

FP7 RESEARCH INFRASTRUCTURES



CP-CSA

DELIVERABLE D4.4.2
DEPLOYMENT AND EVALUATION REPORT
YEAR 1

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Abstract:

This document describes the progress in setting up the DECIDE infrastructure, as outlined in D4.4.1, as far as network connectivity, GRID activity and applications are concerned.

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1. EXECUTIVE SUMMARY

This deliverable provides an overview of the first year progress in setting up the DECIDE infrastructure. It references deliverable D4.4.1, in which the overall network topology and GRID architecture were described.

The document is structured in 4 sections, as follows:

- Section 2.1 describes progress with network connectivity at the participating sites,
- Section 2.2 describes progress with respect to setting up the Grid services and sites (both production and pre-production),
- Section 2.3 deals with additional infrastructural aspects, which are needed to run DECIDE applications,
- Chapter 3 presents preliminary conclusions and introduces future work to be carried out over next year.

2. DECIDE PLATFORM REPORT

As was described in deliverable D4.4.1, DECIDE's network infrastructure is the base for providing early diagnostic neurodegenerative disease services to the medical community.

The deployment and the maintenance of the network involve the interconnectivity of 13 sites in total.

Some of the DECIDE sites, 10 at present, host GRID services, while the remaining sites host PC workstations for the user validation and for the service testing activity.

2.1. Network connectivity

With respect to the assessment of the network connectivity described in D4.4.1, during the first year two sites were upgraded:

- Site PLWOODSGDD upgraded network connectivity to 100 Mbps
- Site INFN-ROMA3 upgraded network connectivity to 1 Gbps.

2.1.1. Present status

The full picture of present sites' network connectivity is shown in Table 1 below.

Partner short name	Type of link	Bandwith [Mbps]	National Research network OR other connectivity provider
GARR	Fibre optic	1Gbps	GARR
CNR (IBFM)	Fibre optic	100Mbps (1Gbps feasible)	GARR
COMETA	Fibre optic	1Gbps	GARR
PLWOODSGDD	Fibre optic	100Mbps since May 2011 (1Gbps feasible)	GARR
USR	Fibre optic	10Mbps	GARR
UNIGE	Fibre optic	1Gbps	GARR
UNIFG	Circuit SDH	100Mbps	GARR
SDN	Fibre optic	30Mbps	GARR
Imperial College	Fibre optic	1Gbps	JANET
UWAR	Fibre optic	100Mbps	PIONIER (NASK)
CHUT			
MAAT	Circuit SDH	50Mbps	Via-Numerica
INFN-ROMA3	Fibre optic	1Gbps since June 2011	GARR

Table 1: Network connectivity of DECIDE sites, as of 2011/09.

2.1.2. Evaluation tests

We present in this paragraph the statistics relevant to the utilization of the links for PLWOODSGDD and INFN-ROMA3, which are the only two sites having network connectivity upgraded during the first year.

As shown in Figure 1 and Figure 2, users of these sites have already started to benefit from the upgrade, although a sizeable fraction of the available capacity is still to be exploited.

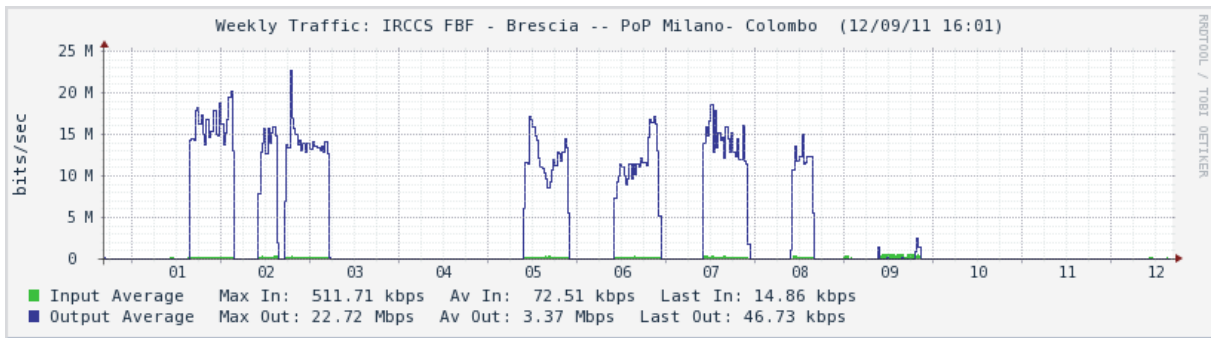


Figure 1: Usage statistics for the link PLVOODSGDD.

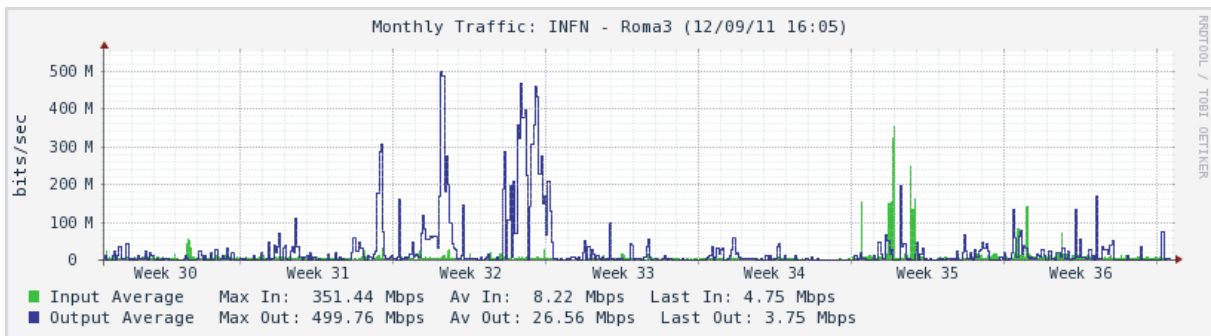


Figure 2: Usage statistics for the link INFN-ROMA3.

2.2. GRID infrastructure

The setup of the GRID infrastructure during the first year has progressed rather smoothly, although some new sites have experienced difficulties with the procurement of the hardware and the initial setup.

The infrastructure is now complete: all needed services are installed and operational, at least in one instance.

Robot certificates for each application have been generated and registered in VOMS.

One partner, GARR, has completed the accreditation procedure with the National GRID Infrastructure for its site "GARR-01-DIR", which is now a certified production site, and one partner, MAAT, has provided resources for a new pre-production site "MAAT_FRANCE".

2.2.1. VO Users

Given that applications are still in their porting or testing phase, there has not been much increase in the number of users registered to the VO. Actually, DECIDE's strategy is based on making extensive use of robot certificates, so that the number of users is in any case not expected to grow much in future.

Robot certificates have been obtained from INFN-CA for each of the 4 applications, and have been registered in VOMS (see next 2 pictures).

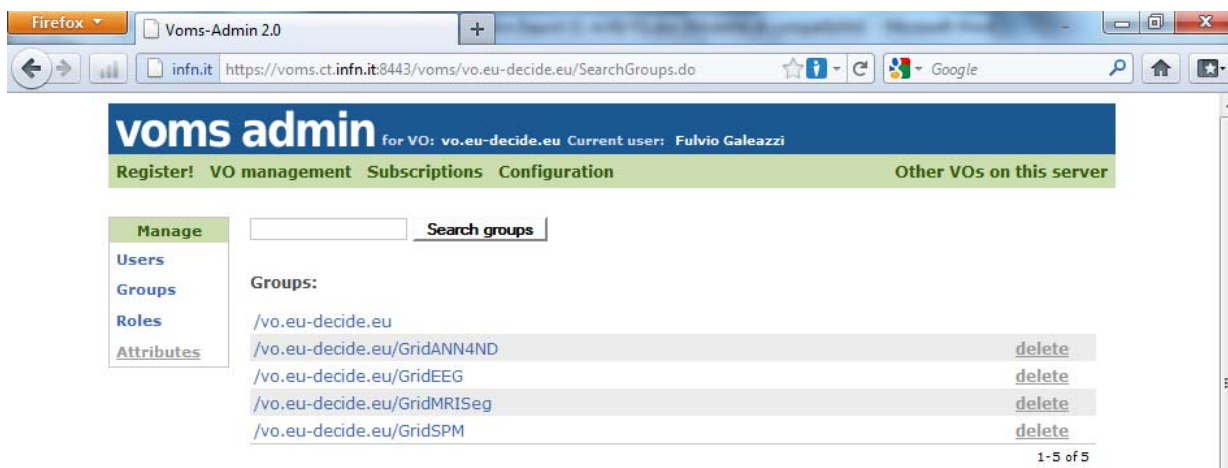


Figure 3 VO management: view of the VO groups created, one for each application.



Figure 4 VO management: list of users belonging to a specific VO group, last entry is for the Robot certificate.

2.2.2. Production and Pre-production activity

As it was described in D4.4.1, the distinction between production and pre-production sites is based on the expected quality (availability and reliability) of the services provided. This is formalized by signing a SLA, by which the site, among other things:

- ✦ commits to provide clear reference for service ownership, accountability, roles and responsibilities
- ✦ presents a clear and measurable description of the services provided
- ✦ agrees to adhere to well-defined procedures, e.g. for security, operational or administrative incidents
- ✦ binds to provide services with a minimum level of availability and reliability

Leaving aside the more formal aspects of the SLA, a report on the evaluation of the

availability and reliability of the DECIDE GRID sites will be presented in next paragraph.

Before that, this paragraph presents a brief summary of the activities performed at each site.

Overall, the infrastructure has been completed: all needed services are installed and operational, at least in one instance.

Partner short name	IP address	GRID certification Yes/Ongoing/Planned/ No	Technical contact points (Network and GRID)	NGI (*)
GARR	topBDII : bdii.eu-decide.eu <i>Domain : dir.garr.it</i> Site BDII : gridsrv4-4 UI : ui2-4 WN class IP : 193.206.106.0/24 WMS : wms-4 CE : gridsrv2-4 SE : gridsrv3-4	Yes	Mario Reale – mario.reale@garr.it ; Fulvio Galeazzi – fulvio.galeazzi@garr.it ; grid-tech@garr.it (GRID Tech. Contact Point) Sabrina Tomassini – sabrina.tomassini@garr.it ; planning@garr.it (Network contact point)	IGI
CNR (IBFM)	<i>Domain : ibfm.cnr.it</i> SiteBDII : decidebd CE : decidece SE : decidese KS : decideks	No (pre-production site)	Giacomo Manfredi - giacomo.manfredi@ibfm.cnr.it ; Isabella Castiglioni - isabella.castiglioni@ibfm.cnr.it	
COMETA	LFC : lfc-01.ct.trigrd.it AMGA : amga.ct.infn.it <i>Domain : ct.pi2s2.it</i> UI : infn-ui-01 WN class IP : 212.189.144.0/23 CE – INFN-CT: infn-ce-01 CE – INFN-LNS: infnlns-ce-01 SE : infn-se-01 WMS : infn-wms-01	Yes	Roberto Barbera – roberto.barbera@ct.infn.it ; Gianluca Passaro – gianluca.passaro@ct.infn.it	IGI
PLVOOD SGDD	Site BDII: 193.204.145.5/32 CE: 193.204.145.2/32 SE: 193.204.145.1/32 User Interface and Worker Nodes: 193.204.145.6-16/32	Planned	Alberto Redolfi - aredolfi@fatebenefratelli.it ; Jordi Paraire - jparaire@maatg.fr ; Jerome Revillard - jrevillard@maatg.fr	IGI
UNIGE	<i>Domain : bio.dist.unige.it</i> SiteBDII : grid-bdii CE : grid-ce SE : grid-se WN: on private network, NAT possibly using 130.251.10.0(.2)	No (pre-production site)	Andrea Schenone – andrea.schenone@unige.it ; Ivan Porro – pivan@dist.unige.it	
UNIFG	<i>Domain : medicina.unifg.it</i> SiteBDII : n02.decide SE : n01decide	Planned	Claudio Babiloni – c.babiloni@unifg.it ; Ivan Cincione – i.cincione@alice.it	

Partner short name	IP address	GRID certification Yes/Ongoing/Planned/ No	Technical contact points (Network and GRID)	NGI (*)
SDN	Test/validation node: 90.147.31.10/32	No (pre-production site)	Francesca Cesaro – fcesaro@sdn-napoli.it	
Imperial College	CE : brodmann39.med.ic.ac.uk SE : DBserver : user PC station : 129.31.117.235/32	Planned	James Swingland – james.swingland02@imperial.ac.uk	
UWAR	<i>Domain : bioexploratorium.pl</i> SiteBDII : bdii CE : ce SE : se	Planned	Bogdan Lesyng – lesyng@gmail.com ; Pawel Daniluk pawel@bioexploratorium.pl	
MAAT	<i>Domain : maatg.fr</i> SiteBDII: bdii-site CE: ng-maat-server9 SE : ng-maat-server3	No (pre-production site)	Jordi Paraire - jparaire@maatg.fr ; Jerome Revillard - jrevillard@maatg.fr	
Other resource providers				
INFN-ROMA3	<i>Domain : roma3.infn.it</i> CE : ce-02 SE (Storm) : storm-01	Yes	Antonio Budano – antonio.budano@roma3.infn.it ; Federico Bitelli – bitelli@fis.uniroma3.it	

Table 2: DECIDE GRID infrastructure status, as of 2011/09.

For the sake of completeness, the remaining DECIDE sites, USR and CHUT, have user PC stations only.

2.2.2.1. Site GARR

During the first year GARR has successfully completed the GRID certification procedure, and is an official GRID production site since end of May 2011. The reference infrastructure is IGI (the Italian Grid Infrastructure), which is part of the European EGI infrastructure.

On top of offering computing and storage resources, GARR is also hosting some central services for the DECIDE Virtual Organization, namely the topBDII and the WMS.

The computing resources at the site presently amount to 40 cores, with this number due to double on a timescale of a couple of months.

2.2.2.2. Sites GRISU-COMETA-INFN-CT and GRISU-COMETA-INFN-LNS

These two sites are both official, certified GRID production sites in the EGI infrastructure (previously EGEE) since many years. Some central VO services like WMS, LFC catalogue and AMGA catalogue are hosted at these two sites.

During the first year of the project these sites have been extensively used for testing the applications, for developing their porting to the GRID environment, and for developing the Science Gateway prototype.

2.2.2.3. Site INFN-ROMA3

This site is not linked to any DECIDE partner, but is one of the largest EUMEDGRID-Support sites: in the framework of the MoU signed between the two projects, INFN-ROMA3 agreed to support the DECIDE VO on its infrastructure.

It is an official GRID production site (IGI-EGI) which acquired new CPUs during last year, and is now totalling over 270 job slots. Although not strictly related to DECIDE at present, it is also worth mentioning that the site has installed few nodes offering GPUs, and these nodes are also published in GRID and accessible to the DECIDE VO.

2.2.2.4. Site CNR (IBFM)

The GRID site has been setup from scratch, and it is presently fully deployed: GRID certificates were issued by the INFN Certification Authority. Site offers services as SiteBDII, CE, SE, KeyStore. It is operational, although in testing phase, since April 2011. Reachability and availability metrics have unfortunately not been collected for the whole period since site startup, though, due to miscommunication leading to lack of update of the relevant entries in Smokeping (problem now fixed).

2.2.2.5. Sites PLVOODSGDD and MAAT-FRANCE

These sites represent the liaison between DECIDE and neuGRID.

GRID resources accessible to the DECIDE VO are installed at the MAAT site, whereas other computing resources dedicated to the development of DECIDE applications are available at the PLVOODSGDD site.

The sites offer CE and SE services, and WNs for a total of 8 cores (counting only the GRID-enabled worker-nodes): the difference will in part be compensated by future acquisitions, and largely compensated when the interoperability between neuGRID and DECIDE will be fully deployed at each other VO's sites.

2.2.2.6. Site SDN

This site committed resources to be used for testing and validation purposes.

One server is presently being installed, offering 8 computing cores and 5 TB local disk space: another server will soon follow.

2.2.2.7. Site UNIFG

Site has been setting up the infrastructure from scratch. Late shipment of the hardware has delayed the installation of the resources.

At present, the site offers two multi-core physical machines on which the SiteBDII and SE services are being installed: installation of CE and WN will soon follow. The site is almost ready to offer 3 TB of storage (thus exceeding the original foreseen amount of 1 TB, as reported in the DoW) and a few computing cores: more cores will be added within a time frame of 2-5 months, to match and possibly exceed the resources declared in the DoW (20 cores).

2.2.2.8. Site UNIGE

The site is being setup, but activity on this item has been slowed down since the technical manpower, in full agreement with DECIDE Technical Management, has been diverted to activities in WP6 JRA1.

By the end of 2011, the site will offer pre-production services: CE, SE, and WN for a total of 24 cores. Figures in the DoW were somewhat higher, though, and referred to existing

computing resources in a public-private laboratory: the agreement which will allow DECIDE to have access to such resources should be finalized in the coming months.

2.2.2.9. Site UWAR

After some initial delay with the procurement of the hardware, computing resources are now available and are being configured.

At present, site offers SiteBDII, CE and SE, as well as a few computing cores. More computing resources, to match and possibly exceed what anticipated in the DoW (in the range between 64 and 128 cores), will be available by mid-2012 after the purchase of some new hardware.

2.2.2.10. Site Imperial College

In March 2011 the Cyclotron Unit has been closed, and this has adversely affected the PET imaging group and, as a consequence, the Unit's resources which had been committed in the DoW. The PET imaging activity is expected to be resumed on campus, in a time scale of a few months.

2.2.3. Evaluation

All DECIDE Production sites are also GRID production sites registered to a Regional Operation Center (ROC). ROCs regularly publish information about the health status of their sites, and measure sites' availability and reliability.

Such metrics are defined as:

$$\text{Availability} = \text{Uptime} / (\text{Total time} - \text{Time_status_was_UNKNOWN})$$

$$\text{Reliability} = \text{Uptime} / (\text{Total time} - \text{Scheduled Downtime} - \text{Time_status_was_UNKNOWN})$$

Since the metrics adopted within DECIDE are identical to those in use within EGI, numbers reported in Table 3 have been extracted from the EGI monthly reports https://wiki.egi.eu/wiki/Availability_and_reliability_monthly_statistics

Site name	Measurement	1009	1010	1011	1012	1101	1102	1103	1104	1105	1106	1107	1108
GARR	Availability									100	100	100	99
GARR	Reliability									100	100	100	99
GRISU-COMETA-INFN-CT	Availability	100	93	87	100	99	100	100	96	99	95	63	89
GRISU-COMETA-INFN-CT	Reliability	100	95	87	100	99	100	100	96	99	95	81	100
GRISU-COMETA-INFN-LNS	Availability	94	99	99	97	93	100	100	92	92	92	38	100
GRISU-COMETA-INFN-LNS	Reliability	94	99	99	97	93	100	100	92	92	92	62	100
INFN-	Availability	93	99	94	81	89	92	96	98	98	97	98	100

ROMA3													
INFN- ROMA3	Reliability	93	99	94	95	89	93	97	98	98	97	98	100

Table 3: Monthly Availability and Reliability figures for DECIDE production sites: column headers contain year and month in the format YYMM.

For Pre-production sites, although no SLA was signed, it is still desirable to monitor the level of availability of the services. An estimate can be obtained by analysing the Smokeping (the network latency measurement tool) databases. DECIDE servers have been configured into the Smokeping instance running at <http://dpm2-4.dir.garr.it/Smokeping/smokeping.cgi>.

Referring to such webpage, the "Network latency" section accumulates statistics about the round-trip-time (RTT) and loss of "ping" packets: this provides a measurement of the server's "reachability", namely the time the server "exists on the network". More formally, "Reachability" is defined as the fraction of time the server was reached with a loss of ICMP packets below 50% and a Round Trip Time below 500 ms: measurements were averaged over a time window of 1 hour.

Reachability: Uptime / Total time

with Uptime constraint: Loss<50% && RTT<500ms

Since running GRID services use LDAP to publish information about their status and configuration, a "Site Services" section has been defined in Smokeping, accumulating statistics on the time to respond to LDAP queries and on the number of queries which went unanswered. Responding to LDAP queries, which means the Information System is up and running, does not necessarily imply the underlying service is working as expected: hence this measurement can be taken only as an upper bound for service availability, although it will be referred to as "Availability" in the following. This metric is formally defined as the fraction of time the server replied to at least 50% of the queries with an average response time below 1s: again, measurements were averaged over a time window of 1 hour

Availability: Uptime / Total time

With constraint: Available && NoResponse<50% && ResponseTime<1s

Results for all pre-production sites are shown in Table 4.

In order to limit the amount of traffic towards production and pre-production sites, the number of tests in the "Site Services" section has been kept to a minimum: typically only the siteBDII was being monitored. For pre-production sites, since they are not monitored by other means (as production sites by EGI), we intend for next year to review this decision and plan to add tests for all services made available by each site.

The Smokeping tool was setup at the end of December 2010, so statistics are only available since 1st January 2011.

Site name	Measurement	Since	Comment	1101 - 1102	1103	1104	1105	1106	1107	1108
CNR-IBFM	Reachability	2011-02-16	Wrong hosts defined in Smokeping, problem now fixed.							
CNR-IBFM	Availability	2011-09-01	SE							

Site name	Measurement	Since	Comment	1101 - 1102	1103	1104	1105	1106	1107	1108
MAAT	Reachability	2011-02-15	SiteBDII	100	99.9	95.6	96.1	100	100	100
MAAT	Availability	2011-02-15	SiteBDII	100	100	95.7	95.9	100	100	100
PLWOODS GDD	Reachability	2011-02-15	SiteBDII	100	99.9	95.6	96.1	100	100	100
PLWOODS GDD	Availability	2011-02-15	SiteBDII	100	100	95.7	95.9	100	100	100
SDN	Reachability	2011-02-26	SiteBDII	100	99.6	15.0	0	0	0	0
SDN	Availability	2011-02-26	SiteBDII	0	0	0	0	0	0	0
UNIFG	Reachability	2011-02-16	Tentative host acting as NAT	0	0	0	0	0	0	0
UNIFG	Availability	N.A	Not applicable to NAT.							
UNIGE	Reachability	2011-02-16	SiteBDII	100	99.9	99.0	100	100	100	100
UNIGE	Availability	2011-09-01	SiteBDII							
UWAR	Reachability	2011-02-24	SiteBDII	100	99.9	99.9	100	100	99.7	99.9
UWAR	Availability	2011-07-20	SiteBDII						0	0
ImperialC ollege	Reachability	2011-03-04	UserPC was monitored until 2011-08-31		10.6	12.4	19.7	21.4	9.5	5.1
ImperialC ollege	Availability	2011-09-01								

Table 4: Monthly Reachability and Availability estimates for pre-production sites: column headers contain year and month in the format YYMM.

2.3. DECIDE applications

This chapter describes the progress with other aspects of the DECIDE infrastructure, more closely related to applications: the setup of the web portal (Science Gateway), integrating the user authentication and authorization mechanism, and the setup of the Software Release Repository.

2.3.1. GUI of the WEB-GRID Access (Science Gateway)

The design of the Science Gateway was presented in detail in D7.7.3, and D7.7.5 described the first prototype, which was shown at the EGI User Forum 2011 held in Vilnius, in April 2011.

A federated authentication mechanism is now in place¹, linking the GARR-IDEM federation (which includes all Italian Research Institutes and Universities) and the GrIdP federation

¹ R. Barbera, M. Fargetta, R. Rotondo, *A simplified access to Grid resources by Science Gateways*, proceedings of the *The International Symposium on Grids and Clouds and the Open Grid Forum*, Academia Sinica, Taipei, Taiwan, March 19 - 25, 2011. http://pos.sissa.it/archive/conferences/133/023/ISGC%202011%20&%20OGF%2031_023.pdf

(which includes the IDPCT, the “catch all” Identity Provider, where “homeless” users not belonging to other federations are registered). The portal is thus ready for the seamless integration with the authentication mechanisms of hospitals and research centres, as soon as these will be available.

The following figures show the screenshots which are presented to a user upon authentication to the DECIDE application portal. As shown by Figure 8, authorization is handled separately, after the user has been properly trained, via the addition of the user to LDAP groups which are in turn mapped to roles and authorizations: in the specific case of the figure the user was identified but is not authorized to use any application.

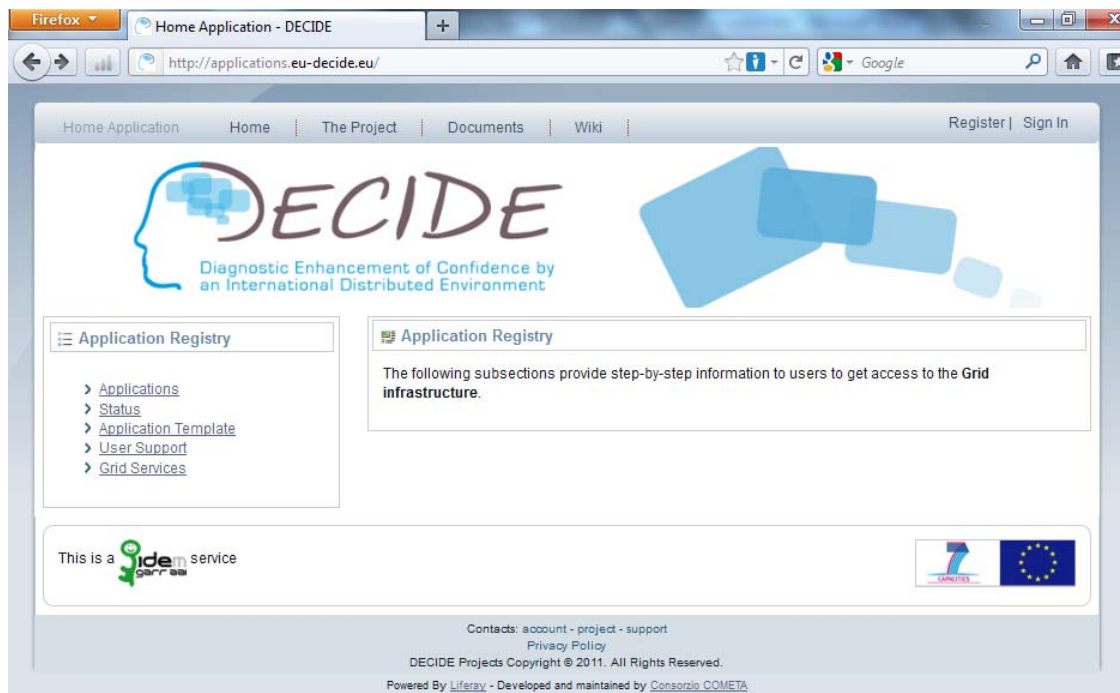


Figure 5: DECIDE applications portal

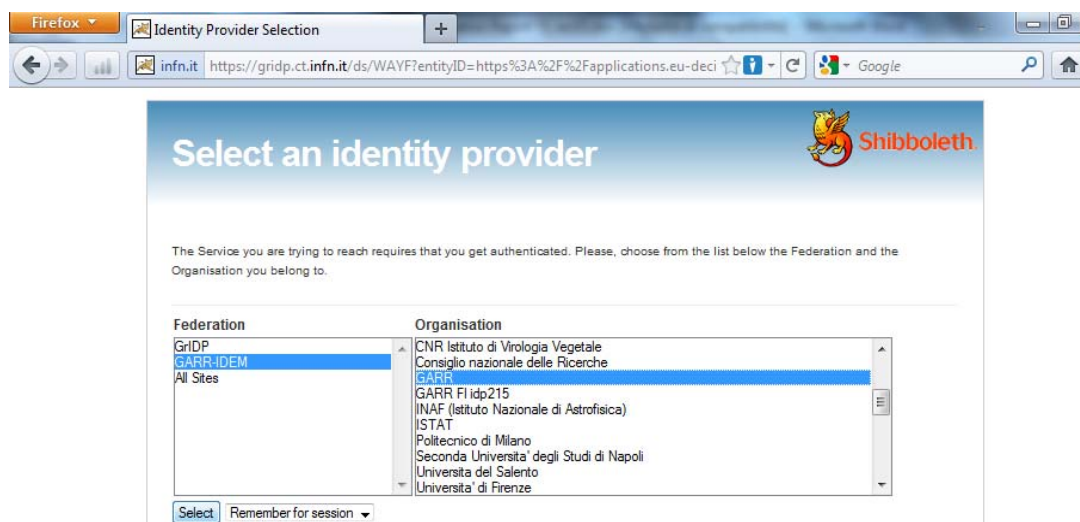


Figure 6: DECIDE applications portal: Identity Provider selection.



Figure 7: DECIDE applications portal redirected the user to his own institute's identification portal.

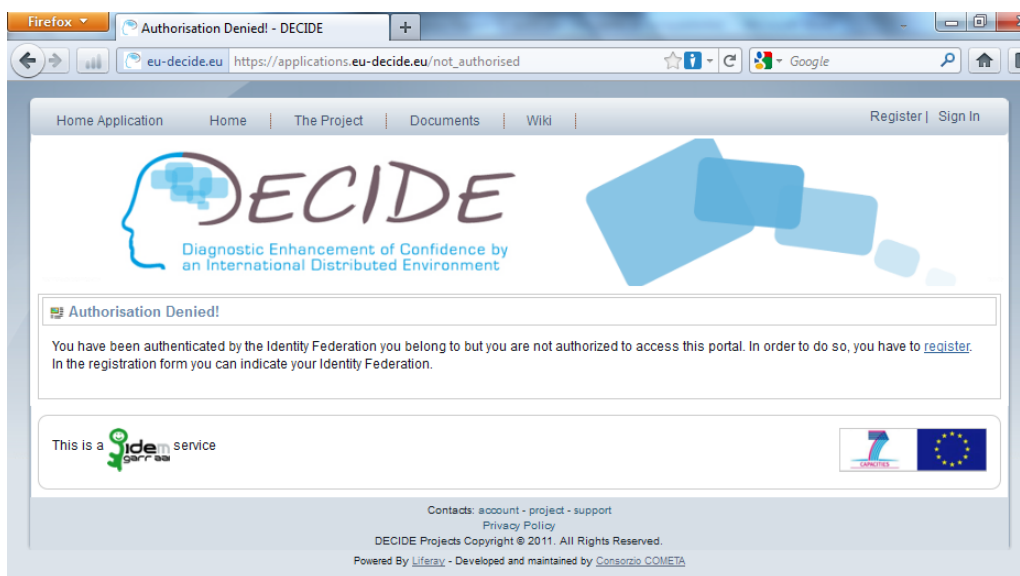


Figure 8: DECIDE application portal: user is not authorized to access any application, although was successfully identified.

2.3.2. Software Release Repository and other infrastructural issues

As was initially defined in deliverable D4.4.1, the DECIDE platform release policy (SRP) implements a standard versioning approach. New versions of the system are released under a given triplet "x.y.z" of numbers, where "x" indicates the major release number, "y" the

minor release number and "z" the bug fix number.

The following table provides a template of the detailed information accompanying each software release. Note: the SRP policy only concerns applications integrated in the Grid such as binary, libraries and scripts. The DECIDE Web portal and thus portlet applications remain outside the scope of this policy and software repository.

Release Number	DECIDE x, y, z	
Release Notes	<ul style="list-style-type: none">• Note 1• Note 2• Note 3	
Software Packages	Package	Version
	glite-amga-server	2.0.1-pre6
	glite-amga-cli	2.0.1-pre6
Library Dependencies		

Software packages are made available in the Grid, thus allowing automated deployments to be launched. Software packages are being compiled and uploaded to the Grid by technical partners contributing to the JRA development activities.

The software packages can thus be found in the LFC catalogue *lfc-01.ct.trigrid.it* at the following location: `/grid/vo.eu-decide.vo/SoftRepo/`.

The software repository is regularly updated as new releases of the platform are ready. It is fully and automatically replicated to at least another production site, for safety reasons and to ensure continuity of service during maintenance or downtime. The content of the LFC catalogue will also be regularly dumped and stored into some independent disk system (possibly in another production site): same will hold for the AMGA metadata catalogue.

3. CONCLUSIONS

This deliverable has reported on the deployed infrastructure so far and the underlying network topology. As of today, the DECIDE infrastructure consists of 13 installed and tested computing sites, out of which 10 host Grid services exposing computing resources such as processing power and storage capacity. Three Grid sites were already certified and one was certified during the first year of the project: moreover, three sites plan to complete the certification procedure during the second year. Certified sites do belong to production, thus supporting high QoS over offered diagnostic services.

All production sites were registered to the Regional Operation Center (ROC) database. From the different network tests applied, Service Level Agreements (SLA) as specified in deliverable D4.4.1, were respected.

Network bandwidths vary from 10 Mb/s to 1Gp/s depending on actual partners and onsite connectivity. All sites are connected to GEANT. It however can be noticed that the DECIDE project just having released the technological base of its infrastructure, low network traffic were thus far measured.

The overall project connectivity picture is stable and fits the DECIDE service requirements collected so far. During this first year no technical criticality has emerged, but we will continue the evaluation activity in order to support a potential enlargement of the DECIDE infrastructure.

The infrastructure is now ready for exploitation and to scale-up on demand.