Service Delivery and
Service Level Management
in Grid Infrastructures

GRID INFRASTRUCTURE USERS SURVEY

SUMMARY REPORT

INTRODUCTION

The Grid infrastructure users are a group which is directly interested in the quality of the Grid services the infrastructures provide. One of the methods of improving this quality is introducing Service Level Management (SLM) processes into the functioning of Grid infrastructures. This affects both the infrastructure providers and their users. To examine the view of the latter group on the importance of features related to Service Level Management, the authors prepared a survey directed at users of Grid infrastructures and the Virtual Organisation managers – who are representatives of groups of users in the Grid community. The survey was circulated among the participants of the EGI User Forum 2011 held on 11-14 April 2011. 33 responses were collected from people from different countries and different user communities.

The respondents were asked, among others, about the problems they perceive as most important while using Grids, the most important improvements they would suggest to the infrastructure management, and whether they would accept them even if they meant the necessity of following more strict procedures. The users were also asked to assess their general experience with different Grid infrastructures.

In this document the authors present an analysis of the results of the survey, which is meant to be a part of the process of forming a roadmap with recommendations to European Grid infrastructures. The roadmap is a deliverable of European FP7 project gSLM. (http://gslm.eu).

PROBLEMS THE USERS ENCOUNTER USING GRIDS AND SUGGESTED IMPROVEMENTS

METHOD

The two questions analysed in this section – *"What do you perceive as main problems of the current Grids?"* and *"If there was a possibility to improve Grid resource provision and management, what would be, according to you, the most important improvements?"*. They were based on the same scheme: as the authors intended to measure the importance of these problems or, respectively, introducing improvements, the users were asked to evaluate the importance of each issue/improvement on the scale 0-5, based on their own perception. For each answer, an average value of the points assigned was calculated.

RESULTS

Fig. 1. The analysis of the answers concerning problems the users encounter while utilising Grid infrastructures (see Fig. 1) showed that, although most of the respondents perceive technical problems with the Grid usage as a major issue (which was expected) – with average of 3.82, the second most popular answer was "*No or poor warranty of getting the resources in reasonable time*" – with average importance to the responses at the level of 2.79. The summarised percentage of the importance (arduousness) of the problems related to the quality of service, and hence, the SLM, constitutes more than a half of the problems the users are concerned with (59%) –

the yellow part of the chart presented in Fig. 1. In addition, most of the answers elaborating on the *"Other problem"* option were also related with service reliability and warranty – what makes them as well SLM-related problems.

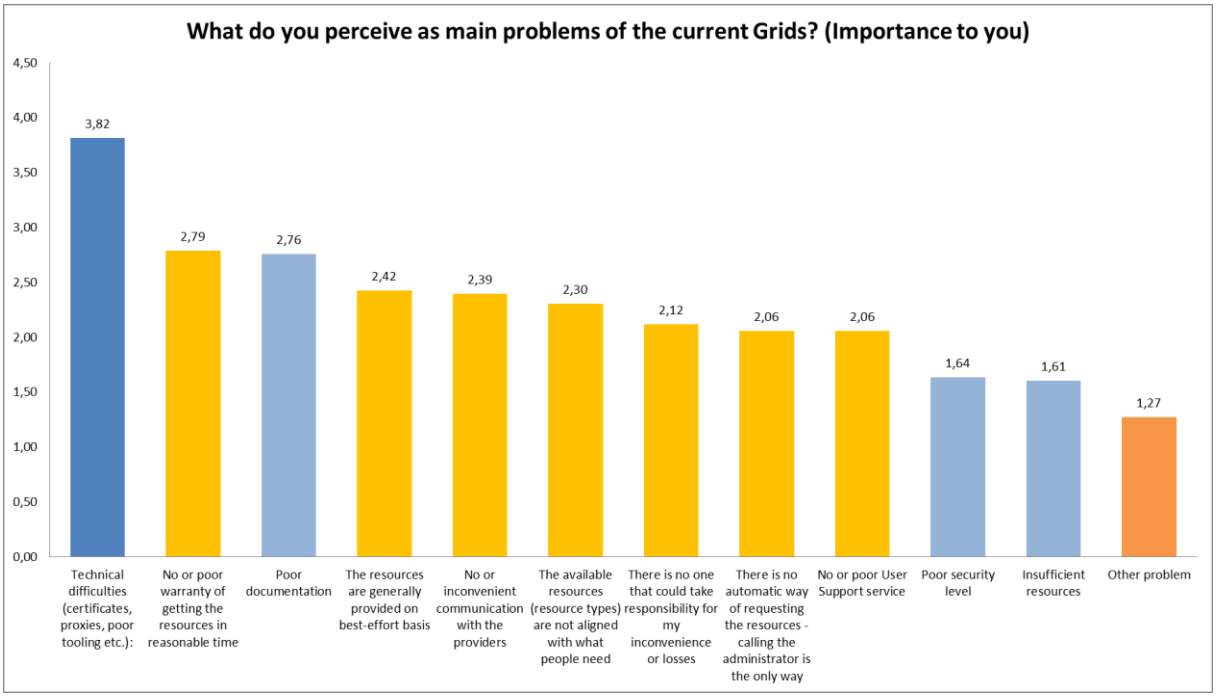

Fig. 1. The most important problems the questioned users encounter while using Grids. The SLM-related problems are shown in yellow, while other problems are coloured blue.

Among the most important improvements, summarised in Fig. 2, the users often pointed out the possibility of negotiate and manage the resources assigned to them – *"Possibility of monitoring the usage of the resources assigned to you"* (average of 3.30 points), *"Ability to manage the resources assigned to you"* (3.30), *"Clear procedures"* (3.12) and *"Possibility of negotiations - to gain access to resources that are most suited to your needs"* (3.06) were the highest-rated answers (see Fig.2). That suggests a great need, from the point of view of the users, for a working contract-based framework (SLA framework).

The reliability of the resources and their provision receives no less attention, which is reflected in the ratings of answers connected with resource providers reliability – *"Responsibility of providers"* (2.70), *"Imposing maturity on the resource providers"* (2.64), *"Clear rules of interaction with the providers*" (2.39), *"Warranty"* (2.33), as well as *"Clear procedures"* (3.12).

A rather flat distribution between many aspects of Service Management-related improvement can be interpreted in many ways. Users may have not clear, common ideas how to improve the current status. But also, this kind of results show that only integrated implementation of Service Management would bring satisfactory results. Furthermore, what is shown in high rating of the answers highlighting clear rules or procedures and, later, in section 'Users' Experience with Grid Infrastructures'; they are ready to suffer from more strict and complex procedures (high rating of the answers highlighting clear rules or procedures) in exchange for improvements to these issues.

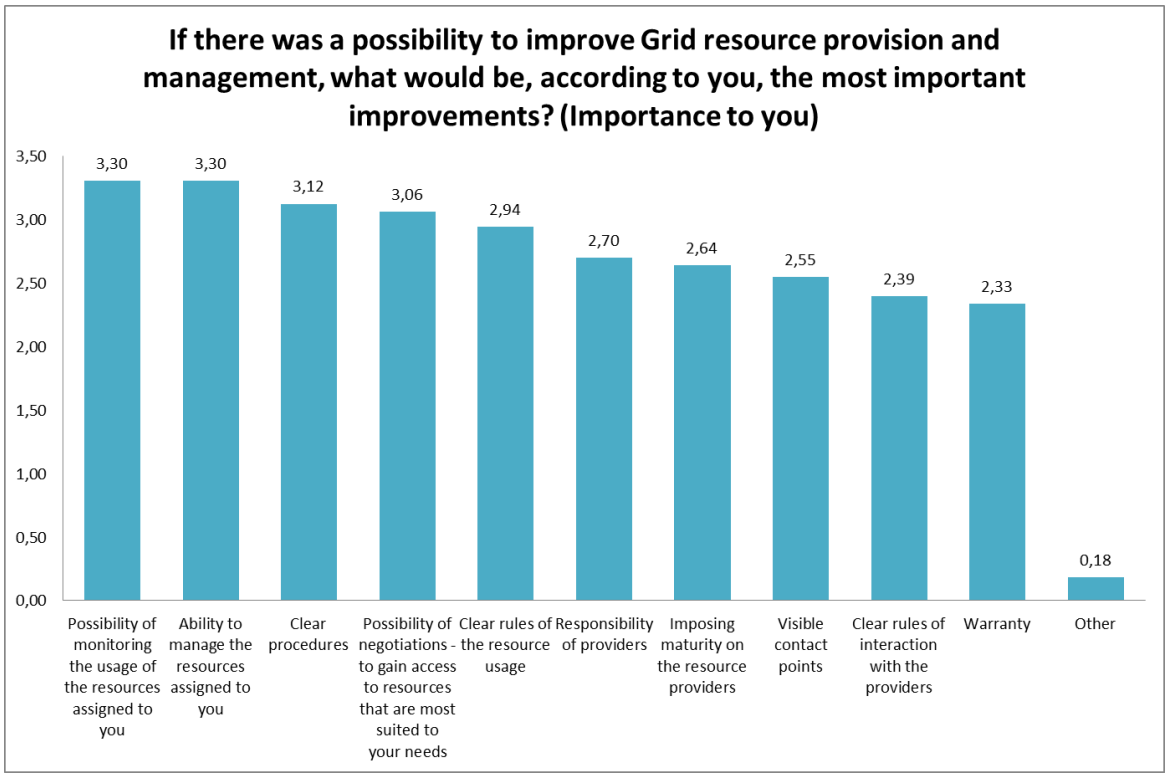

Fig. 2. The improvements the questioned users consider most important to be applied to Grid resource provision and management.

The determination of the users towards introducing the abovementioned changes is shown by the next figure – Fig. 3. The need for changes was confirmed by 58% respondents who say that they are ready to suffer some additional overhead related to those changes. Another 36% of users answered that they would like the changes to be implemented, but only if nothing is required from their side.

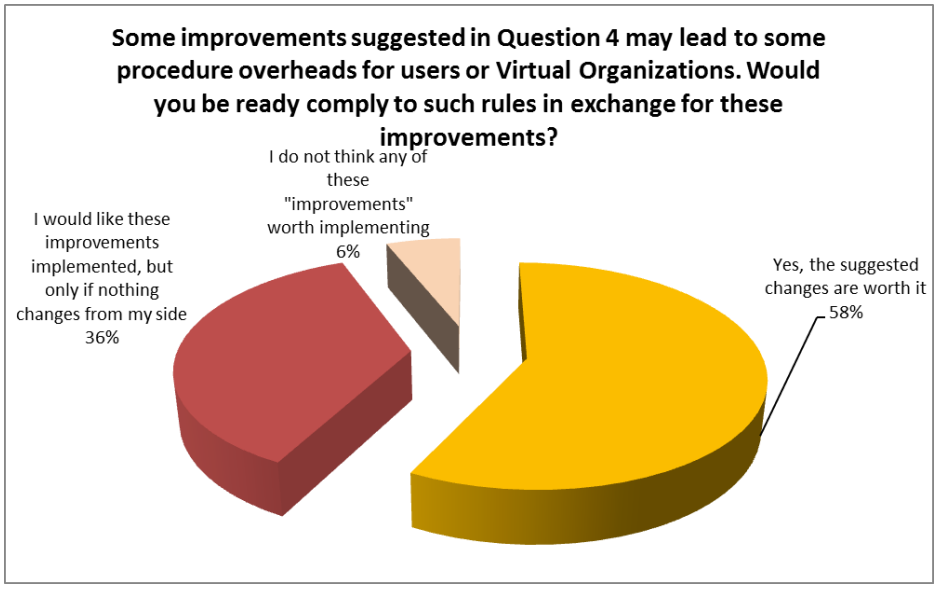

Fig. 3. The attitude of the users towards sacrificing the ease of use in exchange for introducing improvements connected to SLM.

EXISTING MECHANISMS OF RESOURCE ALLOCATION

METHOD

For each answer to the questions included in this section, the per cent value next to it is a relation of respondents selecting this option to all the answers.

RESULTS

The survey showed also that, although, the SLA frameworks are beginning to be implemented in some of the infrastructures, only small fraction of resources is acquired with use of SLA mechanisms – only 14% of the questioned people are conscious of an SLA framework that is used for acquiring resources for them (see Fig. 4). The same figure reveals that contact points for requesting resources are different- approximately the same volume of users contacts Grid Infrastructure as Sites to obtain resources. It means that there are different patterns of performing the same operation. Unfortunately, the survey is not detailed enough to judge about the trends of changes in this matter.

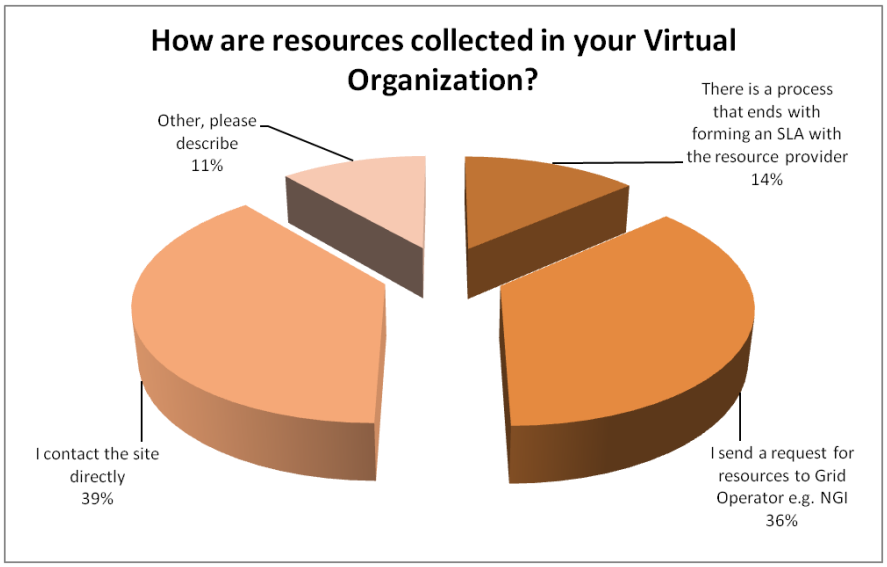

Fig. 4. The means of acquiring resources by the Grid infrastructure users.

Nevertheless, most of the users (65%) are conscious of the need to involve their Virtual Organisation in the process of forming the SLA and OLA agreements with resource providers.

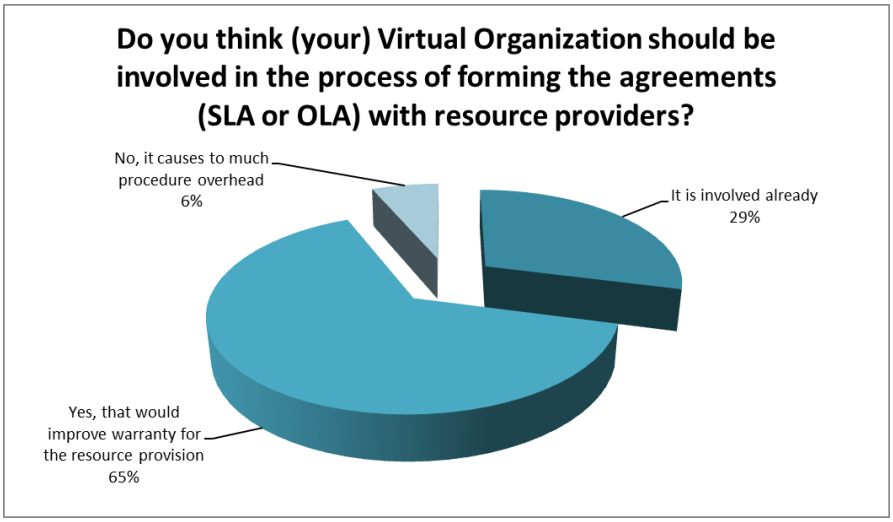

Fig. 5 The users' view on the need for involving their Virtual Organisation in the process of forming SLAs/OLAs with resource providers.

USERS' EXPERIENCE WITH GRID INFRASTRUCTURE

METHOD

To measure how the users perceive the changes in time for question *"Have you noticed any changes to the quality of provided resources or the resource provision (and management) itself in the course of your experience with Grids?"* the authors counted separately all the answers *"No change"* and *"Improving"* for each option (*"The quality of resources"* and *"The quality of the resource provision/management"*).

For question *"What is your opinion about the following Grid infrastructures?"*, the average note from the answers within the scale 1-5 was calculated for each option (*"The quality of resources"* and *"The quality of the resource provision/management"*). If the user had no experience with a given infrastructure, the answer was left empty and was not counted.

RESULTS

In spite of the problems they encounter, most of the questioned users perceive the quality of the resources as well as their provision and management as improving over time (see Fig. 7), with the improvement in the resources quality being slightly more visible than the improvement in their provision and management (79% vs. 73%).

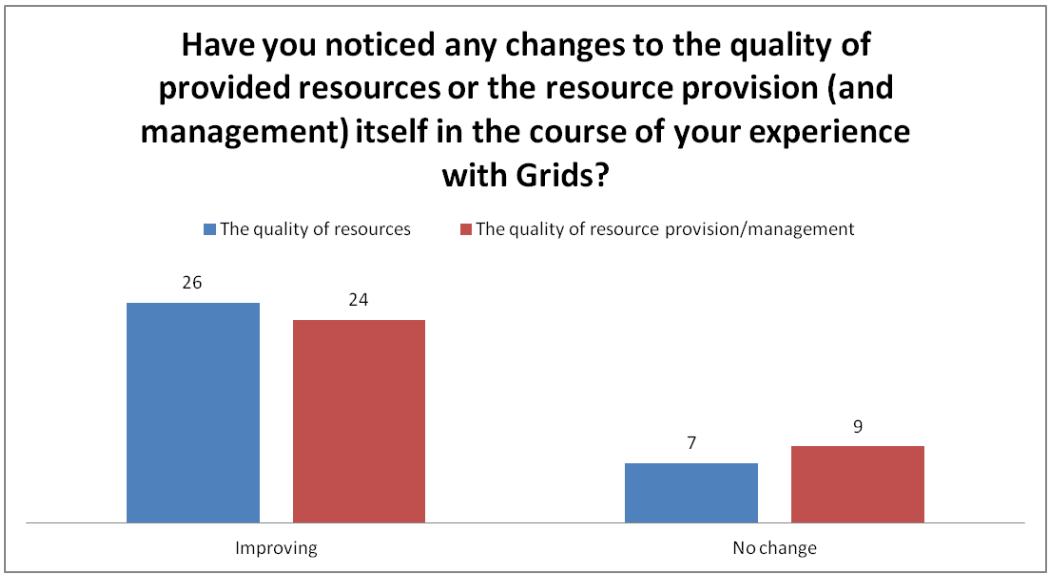

Fig. 6. The users' perception of the changes in Grid infrastructures.

As the last question, the users were asked to evaluate the infrastructures they had experience with, from the point of view of the quality of resources provided by the infrastructure and of the quality of the resource provision and management. The collected answers are shown in Fig. 8. It is significant, that the quality of the resource provision and management in the most popular infrastructures is considerably lower than the quality of the resources themselves. The disparity of the average grade spans from 0.52 to 1.35 in 1-5 scale, for the main infrastructures. What is worth mentioning, among the enumerated infrastructures, the national Grids are considered as the ones offering the best resource provision and management quality. The result was drastically different for the infrastructures described as 'Other' – these were, as pointed by respondents, FutureGrid, EUMEDGRID and GRIDPP. However, they cannot be considered valid, as for each of these infrastructures only one evaluation was obtained.

In general, we can observe that larger infrastructures are perceived as those with lower quality. This might suggest lack of professional solution for management, which, in case of smaller infrastructures, are not that visible.

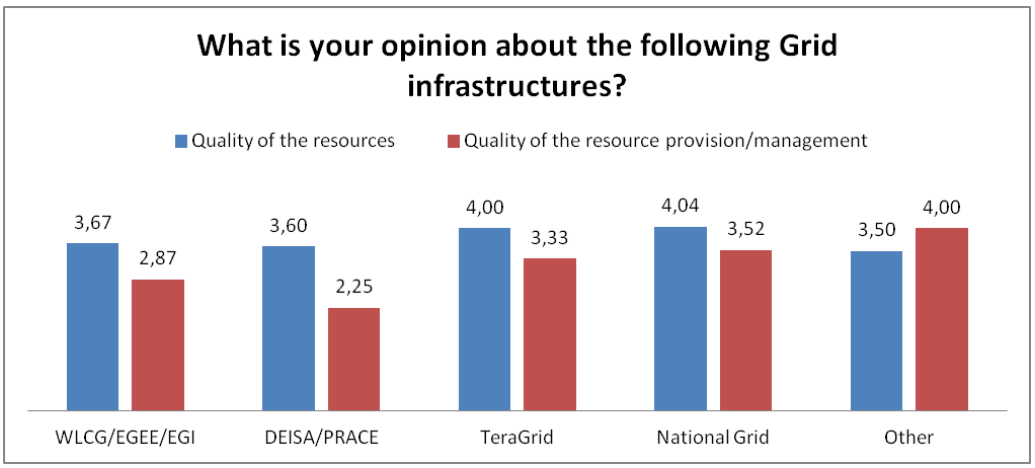

Fig. 7. The users' evaluation of the quality of the resources and resource provision within Grid infrastructures they have experience with.

SUMMARY

The results of the survey show that Service Management is an significant factor of the users' satisfaction and should be important area of grid development. A better understanding of the required changes, however, needs further studies.