



034115

PHOSPHORUS

Lambda User Controlled Infrastructure for European Research

Integrated Project

Strategic objective:  
Research Networking Testbeds



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## **Annual Report on Standardisation Activities**

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## **Annual Report on Standardisation Activities**

### **Abstract**

This deliverable presents a detailed report on all standardisation activities during the first 18 months of the project. The deliverable is structured according to the activities of the PHOSPHORUS partners in different research and working groups of the Open Grid Forum. It is the periodic update of D7.2.2 version 1.1, which was covering the first year's activities. A third version of the deliverables will be produced at month 30 covering the whole duration of the project.



# Table of Contents

0	Executive Summary	6
1	Collection of information	7
1.1	Information requested for D7.2.2 at month 12	7
2	Collected information	8
2.1	FI-RG – Firewall Research Group	8
2.1.1	Group description	8
2.1.2	Partners active in this research group	8
2.1.3	What is the subject of the contribution?	8
2.1.4	Partner/ Person leading this effort in that research group	9
2.1.5	Role in that research group	9
2.1.6	Expected outcome and tentative date	9
2.1.7	State of the work (e.g. under way, draft, proposed, recommendation)	9
2.2	GHPN-RG – Grid High Performance Networking Research Group	9
2.2.1	Group description	9
2.2.2	Partners active in this research group	10
2.2.3	What is the subject of the contribution?	10
2.2.4	Partner/ Person leading this effort in that research group	11
2.2.5	Role in that research group	11
2.2.6	Expected outcome and tentative date	11
2.2.7	State of the work (e.g. under way, draft, proposed, recommendation)	11
2.3	GRAAP-WG – Grid Resource Allocation Agreement Protocol Working Group	12
2.3.1	Group description	12
2.3.2	Partners active in this working group	12
2.3.3	What is the subject of the contribution?	12
2.3.4	Partner/ Person leading this effort in that working group	13
2.3.5	Role in that working group	13
2.3.6	Expected outcome and tentative date	13
2.3.7	State of the work (e.g. under way, draft, proposed, recommendation)	13
2.4	GSA-RG – Grid Scheduling Architecture Research Group	14
2.4.1	Group description	14
2.4.2	Partners active in this research group	14

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## Annual Report on Standardisation Activities

2.4.3	What is the subject of the contribution?	14
2.4.4	Partner/ Person leading this effort in that research group	14
2.4.5	Role in that research group	15
2.4.6	Expected outcome and tentative date	15
2.4.7	State of the work (e.g. under way, draft, proposed, recommendation)	15
2.5	JSDL-WG – Job Submission Description Language Working Group	15
2.5.1	Group description	15
2.5.2	Partners active in this working group	16
2.5.3	What is the subject of the contribution?	16
2.5.4	Partner/ Person leading this effort in that working group	16
2.5.5	Role in that working group	16
2.5.6	Expected outcome and tentative date	16
2.5.7	State of the work (e.g. under way, draft, proposed, recommendation)	16
2.6	NML-WG - Network Mark-up Language Working Group	17
2.6.1	Group description	17
2.6.2	Partners active in this working group	17
2.6.3	What is the subject of the contribution?	17
2.6.4	Partner/ Person leading this effort in that working group	17
2.6.5	Role in that working group	18
2.6.6	Expected outcome and tentative date	18
2.6.7	State of the work (e.g. under way, draft, proposed, recommendation)	18
2.7	NM-WG - Network Measurements Working Group	18
2.7.1	Group description	18
2.7.2	Partners active in this working group	18
2.7.3	What is the subject of the contribution?	19
2.7.4	Partner/ Person leading this effort in that working group	19
2.7.5	Role in that working group	19
2.7.6	Expected outcome and tentative date	19
2.7.7	State of the work (e.g. under way, draft, proposed, recommendation)	19
2.8	OGSA-AUTHZ-WG – OGSA Authorization Working Group	19
2.8.1	Group description	19
2.8.2	Partners active in this working group	20
2.8.3	What is the subject of the contribution?	20
2.8.4	Partner/ Person leading this effort in that working group	20
2.8.5	Role in that working group	20
	Expected outcome and tentative date	20

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## Annual Report on Standardisation Activities

2.8.6	20	
2.8.7	State of the work (e.g. under way, draft, proposed, recommendation)	20
2.9	OGSA-RSS-WG – OGSA Resource Selection Service Working Group	21
2.9.1	Group description	21
2.9.2	Partners active in this working group	21
2.9.3	What is the subject of the contribution?	21
2.9.4	Partner/ Person leading this effort in that working group	21
2.9.5	Role in that working group	21
2.9.6	Expected outcome and tentative date	22
2.9.7	State of the work (e.g. under way, draft, proposed, recommendation)	22
2.10	WFM-RG – Workflow Management Research Group	22
2.10.1	Group description	22
2.10.2	Partners active in this research group	22
2.10.3	What is the subject of the contribution?	22
2.10.4	Partner/ Person leading this effort in that research group	22
2.10.5	Role in that research group	23
2.10.6	Expected outcome and tentative date	23
2.10.7	State of the work (e.g. under way, draft, proposed, recommendation)	23
3	Conclusions	24
4	Acronyms	25
Appendix A	27	
	Open Grid Forum Overview	27
	Who We Are	27
	The OGF Mission	27
	A Brief History	27

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## 0 Executive Summary

This report describes the current status of standardisation activities seen as relevant to PHOSPHORUS by the project partners of PHOSPHORUS. It also describes partners' ongoing contributions to standardisation relevant to the objectives of the PHOSPHORUS.

The standardisation activities of partners of PHOSPHORUS are focusing on participation in different research groups and working groups of the Open Grid Forum (OGF). PHOSPHORUS partners are active in the following groups:

<b>FI-RG</b>	Firewall Issues Research Group
<b>GHPN-RG</b>	Grid High Performance Networking Research Group
<b>GRAAP-WG</b>	Grid Resource Allocation Agreement Protocol Working Group
<b>GSA-RG</b>	Grid Scheduling Architecture Research Group
<b>JSDL-WG</b>	Job Submission Description Language Working Group
<b>NML-WG</b>	Network Markup Language Working Group
<b>NM-WG</b>	Network Measurements Working Group
<b>OGSA-AUTHZ-WG</b>	OGSA Authorisation Working Group
<b>OGSA-RSS-WG</b>	Open Grid Service Architecture Resource Selection Working Group
<b>WFM-RG</b>	Workflow Management Research Group

The development of standards is restricted to the working groups while research groups are dedicated towards presentation and discussion of ongoing or planned work in the respective area and to join forces. The state of technology in these areas or the direction the development of these technologies will take usually are not mature enough to start creating a standard immediately. However, these groups will spin-off working groups targeting on standards once the need for the development of a standard is recognised.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



# 1 Collection of information

In order to collect information for this deliverable a mail was sent out on the general assembly list asking the members of the collaboration to deliver updated information on contributions and activities of Phosphorus in standardization organisations described in the previous version of this deliverable D7.2.2 version 1.1 produced at month 12 of the project. These activities are particularly important since we try to let different networks inter-work on control and service plane in order to deliver hybrid services, and obviously we aim for open standards.

## 1.1 Information requested for D7.2.2 at month 12

1. What is the subject of your contribution?
2. Person/partner leading this STD effort in that organisation
3. Standards organisation where contribution is made
4. Working/research group
5. Role in that organisation
6. Expected outcome and tentative date
7. State of the work (e.g. under way, draft, proposed, recommendation)
8. Any other information

The information received from the PHOSPHORUS partners updated with their contributions received at month 18 is presented in the next chapter.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## 2 Collected information

### 2.1 FI-RG – Firewall Research Group

#### 2.1.1 Group description

The research group will first document the type of issues that Grid applications experience when the need arises to control data transport policy enforcement devices (firewalls, packet filter, application gateways). Once the types of issues have been identified, the group will relate these issues to specific categories of enforcement devices.

This research group is not working on standards but carries out activities to investigate the group's topic and to potentially spin-off an OGF working group later to work on standards.

Link to group's page at OGF website: [http://www.ogf.org/gf/group\\_info/view.php?group=fi-rg](http://www.ogf.org/gf/group_info/view.php?group=fi-rg)

#### 2.1.2 Partners active in this research group

FZJ, UVA

#### 2.1.3 What is the subject of the contribution?

FZJ and UVA contributed to the research group's document "Firewall issues overview"

OGF Document: GFD.83.pdf

Link to document: <http://www.ogf.org/documents/GFD.83.pdf>

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>





## Annual Report on Standardisation Activities

### 2.1.4 Partner/ Person leading this effort in that research group

UVA: Leon Gommans

FZJ: Ralph Niederberger

### 2.1.5 Role in that research group

Leon Gommans: Co-chair

Ralph Niederberger: Co-chair

### 2.1.6 Expected outcome and tentative date

The outcome of the RG effort is a document describing problems and requirements to the organisational and enterprise firewalls, in particular to on-demand and high-performance optical networks.

### 2.1.7 State of the work (e.g. under way, draft, proposed, recommendation)

The group has published one document as OGF informational document ("Firewall issues overview"). Two others are in preparation:

The second document (draft) of FI-RG is describing existing solutions allowing grid applications traversing firewalls

The third document (draft) of FI-RG evaluating approaches and solutions (for firewall issues) such as application level gateways, host based firewalls, VPN style gateways etc.

## 2.2 GHPN-RG – Grid High Performance Networking Research Group

### 2.2.1 Group description

The Grid High-Performance Networking Research Group focuses on the relationship between network research and Grid application and infrastructure development. Two specific goals of the GHPN-RG are

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



### Annual Report on Standardisation Activities

identifying a) grid application requirements and implementations that are not supported or understood by the networking community, and b) advanced networking features that are not being utilized by grid applications.

This research group is not working on standards but carries out activities to investigate the group's topic and to potentially spin-off an OGF working group later to work on standards.

Link to group's page at OGF website:

[http://www.ogf.org/gf/group\\_info/view.php?group=ghpn-rg](http://www.ogf.org/gf/group_info/view.php?group=ghpn-rg)

### 2.2.2 Partners active in this research group

FHG, NXW, UESSEX, UVA

### 2.2.3 What is the subject of the contribution?

FHG contributed requirements and use-cases for Service Level Agreements on network usage, e.g. reservation and co-allocation with other types of resources.

UESSEX, NXW and FHG contributed to the research group draft on "Grid User Network Interface (GUNI)". This document was presented in OGF22 (Boston, Feb. 2008). A WG Charter will be submitted towards the formation of a Working Group targeting the formal standardization of the interface. A BoF will be organized at OGF23 (Barcelona, June 2008) to consult the wider community.

NXW and UESSEX also contributed to the research group's draft documents "Grid Optical Burst Switched Networks – GOBS". The documents continued their evolution path into the research group and were revised and discussed at the various OGF meetings. Fundamental inputs to this standardization work derived from the completion of the design activities on G<sup>2</sup>MPLS Control Plane carried out in Phosphorus WP2. This document passed its public comments period and external review. It is due to be published by end of March.

IBBT contributed to the research group's draft documents "Grid Optical Burst Switched Networks – GOBS"

Link to documents:

GOBS: <https://forge.gridforum.org/sf/go/doc14108?nav=1>

G-OUNI: <https://forge.gridforum.org/sf/go/doc15126?nav=1>

Moreover, the group has published an informational document: Grid Network Services Use Cases from the e-Science Community. The document can be found here:

<http://www.ogf.org/documents/GFD.122.pdf>

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## Annual Report on Standardisation Activities

### 2.2.4 Partner/ Person leading this effort in that research group

FHG:	Wolfgang Ziegler
NXW:	Nicola Ciulli
UESSEX:	Dimitra Simeonidou, Eduard Escalona
IBBT:	Bart Dhoedt
UVA:	Cees de Laat

### 2.2.5 Role in that research group

Nicola Ciulli	Contributing Member
Eduard Escalona	Contributing Member
Cees de Laat:	Co-chair
Dimitra Simeonidou:	Co-chair
Wolfgang Ziegler:	Contributing Member

### 2.2.6 Expected outcome and tentative date

Documents discussing issues of Grid high performance networking, especially in the optical domain, that might be important to standardise. The group may spin-off a working group later to work on specific standards.

Raise awareness and consensus, in both the grid and networking research communities, about the definition and architectural positioning of the Network Interface for grid user services, initial promotion of these concepts at the industry.

### 2.2.7 State of the work (e.g. under way, draft, proposed, recommendation)

Work in progress, with continuous updates.

Latest release is as of Feb 2008.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



#### Annual Report on Standardisation Activities

The group has not yet published a document in the series of OGF documents. Two documents are in preparation:

Grid Optical Burst Switched Networks – GOBS

Grid Optical User Network Interface (G.OUNI)

## 2.3 GRAAP-WG – Grid Resource Allocation Agreement Protocol Working Group

### 2.3.1 Group description

The goal of the GRAAP Working Group is to produce a set of specifications and supporting documents which describe methods and means to establish Service Level Agreements between different entities in a distributed environment. The WS-Agreement Specification V1.0, a Web Services protocol to establish agreements between two services, has been published in May 2007 as an OGF Proposed Recommendation (see GFD.107). Currently, the group focuses on WS-Agreement interoperability and usage scenarios.

This group works on standards.

Link to group's page at OGF website:

[http://www.ogf.org/gf/group\\_info/view.php?group=graap-wg](http://www.ogf.org/gf/group_info/view.php?group=graap-wg)

### 2.3.2 Partners active in this working group

FHG

### 2.3.3 What is the subject of the contribution?

FHG contributed to the development of WS-Agreement. Since the OGF20 meeting of the working group FHG realised together with the Technical University of Berlin an interoperable Grid scheduler applications using WS-Agreement for the exchange of Grid jobs. The two code-independent implementations will be used to prepare the experimental document that will describe the experiments, the interoperability and conformance tests and their results. Based on this document the Grid Forum Steering Group will later decide on the transition of the WS-Agreement specification from a proposed recommendation to an OGF recommendation.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



#### Annual Report on Standardisation Activities

As an extension to the basic negotiation mechanism in WS-Agreement FHG currently contributes to the draft of a specification for a protocol for agreement negotiation (WS-Agreement-Negotiation). This document is based on the contributions gathered from GRAAP-WG members covering different scenarios for negotiation and re-negotiation of WS-Agreements. WS-Agreement-Negotiation will define a negotiation protocol on top of WS-Agreement.

FHG contributed to the working group's specification "Web Services Agreement Specification (WS-Agreement)"

OGF Document: GFD.107.pdf

Link to document: <http://www.ogf.org/documents/GFD.107.pdf>

#### 2.3.4 Partner/ Person leading this effort in that working group

FHG: Oliver Wäldrich, Wolfgang Ziegler

#### 2.3.5 Role in that working group

Oliver Wäldrich: Contributing member

Wolfgang Ziegler: Co-chair

#### 2.3.6 Expected outcome and tentative date

In May 2007 the WS-Agreement specification became a proposed recommendation of the OGF. Currently the group is working on interoperable implementations on different code-bases, the description of the interoperability experiments, and an experimental report. The objective is to make WS-Agreement a recommendation of the OGF. One of the code-bases involved in the interoperability experiments is the MetaScheduling Service used in PHOSPHORUS. At the same time the group is preparing WS-Agreement-Negotiation, which aims to lead to a multi-step protocol to achieve agreements where the single step approach of the current WS-Agreement protocol is not appropriate.

#### 2.3.7 State of the work (e.g. under way, draft, proposed, recommendation)

WS-Agreement is a proposed recommendation. The work on WS-Agreement-Negotiation is under way, a first draft is expected end of 2008.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## 2.4 GSA-RG – Grid Scheduling Architecture Research Group

### 2.4.1 Group description

The goal of the Grid Scheduling Architecture Research Group (GSA-RG) is to define a scheduling architecture that supports cooperation between different scheduling instances for arbitrary Grid resources. The group currently focuses on the interoperation of different schedulers in an OGF-compliant ecosystem.

This research group is not working on standards but carries out activities to investigate the group's topic and to potentially spin-off an OGF working group later to work on standards.

Link to group's page at OGF website: [http://www.ogf.org/gf/group\\_info/view.php?group=gsa-rg](http://www.ogf.org/gf/group_info/view.php?group=gsa-rg)

### 2.4.2 Partners active in this research group

FHG, PSNC

### 2.4.3 What is the subject of the contribution?

FHG, FZJ and PSNC contributed to the research group's draft documents "Grid Scheduling Architecture – Requirements" and "Grid Scheduler Interaction".

Link to documents:

Requirements: <https://forge.gridforum.org/sf/go/doc8640?nav=1>

Interaction:

[https://forge.gridforum.org/sf/docman/do/listDocuments/projects.gsa-rg/docman.root.documents.grid\\_scheduler\\_interaction](https://forge.gridforum.org/sf/docman/do/listDocuments/projects.gsa-rg/docman.root.documents.grid_scheduler_interaction)

### 2.4.4 Partner/ Person leading this effort in that research group

FHG: Oliver Wäldrich, Wolfgang Ziegler

PSNC: Ariel Oleksiak

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



### 2.4.5 Role in that research group

Ariel Oleksiak Secretary, Contributing Member

Oliver Wäldrich: Contributing Member

### 2.4.6 Expected outcome and tentative date

The group began with identifying a set of relevant approaches obtained in existing Grid projects resulting in GFD.64 published in 2006. Currently, the GSA-RG reviews necessary protocols and interfaces to support interoperability between different Grid schedulers, and components of a modular scheduling architecture and their interactions. Services and protocols from other OGF groups are considered as potential basic building blocks of such an architecture and will be used wherever possible. The resulting information document on Grid Scheduling Architecture Requirements is going to be finalized after OGF23 (June 2008).

### 2.4.7 State of the work (e.g. under way, draft, proposed, recommendation)

Mid 2008 The group plans to finalise and submit the requirements document as OGF informational document ("Grid Scheduling Architecture – Requirements").

Another one is in preparation:

The Grid Scheduler Interaction document (draft) is describing the interaction and interoperability issues between Grid schedulers (Grid scheduler interoperation profile).

## 2.5 JSDL-WG – Job Submission Description Language Working Group

### 2.5.1 Group description

The JSDL-WG has produced a language specification that describes the requirements of jobs for submission to Grids. JSDL 1.0 (published as GGF recommendation GFD.056) is an XML-based language that focuses mainly on computational jobs. The JSDL-WG is working on extending this language to address a wider class of jobs.

This group works on standards.

Link to group's page at OGF website:

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## Annual Report on Standardisation Activities

[http://www.ogf.org/gf/group\\_info/view.php?group=jdsl-wg](http://www.ogf.org/gf/group_info/view.php?group=jdsl-wg)

### 2.5.2 Partners active in this working group

FHG, FZJ

### 2.5.3 What is the subject of the contribution?

FHG contributes to the discussion of a number of extensions/add-ons to JSDL, namely for the specification of network properties when describing a distributed job, the description of licenses when running license protected applications, and key performance indicators.

### 2.5.4 Partner/ Person leading this effort in that working group

FHG: Oliver Wäldrich, Wolfgang Ziegler

### 2.5.5 Role in that working group

Oliver Wäldrich : Contributing member

Wolfgang Ziegler: Contributing Member

### 2.5.6 Expected outcome and tentative date

The expected outcome are extensions/add-ons to JSDL that might be used as term-language in WS-Agreement to describe Service Level Agreements including various non-computational resources like network with certain QoS properties and licenses.

### 2.5.7 State of the work (e.g. under way, draft, proposed, recommendation)

The work has started recently.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>





## 2.6 NML-WG - Network Mark-up Language Working Group

### 2.6.1 Group description

The purpose of the Network Mark-up Language Working Group is to combine efforts of multiple projects to describe network topologies, so that the outcome is a standardised network description ontology and schema, facilitating interoperability between different projects.

This group works on standards.

Link to group's page at OGF website:

[http://www.ogf.org/gf/group\\_info/view.php?group=nml-wg](http://www.ogf.org/gf/group_info/view.php?group=nml-wg)

### 2.6.2 Partners active in this working group

FHG, FZJ, UVA

### 2.6.3 What is the subject of the contribution?

FHG contributes basic requirements with respect to Service Level Agreements on network usage, e.g. for reservation and co-allocation. The objective is to agree on a subset of terms describing network QoS properties like bandwidth that might be used as term language for WS-Agreement.

UVA contributes the work on NDL – Network Description Language. NDL is a network topology model suited for descriptions of lightpaths and hybrid networks; it is based on Semantic Web and uses RDF as the language syntax.

### 2.6.4 Partner/ Person leading this effort in that working group

FHG: Wolfgang Ziegler, Oliver Wäldrich

FZJ: Ralf Niederberger

UVA: Paola Grosso

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## Annual Report on Standardisation Activities

### 2.6.5 Role in that working group

Paola Grosso:	Co-chair
Wolfgang Ziegler:	Contributing member
Oliver Wäldrich:	Contributing member
Ralf Niederberger:	Contributing member

### 2.6.6 Expected outcome and tentative date

The outcome of the working group effort is a standardised network description ontology and schema, facilitating interoperability between different projects. The first standard schema is currently expected in the first half of 2008.

### 2.6.7 State of the work (e.g. under way, draft, proposed, recommendation)

The current standardization effort is under way. A first deliverable of the WG is currently in draft form. Link to document: <https://forge.gridforum.org/sf/go/doc14679?nav=1>

## 2.7 NM-WG - Network Measurements Working Group

### 2.7.1 Group description

The performance of most grid applications is dependent on the performance of the networks forming the grid. The Network Measurements Working Group (NM-WG) identifies network metrics (aka characteristics) useful to grid applications and middleware, and develops standard mechanisms to describe and publish these characteristics to the Grid. This group works on standards.

Link to group's page at OGF website:

[http://www.ogf.org/gf/group\\_info/view.php?group=nml-wg](http://www.ogf.org/gf/group_info/view.php?group=nml-wg)

### 2.7.2 Partners active in this working group

FZJ

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



### 2.7.3 What is the subject of the contribution?

FZJ contributes basic requirements with respect to the tools for performance measuring. Moreover, currently FZJ is using and evaluating tools that derived from the working group like PerfSONAR in the DEISA project.

### 2.7.4 Partner/ Person leading this effort in that working group

FZJ: Ralf Niederberger

### 2.7.5 Role in that working group

Ralf Niederberger: Contributing member

### 2.7.6 Expected outcome and tentative date

The results of the group will allow Grid application to retrieve and use qualitative information on the network, which may be used for a selection of resources resulting in a better performance of the applications. Since this kind of topology services has a strong link to the description of the network the group is collaborating intensively with the NML-WG.

### 2.7.7 State of the work (e.g. under way, draft, proposed, recommendation)

Currently there is no document draft under way.

## 2.8 OGSA-AUTHZ-WG – OGSA Authorization Working Group

### 2.8.1 Group description

The objective of the OGSA Authorization WG is to define the specifications needed to allow for basic interoperability and plug-ability of authorization components in the OGSA framework.

This group works on standards.

Link to group's page at OGF website:

[http://www.ogf.org/gf/group\\_info/view.php?group=ogsa-authz-wg](http://www.ogf.org/gf/group_info/view.php?group=ogsa-authz-wg)

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## 2.8.2 Partners active in this working group

UVA

## 2.8.3 What is the subject of the contribution?

UVA contributes to the discussion on a number of documents, In particular providing use cases, basic authorisation service functionality, definition and functional requirements to major authorisation service components.

## 2.8.4 Partner/ Person leading this effort in that working group

UVA: Yuri Demchenko

## 2.8.5 Role in that working group

Yuri Demchenko: Contributing member

## 2.8.6 Expected outcome and tentative date

Current contribution is ensuring that OGSA AUTHZ-WG standardisation takes into account use cases and specific requirements to AAA/AuthZ infrastructure for on-demand Optical Networks. Planned contribution will target on definition of authorisation session management mechanisms and policy obligations handling functionality required for multi-domain Optical Network Resource Provisioning. This will be proposed in the new charter of the follow-on WG.

## 2.8.7 State of the work (e.g. under way, draft, proposed, recommendation)

The current standardisation effort is under way. Current AUTHZ-WG documents confirms to wide networking related use-cases.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## 2.9 OGSA-RSS-WG – OGSA Resource Selection Service Working Group

### 2.9.1 Group description

The OGSA-RSS WG will provide protocols and interface definitions for the Selection Services portion of the Execution Management Services (EMS), which is a component of the Open Grid Services Architecture. The Resource Selection Services (RSS) consist of the Candidate Set Generator (CSG) and the Execution Planning System (EPS). The CSG can be used to generate a set of computational resources that are able to run a job in general, while the EPS uses this list to decide where to run the job. Other resources such as data are out of scope of these services.

This group works on standards.

Link to group's page at OGF website:

[http://www.ogf.org/gf/group\\_info/view.php?group=ogsa-rss-wg](http://www.ogf.org/gf/group_info/view.php?group=ogsa-rss-wg)

### 2.9.2 Partners active in this working group

FHG

### 2.9.3 What is the subject of the contribution?

FHG contributes requirements and use-cases arising from MetaScheduling perspective being one of the consumers of the outcome of the resource selection service.

### 2.9.4 Partner/ Person leading this effort in that working group

FHG: Oliver Wäldrich

### 2.9.5 Role in that working group

Oliver Wäldrich: Contributing member

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## 2.9.6 Expected outcome and tentative date

The group has just submitted the final draft of the resource selection service specification to the OGF editor. It will then go into a first 60 day public comment period.

## 2.9.7 State of the work (e.g. under way, draft, proposed, recommendation)

The final draft is submitted to the OGF document process.

# 2.10 WFM-RG – Workflow Management Research Group

## 2.10.1 Group description

The purpose of this group is to explore, evaluate and propose workflow representation and mapping techniques that enable the high-level description of application workflows and their execution in the Grid environment.

This research group is not working on standards but carries out activities to investigate the group's topic and to potentially spin-off an OGF working group later to work on standards.

Link to group's page at OGF website: [http://www.ogf.org/gf/group\\_info/view.php?group=wfm-rg](http://www.ogf.org/gf/group_info/view.php?group=wfm-rg)

## 2.10.2 Partners active in this research group

FHG

## 2.10.3 What is the subject of the contribution?

FHG contributes requirements and use-cases arising from MetaScheduling workflow components to Grid resources.

## 2.10.4 Partner/ Person leading this effort in that research group

FHG: Oliver Wäldrich, Wolfgang Ziegler

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



## Annual Report on Standardisation Activities

### 2.10.5 Role in that research group

Oliver Wäldrich: Contributing Member

Wolfgang Ziegler: Contributing Member

### 2.10.6 Expected outcome and tentative date

The outcome of the RG effort is a document describing workflow representation and mapping techniques that enable the high-level description of application workflows and their execution in the Grid environment.

### 2.10.7 State of the work (e.g. under way, draft, proposed, recommendation)

The work has started recently.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



### 3 Conclusions

A number of PHOSPHORUS partners have been active in different research and working groups of the Open Grid Forum. Their involvement ranges from contributions to informational documents, proposed recommendations to co-chairing of some of the groups.

Several key technologies in the PHOSPHORUS project use work in progress or even already proposed recommendations of the OGF. At the same time, requirements arising from the PHOSPHORUS project are fed into the groups of the OGF influencing the work of the groups on different levels.

Partners of the project contribute to four research groups and six working groups of the OGF, co-chairing two of the research groups and two of the working groups. A new working group co-chaired by PHOSPHORUS partners will spin-off from the GHPN-RG during OGF 23 in Barcelona, June 2008. The partners contributed to a number of informational documents, some of them currently emerging, and to one proposed recommendation of the OGF.

The update of the deliverable D7.2.2 at month 18 presented here confirms that the PHOSPHORUS project has achieved substantial impact in the standardisation processes of the OGF while continuing the successful work of the first 12 month.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>





## 4 Acronyms

<b>AAA</b>	Authentication, Authorisation, Accounting
<b>AAI</b>	Authentication and Authorisation Infrastructure
<b>DDSS</b>	Distributed Data Storage Systems
<b>e2e</b>	end to end
<b>EGA</b>	Enterprise Grid Alliance
<b>EGEE</b>	Enabling Grids for E-scienceE (European Grid Project)
<b>FC</b>	Fibre Channel
<b>FC-SATA</b>	Fibre Channel to SATA technology (mixed technology used in disk matrices: disk matrix have Fibre Channel ports for hosts connectivity, but contains SATA disk drives)
<b>FI-RG</b>	Firewall Issues Research Group
<b>GEANT2</b>	Pan-European Gigabit Research Network
<b>GEANT+</b>	the point-to-point service in GEANT2
<b>GMPLS</b>	Generalized MPLS (MultiProtocol Label Switching)
<b>G2MPLS</b>	Grid-GMPLS (enhancements to GMPLS for Grid support)
<b>GHPN-RG</b>	Grid High Performance Networking Research Group
<b>GRAAP-WG</b>	Grid Resource Allocation Agreement Protocol Working Group
<b>GSA-RG</b>	Grid Scheduling Architecture Research Group
<b>GT4</b>	Globus Toolkit Version 4 (Web-Service based)
<b>JSDL-WG</b>	Job Submission Description Language Working Group
<b>KoDaVis</b>	Tool for Distributed Collaborative Visualisation
<b>MSS</b>	MetaScheduling Service
<b>NML-WG</b>	Network Markup Language Working Group
<b>NREN</b>	National Research and Education Network
<b>NRPS</b>	Network Resource Provisioning System
<b>OGF</b>	Open Grid Forum
<b>OGSA-AUTHZ-WG</b>	OGSA Authorisation Working Group
<b>OGSA-RSS-WG</b>	Open Grid Service Architecture Resource Selection Working Group
<b>PoP</b>	Point of Presence
<b>QoS</b>	Quality of Service
<b>SNMP</b>	Simple Network Management Protocol
<b>TOPS</b>	Technology for Optical Pixel-Streaming
<b>TPD</b>	Tiled Panel Display
<b>UNI</b>	User to Network Interface

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



#### Annual Report on Standardisation Activities

<b>UNICORE</b>	UNiform Access to COmpute REsources (European Grid Middleware)
<b>VLAN</b>	Virtual LAN (as specified in IEEE 802.1p)
<b>VIOLA</b>	Vertically Integrated Optical Testbed for Large Applications in DFN (A German project funded by the German Federal Ministry of Education and Research)
<b>VPN</b>	Virtual Private Network
<b>WFM-RG</b>	Workflow Management Research Group

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



# Appendix A

## Open Grid Forum Overview

### Who We Are

The Open Grid Forum (OGF) is a community of users, developers, and vendors leading the global standardization effort for grid computing. The OGF community consists of thousands of individuals in industry and research, representing over 400 organizations in more than 50 countries. Together we work to accelerate adoption of grid computing worldwide because we believe grids will lead to new discoveries, new opportunities, and better business practices.

The work of OGF is carried out through community-initiated working groups, which develop standards and specifications in cooperation with other leading standards organizations, software vendors, and users. OGF is funded through its Organizational Members, including technology companies and academic and government research institutions. OGF hosts several events each year to further develop grid-related specifications and use cases and to share best practices.

### The OGF Mission

The Open Grid Forum accelerates grid adoption to enable business value and scientific discovery by providing an open forum for grid innovation and developing open standards for grid software interoperability.

### A Brief History

The Open Grid Forum (OGF) is the "new" organization that resulted from the merger of the Global Grid Forum (GGF) and the Enterprise Grid Alliance (EGA).

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>



#### Annual Report on Standardisation Activities

The GGF grew out of a series of conversations, workshops, and Birds of a Feather (BoF) sessions that addressed issues related to grid computing. The first of these BoFs was held at SC98, the annual conference of the high-performance computing community. That meeting led to the creation of the Grid Forum, a group of grid developers and users in the U.S dedicated to defining and promoting grid standards and best practices. By the end of 2000, Grid Forum had merged with the European Grid Forum (eGrid) and the Asia-Pacific Grid Forum to form the Global Grid Forum. The first Global Grid Forum meeting was held in March 2001. Since then, the GGF has produced numerous standards and specifications documents and held successful events around the world.

The EGA was formed in 2004 to focus exclusively on accelerating grid adoption in enterprise data centres. The EGA addressed obstacles that organizations face in using enterprise grids through open, interoperable solutions and best practices. The alliance published the EGA Reference Model and Use Cases, a Security Requirements document and Data and Storage Provisioning document. The EGA also significantly raised awareness worldwide of enterprise grid requirements through highly effective marketing programs and regional operations in Europe and Asia.

Project:	Phosphorus
Deliverable Number:	<D7.2.2>
Date of Issue:	31/03/08
EC Contract No.:	034115
Document Code:	<Phosphorus-WP7-D7.2.2>