The issue is going to be tackled in the following months, but will probably wait until the creation of an NGI is more advanced.

4.1.1.5 German/ Swiss ROC
They have produced a slightly modified local version that was presented to the production sites in one of the last regional operations meeting in June this year (a different version of this document has been discussed already several times in the past).

They had given the sites some time to comment on this. Since no objections were received, they are about to start the formal process of having the document signed by all production sites. A first site has already agreed to do so very soon.

4.1.1.6 Italian ROC
The Italian ROC has been delaying the distribution of the SLA to the sites for two reasons:
1. They needed to understand better the process for site managers to get availability/reliability statistics amended in case of SAM or middleware problems which are not under their control.
2. They are investing effort to support sites to improve their monthly statistics. They have a fairly large number of small sites that are not in the position today to meet the availability/reliability requirements specified in the SLA. This process will take some time, it is still ongoing.

The Italian ROC is now working on a different SLA version, which includes corrections/additions specific to their region.

The Italian ROC already has a MoU signed with 18 sites. This MoU came earlier than the SLA. They are planning to replace the INFN Grid MoU with the EGEE SLA.

4.1.1.7 Nordic Federation ROC
For the Nordic federation the first issue was to decide which body should sign for the ROC. This is because of the distributed nature of the ROC. They have now concluded that SNIC will sign for the ROC. After that, a discussion took place with the sites. All sites have now agreed to sign, and it is expected that the signature process is completed by the end of August.
4.1.1.8 **Russian ROC**

SLA deployment in Russian ROC should be finished during September-October 2008. Russian ROC sites have to more precisely understand how the reliability/availability depends on the SAM test problems and the problems with gLite Middleware that is not under full control of local administrators. The Russian ROC is also working toward a modified version of the SLA that will address specific regional issues.

4.1.1.9 **South East Europe ROC**

In the SEE ROC, so far two sites from Serbia have signed the EGEE SLA. The SEE ROC is negotiating the process of signing the SLA in each country separately due to the distributed nature of the ROC. Response from most of the countries is, at the moment, positive towards the signature of the SLA as it is. Various modifications in the metrics threshold might be put in place based on the quality and the capabilities of the different sites. It is expected that most of the sites in SEE ROC will sign the SLA soon.

4.1.1.10 **South West Europe ROC**

At the moment of writing this document, the South West Europe ROC has made good progress in signing the SLA document, with 13 sites having signed. Progress can be tracked at [http://www.egee.cesga.es/EGEE-SA1-SWE/accounting/sld.html](http://www.egee.cesga.es/EGEE-SA1-SWE/accounting/sld.html).

4.1.1.11 **UK/Ireland ROC**

The UKI ROC will have an agreement with each of their three constituent grids and not with each individual site. These have all been agreed in principle and there are active negotiations on the exact form of the agreement, using the EGEE SLD as a template. All three Grids already have SLDs and/or MoUs with their sites which cover much of the same scope as the EGEE SLD.

One issue that has arisen so far is concern that the document is not explicit enough about response times. In the document body it does mention GOCDB defined office hours, but the table of metrics does not. Thus “Maximum time to acknowledge GGUS tickets” needs to refer to additional text “During site office hours as defined in the GOCDB”. There is also an issue about what constitutes an “incident” vs a “problem”. The background is that not all incidents can be resolved quickly due to middleware and other dependencies.

There are also concerns on the achievements of the SLD goals due to the effort available for site management since not all sites can easily fulfill the SLD obligations with the current effort. UKI opinion is that this should not be a reason for sites to be removed from the EGEE infrastructure, as their resources are valuable.

4.2 **STATUS OF SLAS IN REGIONAL AND NATIONAL GRID INFRASTRUCTURES**

Several other regional or national grid infrastructures or projects had already in place similar definitions of their service levels to satisfy user and operational requirements. The definitions are in the form of Service Level Agreements or Memoranda of Understanding (MoUs). A brief description of these agreements follows.

The WLCG MoU [R2] defines the qualitative aspects of the Computing Resources and the Service Levels, depending on the Tier Level of each centre participating in the WLCG project. The WLCG MoU is designed specifically to cover the computational and storage needs for the LCG experiments, covering aspects from network connectivity, hosting of specific services in different Tiers, the amount of hardware resources offered to each of the LHC VOs and the level of support (ticket response times).
The **SEE-GRID SLA** [R3] is a pilot SLA that is implemented between the SEE-GRID-2 project and the sites of the South East Europe Regional infrastructure. It was implemented since the 4th Quarter of 2007 by the SEE-GRID-2 project and is similar to the EGEE-II SLA, implementing metrics such as the amount of hardware resources offered to the infrastructure by sites, the level of support and expertise of the sites, fulfilment of operational metrics and VO support. Similar to the EGEE-II SLA, it also covers the obligations of the SEE-GRID ROC and the project towards the sites.

The **UK NGS Service Level Descriptions** [R4] define technical and administrative requirements in the areas of management board composition and operations, support staff, hardware resources, availability of resources, monitoring of hardware resources, provided software, network connectivity and management structure.

The **INFN Grid MoU** [R5] defines obligations of sites such as minimum level of hardware resources offered to the Italian Grid infrastructure, guarantee of sufficient manpower for the site management, response to trouble tickets in a timely manner, site monitoring, and specific VO support.

The **BALTICGRID SLA** [R6] does not deal with the management of Grid resources such as computation and storage, but describes the relationship between the BaltiGrid Project and the NRENs aiming at providing the required networking resources to the users of the Grid infrastructure. The SLA describes various levels of service that the underlying network should provide to the grid users as well as the procedures for network related problem solving.

Another network resource oriented SLA is the **EGEE SA2 SLA** [R7] that defines the procedures for establishing end-to-end SLAs covering the full network path among the involved EGEE Resource Centres (RCs), namely the MAN/Campus/Institution networks, the involved NRENs and the GEANT2 network. In addition, it proposes monitoring and troubleshooting operations regarding SLAs.

## 5 EGEE - SLA IMPLEMENTATION

### 5.1 METRICS

The list of metrics defined in the EGEE-II SLA with their indicative values is depicted in Table 2.

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<tr>
<th>Metric</th>
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<td>Minimum number of site BDIs</td>
<td>one</td>
<td>8</td>
</tr>
<tr>
<td>Minimum number of CEs or SEs</td>
<td>one</td>
<td>8</td>
</tr>
<tr>
<td>Minimum number of WN CPUs/cores</td>
<td>eight</td>
<td>8</td>
</tr>
<tr>
<td>Minimum capacity of SE(s)</td>
<td>one TB</td>
<td>8</td>
</tr>
<tr>
<td>Minimum site availability</td>
<td>70%</td>
<td>10</td>
</tr>
<tr>
<td>Minimum site reliability</td>
<td>75%</td>
<td>10</td>
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<tr>
<td>Period of availability/reliability/outage calculations</td>
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<tr>
<td>Minimum number of system administrators</td>
<td>one</td>
<td>11</td>
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<tr>
<td>Maximum time to acknowledge GGUS tickets</td>
<td>four hours</td>
<td>11</td>
</tr>
<tr>
<td>Maximum time to resolve GGUS incidents</td>
<td>five working days</td>
<td>11</td>
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<tr>
<td>Minimum number of supported user-community VO s</td>
<td>one</td>
<td>11</td>
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<tr>
<td>Tracking of SLA conformance</td>
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</tbody>
</table>

Table 2 - The SLA Table of Metrics
In the following, we provide an analysis on the implementation of each metric, its current status and further implementation plans and necessary actions. Further reference on the metrics calculations can be found at: http://egee-docs.web.cern.ch/egee-docs/list.php?dir=./mig/production/& under the section “Service Level Definitions (SLD)”

- **Site BDII**: Number and availability. This information is available in GridView, SAM, GSTAT, GridMap, GOCDB and R-GMA.
- **CEs and SEs**: Number and availability. This information is available in GridView, SAM, GSTAT, GridMap, GridICE and GOCDB.
- **WN**: Number of CPUs or cores. This information is available in GSTAT, GridICE and R-GMA.
- **SE**: Capacity. This information is available in GSTAT, GridICE and R-GMA.
- **Site**: Availability. This information is available in GridView, GridMap and GridICE. The methodology of availability calculation is defined at [R8]
- **Site**: Reliability. This information is available in GridView, and GridMap. The methodology of availability calculation is defined at [R8]
- **The period of availability/reliability/outage calculations is per month**: No specific implementation is necessary for this metric.
- **System administrators**: Number. This information is available in GOCDB and R-GMA.
- **GGUS**: Maximum time for sites to acknowledge GGUS tickets. No specific implementation is available for this metric. It is envisaged that this metric will be implemented by each ROC individually as there is no way to calculate the metric via GGUS since the tickets are assigned to ROC and not sites in GGUS. The assignment of ticket to specific sites is done internally in the individual ROC helpdesks and therefore the ROCs have to implement the measuring mechanisms for this metric.
- **GGUS**: Maximum time for sites to resolve GGUS incidents. No specific implementation is available for this metric. Similarly to the previous metric, the ROCs have to implement this metric using their individual helpdesks where tickets are assigned to sites.
- **Supported user-community VOs**: Number. This information is available in the CESGA Accounting Portal and GridICE.
- **Tracking of SLA conformance is monthly**: No specific implementation is necessary for this metric.

### 5.2 SERVICE REPORTING AND REVIEWING

Currently, service reporting and reviewing is done on a monthly basis. The specific metrics that are reviewed and reported are the availability and reliability of sites in each ROC in a monthly interval. The statistics for reliability and availability are generated automatically each month using GridView [R9]. An automatic report is sent to ROCs and EGEE SA1 management for further evaluation. The contents of this report are: the overall availability and reliability of sites in each region (mean values over all site of the region); the performance of individual sites in relation to availability and reliability provided per ROC. Data for the previous three months on availability is given in order to understand the progress of the quality offered by sites over time. Furthermore, a league table with all the production sites participating in the EGEE infrastructure is provided with the sites sorted based on their availability.

The ROCs distribute these reports to their sites and request for comments either when the metrics do not fulfil the threshold in the SLA, or when the sites identify inaccuracies in the metrics calculations. That way, the ROCs can identify possible problems with their sites and try to resolve them but also
sites can report problems identified with the metrics calculation so that they are corrected and calculations become more reliable.

In EGEE-III, monthly reporting and reviewing will continue and as more metrics become available they will be added to the monthly reports. The process of sites reporting possible problems with their performance or with the metrics calculations will be formalised so that this information becomes available to all relevant parties, as it is the case with the monthly metrics evaluation reports.

6 FUTURE SLAS

This section provides a brief description of the SLAs that will be provided as SLA templates in EGEE-III. The project does not intend to implement and enforce such SLAs but rather to provide guidelines to relevant parties on their implementation. The relevant parties can then decide to implement such SLAs based on these SLA templates.

6.1 SLAS BETWEEN VOS AND SITES

The current EGEE SLA is a generic one that identifies basic metrics aimed at achieving a better overall quality of service to the users of the infrastructure. It is designed to satisfy the majority of users without taking into account particular user requirements.

However, particular VOs have different requirements than the ones specified in the generic SLA. In order to satisfy their requirements, specific SLAs between a particular VOs or users of this VO with the sites are required. With the SLAs between VOs and sites, the users can be reassured that they will receive the resources that they need with the quality and support required within specific time frames. Differentiation between sites can also be desirable as, for example, in the WLCG MoU where different Tiers are defined to fulfil different requirements of the experiments.

Example metrics that those SLAs can contain and are not available in the generic SLA that is already defined are: the amount of resources offered by a site at particular time periods; the time that data has to be preserved in particular sites; the networking connectivity of those sites in case of special bandwidth requirements of the VOs and their applications; the maintenance of special software or services on those sites; availability and reliability of core VO services etc.

6.2 SLAS BETWEEN ROCS AND CENTRAL MONITORING TOOLS PROVIDERS

One of the issues identified during the process of enforcing the SLA between ROCs and sites is the reliability of metrics calculations. To ensure that SLA metrics are accurately provided and there are no disputes between sites and ROCs on the metrics calculations, special SLAs have to be defined between ROCs and the providers of monitoring tools. The main characteristics of such monitoring services are to be highly available, to be able to identify the reasons of failures in metrics calculations and to be able to provide corrections in case of failures. Therefore, this type of SLA is considered a facilitator for the easier adoption of SLAs between sites and ROCs/NGIs or between VOs and sites in case such SLAs are implemented and enforced.

7 ROADMAP FOR EGEE-III SLA IMPLEMENTATION

7.1 IMPLEMENTATION AIMS

The main objectives of the work related to SLAs in EGEE-III are the following:

- Finalise the implementation of the SLA metrics and make them as reliable as possible.
- Sign the SLAs between the sites and their corresponding ROCs.
• Evaluate the progress of sites regarding the fulfilment of the SLA metrics. As the main aim of the SLA is to improve the quality of services that are offered to users, an evaluation of the quality has to be performed over time to identify improvements or degradations of services.

• Design and propose draft SLAs between VOs and sites and between providers of central monitoring services and the EGEE management.

The status of metrics implementation for the current EGEE SLA has been described in Section 5.1. A first step in the work plan of the SLA roadmap in EGEE-III is the full implementation of the SLA metrics as described in Section 5.1. Following the implementation of each metric, it will be evaluated on a monthly basis following the current procedure. The aim of this testing procedure is the elimination of any inconsistencies and inaccuracies in the metrics implementation. Both ROCs and Sites are expected to provide their feedback on a monthly basis if they find any problems with the reports they receive.

The next step in the process of the SLA introduction to all sites is the actual signature of the SLA between ROCs and sites. It is envisaged that not all sites will sign the SLA as it is. The ROCs and sites are free to decide on the exact limits that they want to specify. Further clarifications on the text of the SLA can also be introduced in order to facilitate easier adoption of the SLA by all sites in all ROCs. The main reason for allowing different levels of metrics thresholds is that although EGEE is a production infrastructure, not all sites are expected to offer the same high levels of service. In cases that VOs have special requirements in terms of those thresholds or any additional metrics requirements these could be addressed in special SLAs between VOs and sites as discussed in section 6.1. ROCs are free to decide which sites are expected to provide higher quality of services and which ones can provide lower level of services but still participate in the infrastructure.

Finally, the SLA will be evaluated on a monthly basis, and exceptions will be raised between ROC and sites but also escalated to the SA1 management if they are not resolved. In these cases, sites or ROCs are expected to provide a report justifying the reasons for the violation in the reporting period. Incidents of consecutive or unjustified violations will be escalated to SA1 management and discussed in the SA1 coordination or operations meetings. The exact escalation procedure has yet to be defined.

The third aim of the SLA Roadmap is to define a couple of SLAs that would be beneficial for the improvement of the infrastructure operations and the quality of service offered to specific users or Virtual Organizations. The aim of EGEE-III is not to implement such SLAs, but to provide the guidelines and templates for their introduction in the pan European Grid infrastructure. As described in Sections 6.1 and 6.2, two different types of SLAs are envisaged to be defined in EGEE-III: the SLA between the VOs and sites, and the SLA between the ROCs and the providers of core monitoring and operational tools.

For the SLA between VOs and sites, close collaboration with NA4 is needed as the exact requirements of specific user groups have to be identified and passed to the operations experts so that the definition of obligations of both users and sites are properly defined aiming at the provision of better services for the users.

The SLA between the ROCs and monitoring and operational tools providers will be defined within SA1 since the requirements for such SLAs are relevant to operations only.

The following sections describe the work organization and the time plan for the implementation of the SLA Roadmap.

7.2 WORK ORGANIZATION

EGEE-II appointed the SLA working group for the definition of the existing operational SLA. The SLA working group had to identify similar SLAs that could act as guidance for the creation of the EGEE-II SLA, extract the relevant points from them, and then propose and define the SLA in its
current form. Implementation of the SLA metrics was not a responsibility of the SLA working group but guidance and coordination from members of the group was provided to teams implementing the metrics, such as the GridView team and the metrics implementation working group of EGEE-II (MIG).

In EGEE-III, for the implementation of the proposed roadmap, the SLA working group will be put in place again. Members of this group will be at least one operational person from each ROC that participates in EGEE-III. The mandate of the SLA working group is as follows:

• Coordinate the implementation of the already defined SLA metrics in collaboration with tools developers and the OAT.
• Coordinate the signing of SLAs between the EGEE ROCs and their sites.
• Overlook the progress of the SLA evaluation on a monthly basis and coordinate escalation issues and disputes.
• Evaluate the progress of the quality of services offered by the sites and ROCs over time.
• Collect relevant examples of other possible SLAs of interest to the EGEE operational and user communities (as specified in this document) and make them available within the working group.
• Identify the broad areas, which the new SLA should cover.
• Collaborate with NA4 to identify the needs of users in relation to VOs/Sites SLAs
• Define relevant SLAs and draft templates of those.

The SLA working group will not:

• Implement the metrics defined in the SLA.
• Coordinate the implementation or signature of the newly defined SLA as this will be only templates that could be possibly used by interested VOs or operational and monitoring tools maintainers.

### 7.3 TIMEPLAN AND MILESTONES

The work described in this Milestone document will be organised as follows:

• At month 6 of the project the SLA working group will be in place. (MSLA-1)
• At month 12 of the project all the metrics of the current SLA will be in place and monthly evaluation of them will be available to all ROCs and sites. Further to that the majority of sites should sign the SLA with their ROCs by that time. (MSLA-2)
• At month 18 the SLA working group needs to have a first draft version of the new SLAs that where specified in this Roadmap. The SLA between VOs and sites will be specified in collaboration with NA4. (MSLA-3)
• At month 24 of the project a final draft of the new SLAs will be put in place and be available for any interested parties to use.

Figure 1 illustrates the SLA Roadmap milestones.
8 CONCLUSIONS

Service Level Agreements facilitate the establishment of a partnership between the infrastructure management structures and the resource centres (sites) in order to provide a level of quality of services to the users of resources. Within EGEE-III, the Service Level Agreement defined in EGEE-II will be carefully implemented to ensure reliable metrics collection, full implementation of all metrics defined in this SLA and, finally, rollout of the SLA to almost all the EGEE sites. The SLA between ROCs and sites will be evaluated on a monthly basis ensuring progress reporting and corrective actions towards sites that do not fulfil the SLA but also towards the accurate implementation of the metrics calculations mechanisms.

Further to that, a set of new SLAs will be defined and provided as templates to the relevant parties. These are the SLA between VOs or applications and sites, and the SLAs between the ROCs and Monitoring tools providers. To fulfil the above objectives, this roadmap defines the work plan of the SLA working group within EGEE-III and a time-plan for the implementation of work of this group.