



Enabling Grids for E-scienceE

# SA1 Status Report

## EGEE Grid Operations & Management

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*Final EU Review of EGEE-II*

*CERN*

*8-9<sup>th</sup> July 2008*

[www.eu-egee.org](http://www.eu-egee.org)



Information Society  
and Media

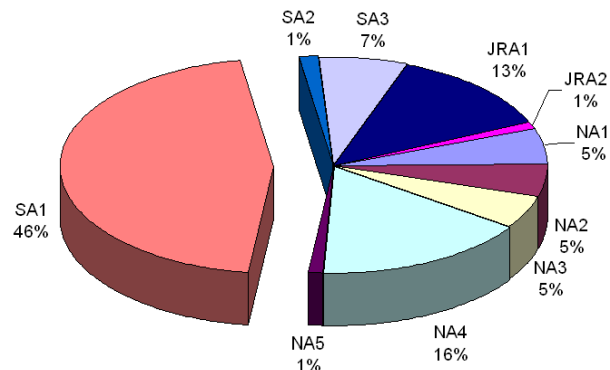


## SA1 Partners



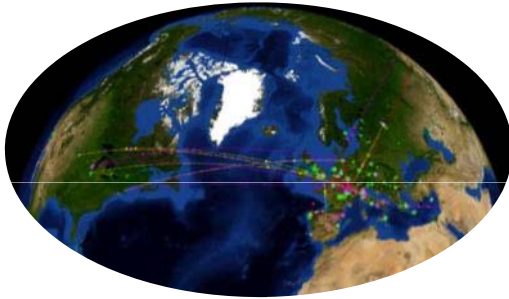
Manpower: 61 partners, 29 countries, 228 FTE

## EGEE-II Budget



Short Name	Country	Total (PMs)
CERN	Switzerland	480
JKU	Austria	24
UIBK	Austria	25
CESNET	Czech Rep.	72
CSC	Finland	12
KFKI-RMKI	Hungary	68
NIIF	Hungary	28
CYFRONET	Poland	108
ICM UW	Poland	36
PSNC	Poland	24
IISAS	Slovakia	36
JSI	Slovenia	36
TCD	Ireland	48
CCLRC	UK	210
UEDIN	UK	72
Imperial	UK	24
CSCS	Switzerland	24
CEA	France	24
CGG	France	24
CNRS	France	504
CS SI	France	48
DESY	Germany	72
FhG/SCAI	Germany	60
FZK	Germany	144
GSI	Germany	60
INFN	Italy	708
UKBH	Denmark	24
FOM	Netherlands	96
SARA	Netherlands	96
VR	Sweden	132
IHEP	Russia	78
IMPB RAS	Russia	48
ITEP	Russia	78
JINR	Russia	90
KIAM RAS	Russia	42
PNPI	Russia	36

RRC KI	Russia	60
SINP MSU	Russia	96
IPP-BAS	Bulgaria	96
UCY	Cyprus	96
GRNET	Greece	216
TAU	Israel	120
ICI	Romania	120
LIP	Portugal	96
CSIC	Spain	84
PIC	Spain	120
TID	Spain	48
ENEA	Italy	21
UNICAL	Italy	20
UNILE	Italy	20
UNINA	Italy	20
RED.ES	Spain	48
CESGA	Spain	84
IPB	Serbia and Montenegro	48
TUBITAK-ULAK	Turkey	48
RUG	Netherlands	12
Glasgow	UK	48
UNIMAN	UK	48
Oxford	UK	48
ASGC	Taipei	135
Srce	Croatia	32
<b>Total</b>		<b>5475</b>



## Test-beds & Services

Production Service

Pre-production service

Certification test-beds (SA3)

Training infrastructure (NA4)

## Support Structures & Processes

Operations Coordination Centre

Regional Operations Centres

Global Grid User Support

EGEE Network Operations Centre (SA2)

Operational Security Coordination Team

Training activities (NA3)

## Security & Policy Groups

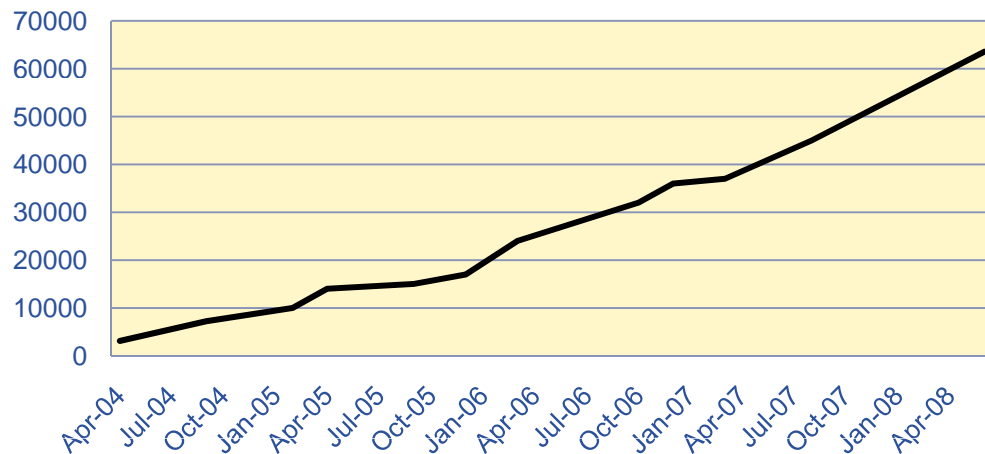
Joint Security Policy Group

EuGridPMA (& IGTF)

Grid Security Vulnerability Group

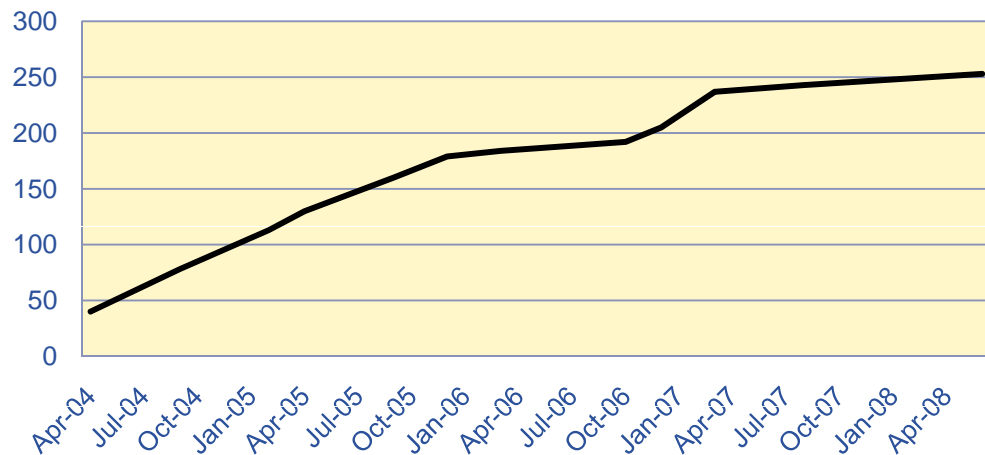
Operations Advisory Group (+NA4)

## No. CPU

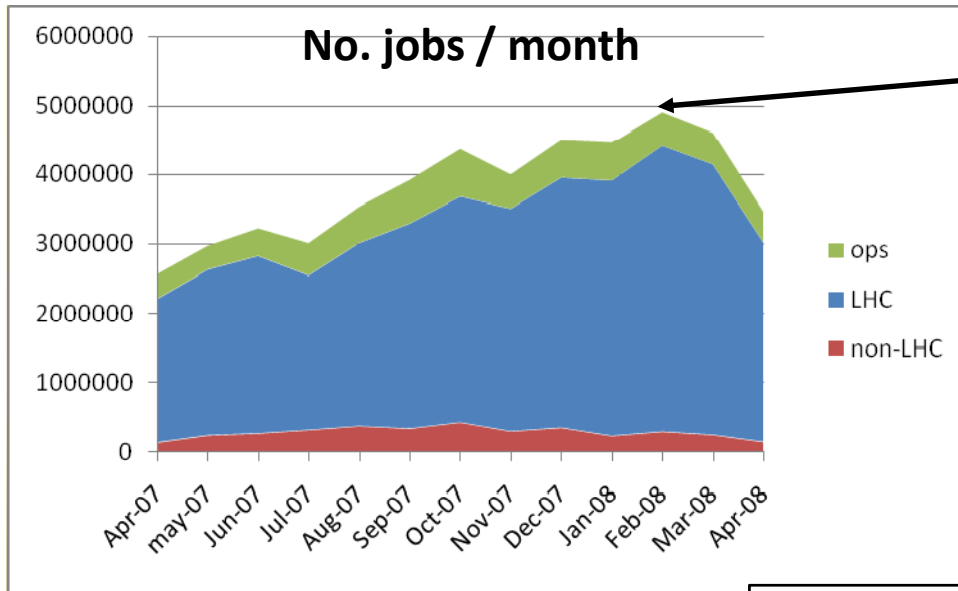


- ▶ 73709 CPU
- ▶ 49 countries (33 partner countries)
- ▶ 255 sites (145 partner sites)

## No. Sites

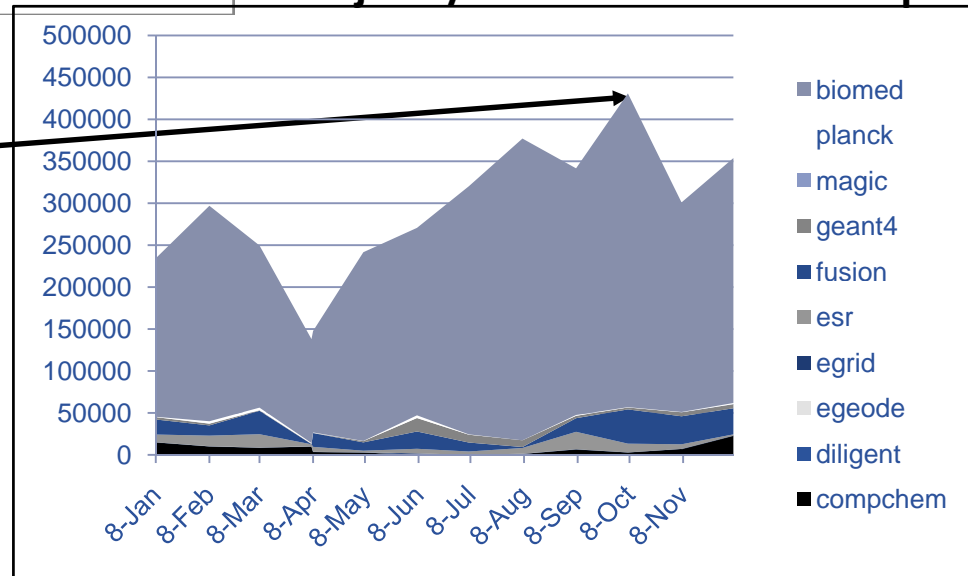


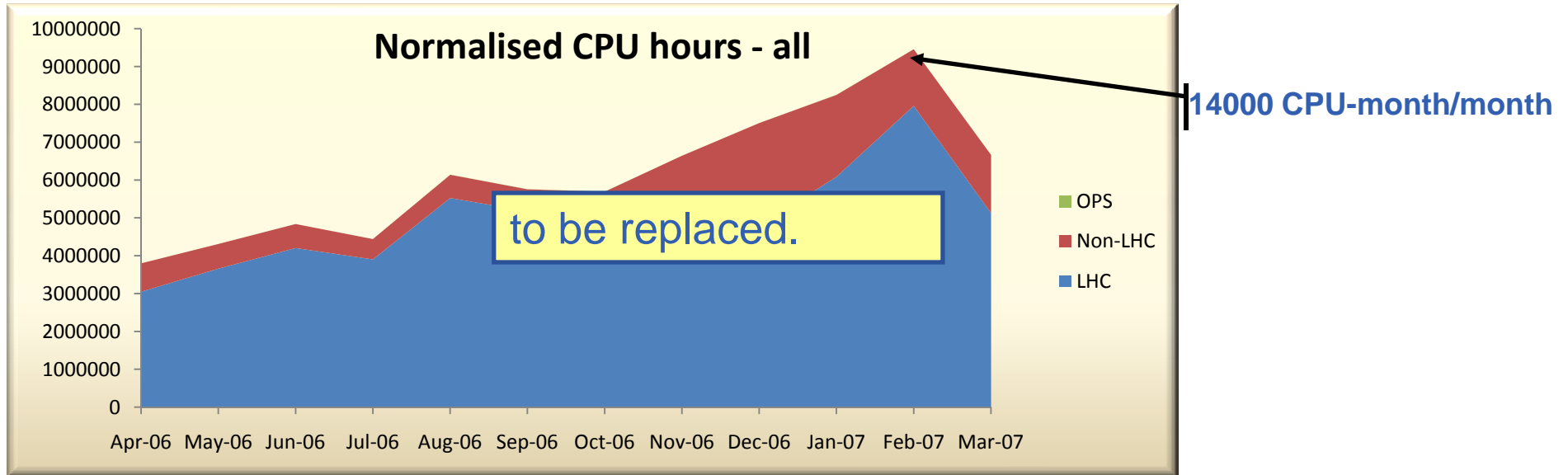
ROC	Partner - DoW	Partner - actual	Total	% non partner
CERN	1800	4856	6676	27%
France	1252	16203	16203	0%
De/CH	1852	8075	12536	36%
Italy	2280	6548	6571	0.4%
UK/I	2010	6618	12040	45%
CE	1163	2959	4711	37%
NE	1860	3207	4110	22%
SEE	1289	3606	3608	0.1%
SWE	898	1699	2280	25%
Russia	445	1378	1601	14%
A-P	801	1912	3373	43%
<b>Total</b>	<b>15650</b>	<b>57061</b>	<b>73709</b>	<b>23%</b>



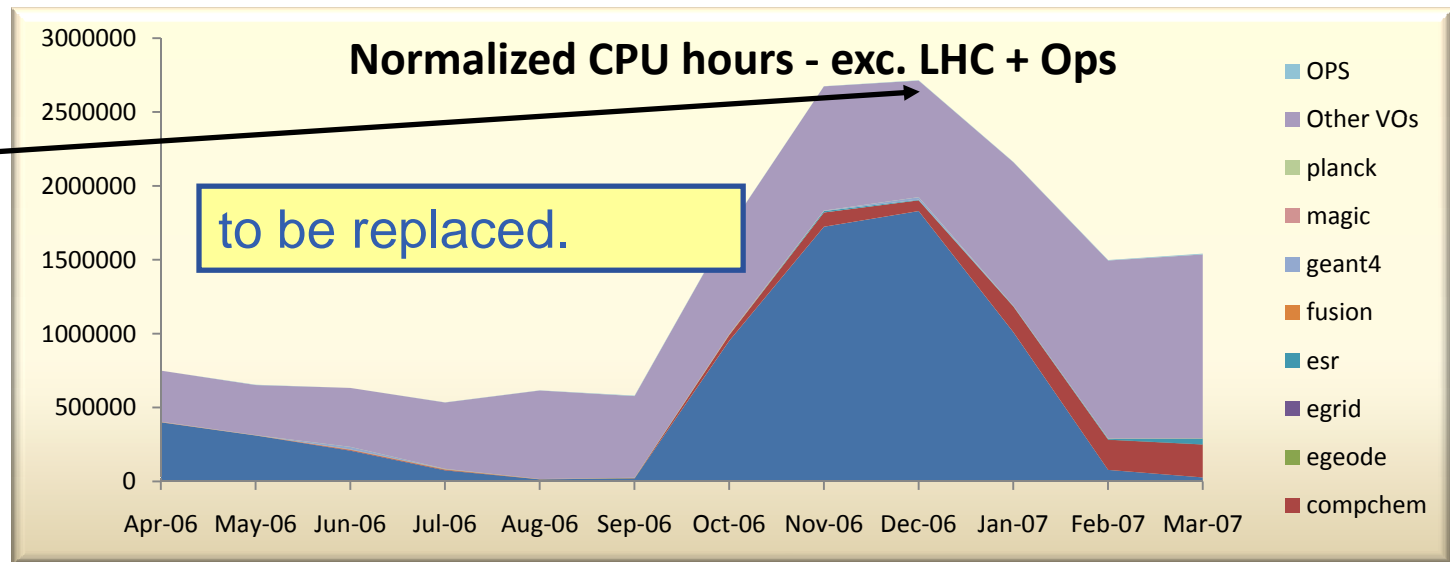
**No. jobs / month – exc. LHC + Ops**

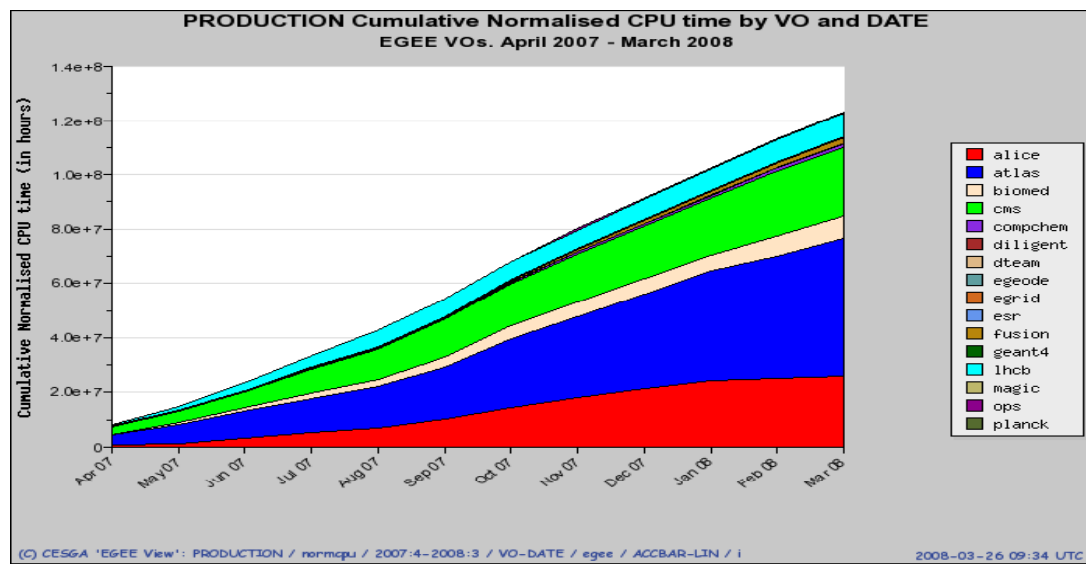
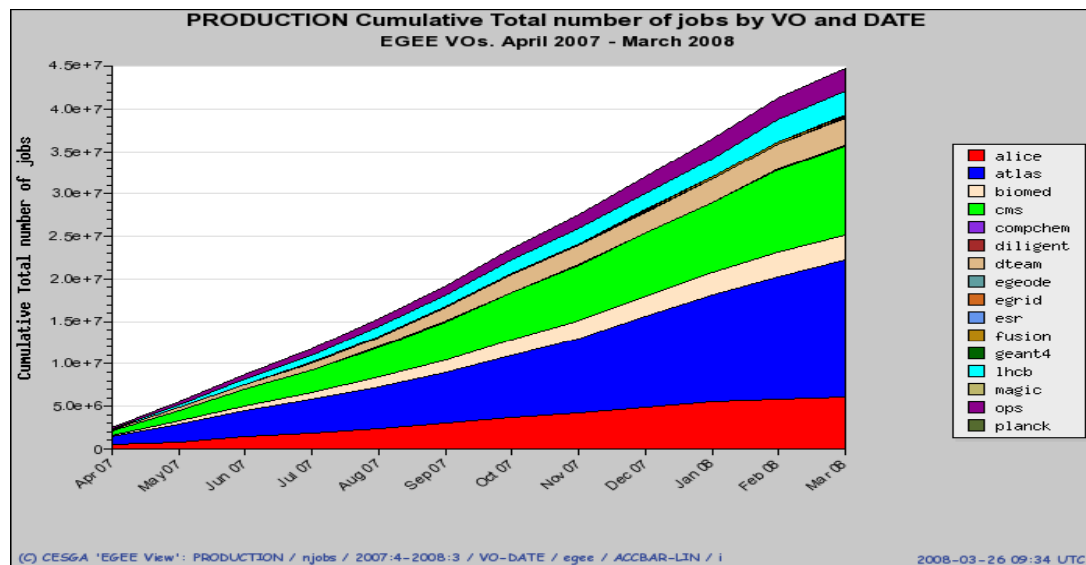
14100 jobs/day





3600 CPU-month  
~ 1/3 of total





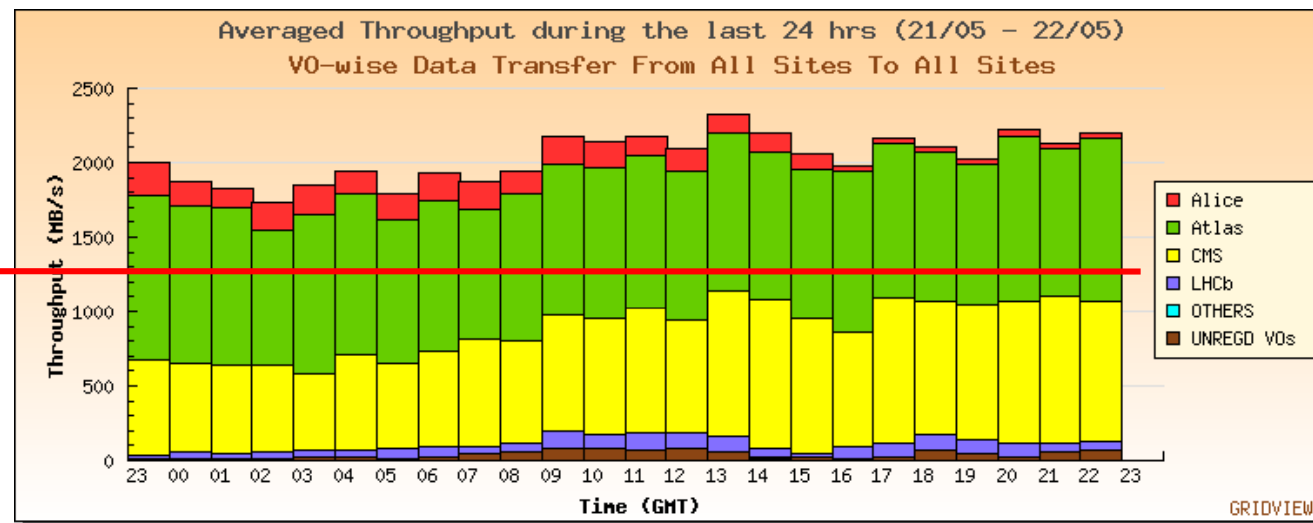
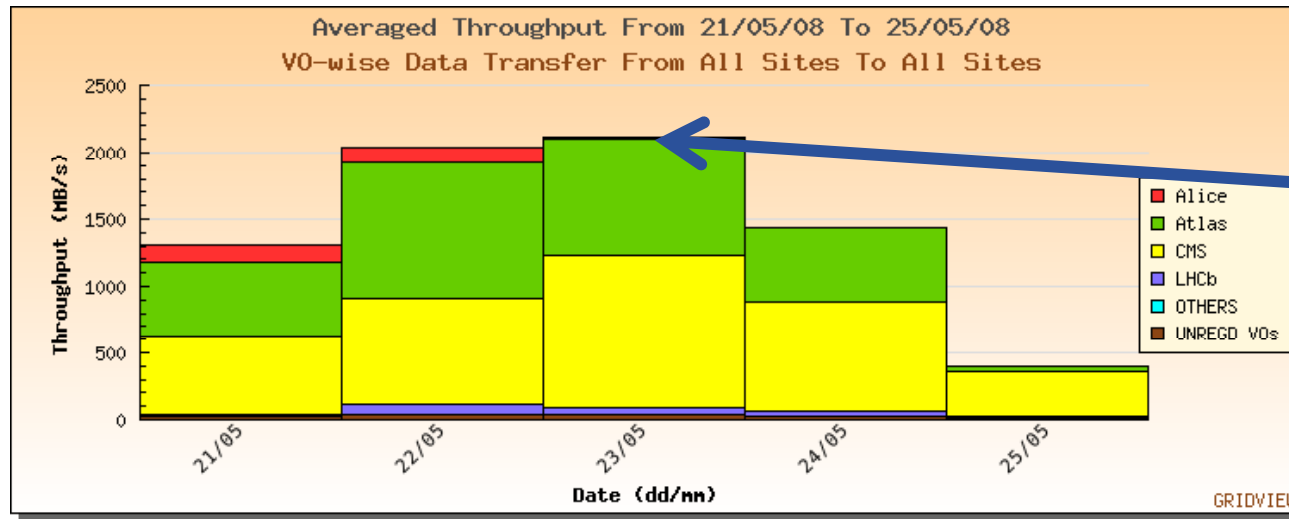
- **49 million jobs run in 2<sup>nd</sup> year of EGEE-II**
  - Xx per day sustained average
  - Peak of 170K
  - Non-LHC 14100 /day
- **10000 CPU-years delivered in 1 year**
  - ~1/3 of total available sustained over the year
  - Peak of 50% of available in Feb '07
  - ~1/3 of total was non-LHC in Dec '06

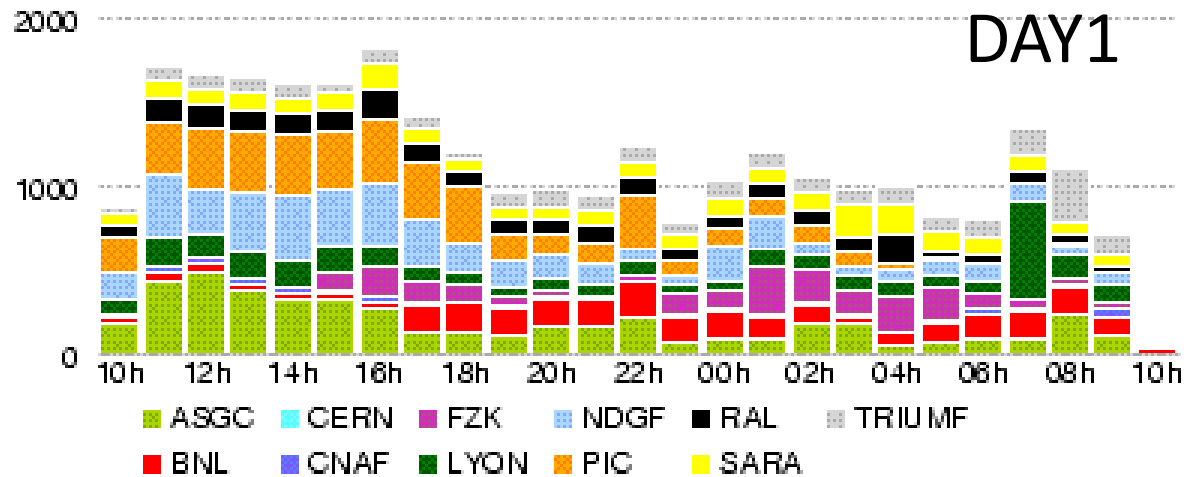
to be replaced.

## WLCG Common Computing Readiness Challenges

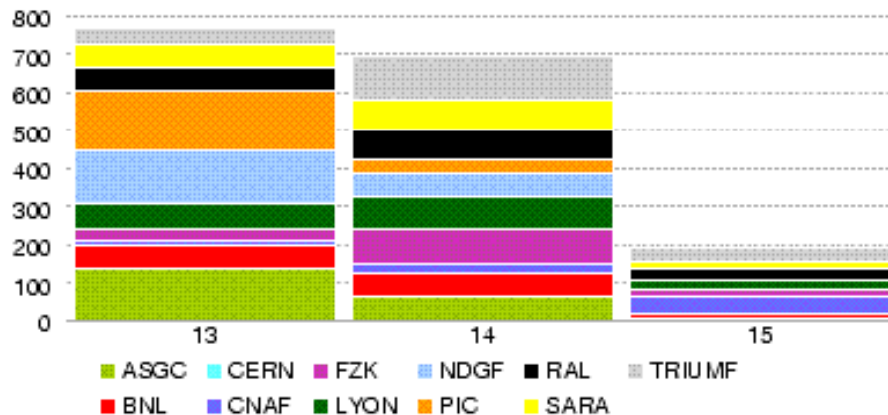
- **Full-scale dress rehearsal for the accelerator run**
  - All experiments together
  - Very demanding metrics, more than needed for accelerator run in 2008
  - Data transfers: ready and well exceeding targets
    - Target was 1.3 Gb/s
    - Rates of greater than 2.1 GB/s were achieved in aggregate between all experiments from CERN to all 11 Tier1 sites
    - With peaks ~3Gb/s
  - Number of jobs at the level needed for real production
    - E.g. only one experiment, CMS, submitted 100.000 jobs a day routinely, 200.00 day peak without problem, using egee and OSG production grids



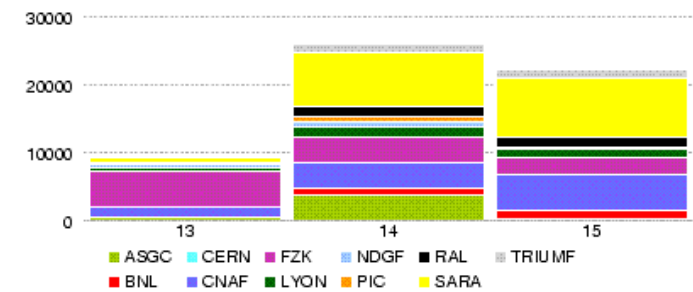




All days (throughput)



All days (errors)



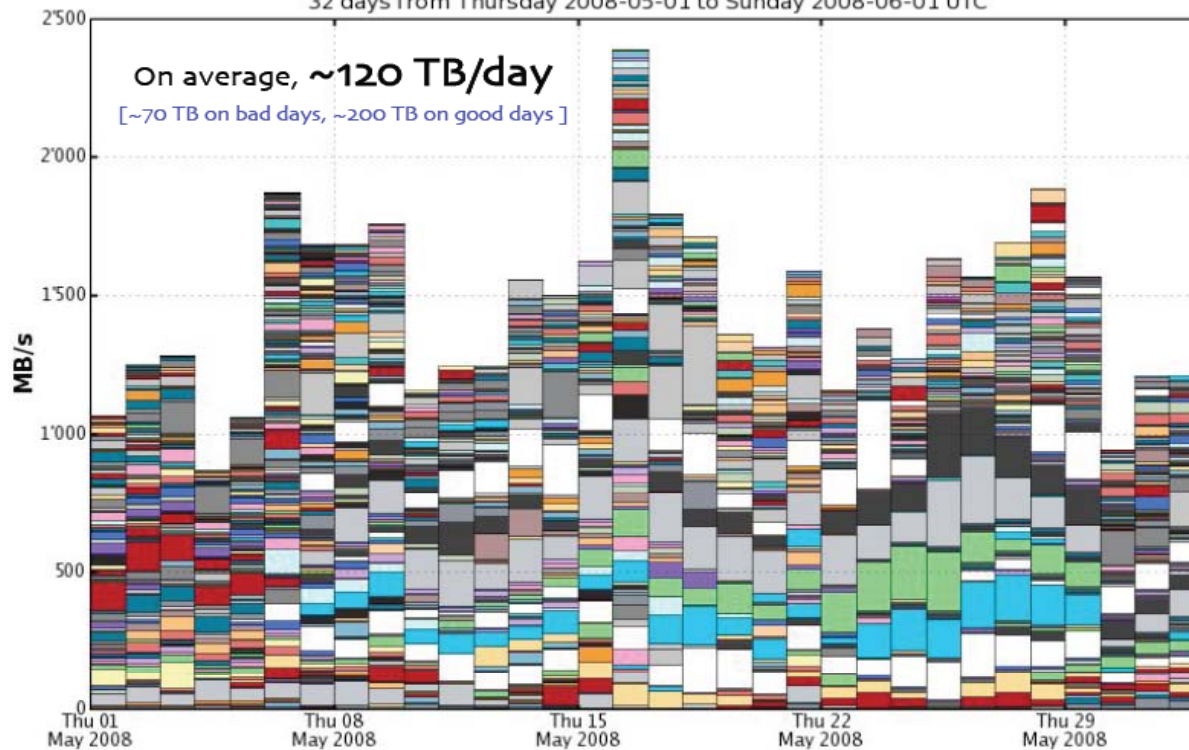


## Tier-x to Tier-x in CCRC'o8/phase-2



### Daily CMS PhEDEx transfer rate, Debug + Production

By site links for non-tape storage only  
32 days from Thursday 2008-05-01 to Sunday 2008-06-01 UTC



Impressive list of few hundreds of links...



## WLCG Common Computing Readiness Challenges

All this using EGEE production infrastructure and operations

- Reliable production service provided to WLCG
- Problems handled rather rapidly, with a decreasing number that require escalation
- Making use of interoperations with other grid infrastructures
  - Site availability/reliability metrics, accounting, support, operations meetings



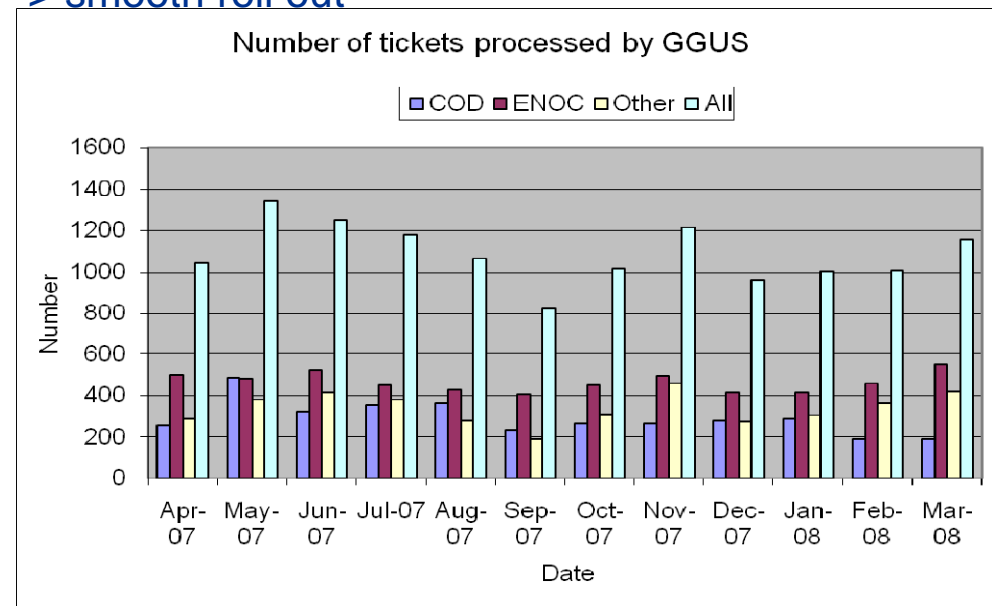
**All this with no additional effort  
No impact in daily operations**

- **Interoperation with OSG is day-to-day business**
  - Interoperability features CMS and ATLAS productions
  - Permanent EGEE/OSG Interoperability Platform operated by SEE region
  - User support processes interconnected (GGUS ↔ GOC)
  - Accounting:
    - Data published from Gratia to APEL repository
    - Visualization through EGEE Accounting portal
  - Agreed site availability/reliability metrics, stored in common repository and visualized with common tools
- **NDGF interoperates with EGEE since Y2**
  - CE gateway to access NDGF resources
  - Tests to probe the NDGF resources (arc-CEs) integrated in Service Availability Monitoring
  - All other operations components are there: accounting, resource registration (GOCDDB)
  - Operation team from NDGF involved in EGEE COD
- **Interoperation with Naregi in progress**
  - Interoperability tests in progress



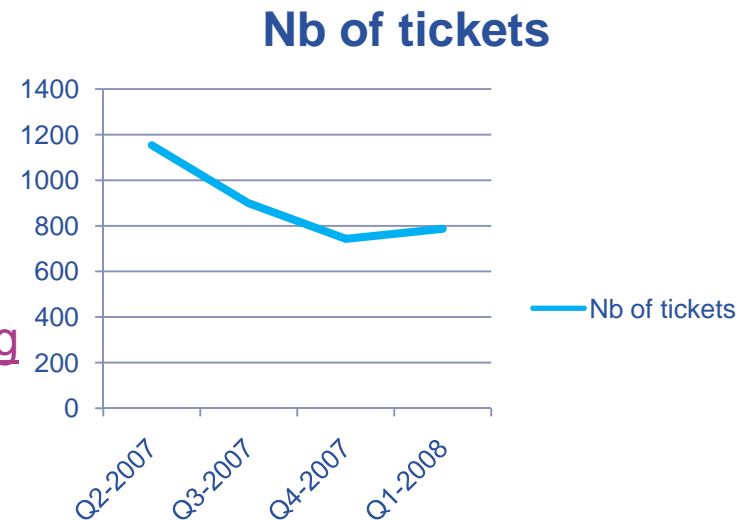


- **GGUS: process and tool well established, accepted and used by the community**
  - “A problem is not a problem if GGUS hasn't been open”
  - Problem reporting, logging and traceability
- **VOs directly involved in shaping GGUS**
  - One major release per year: V6.0 released in Nov '07
    - User is now involved in the final closure of a ticket
    - New status to simplify the work of ROCs
    - Extensive tests before the release -> smooth roll out
  - Monthly minor releases
- **New GGUS ticket submission form with help for problem description and other precisions.**
- **Escalation reports**



- **Grid Operator on Duty**

- Critical activity in maintaining usability and stability of sites
- NDGF operations team joined
- Portal for operations : <https://cic.gridops.org>
- Regional dashboard concept: first level support for the sites in the region

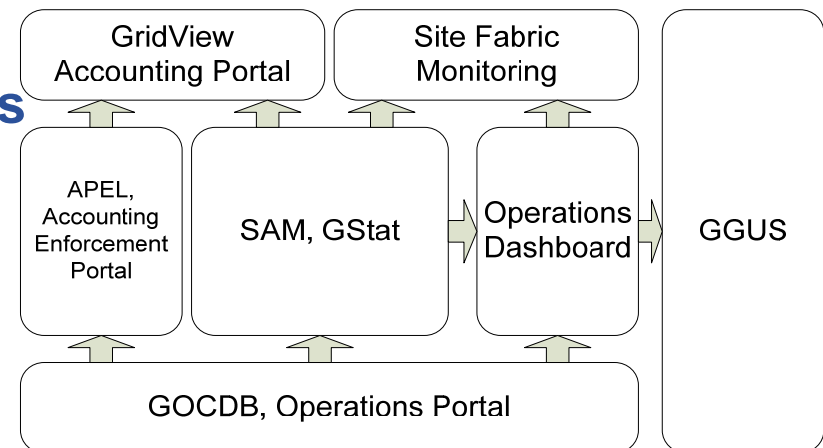


- **Continuous work on operations procedures**

- Contribute to establishment of regional grid infrastructures through related projects – well beyond Europe now

- **Solid set of operational tools provided for central operations teams**

- Good suited for the present operational model, widely used
- Many are shared with other infrastructure projects

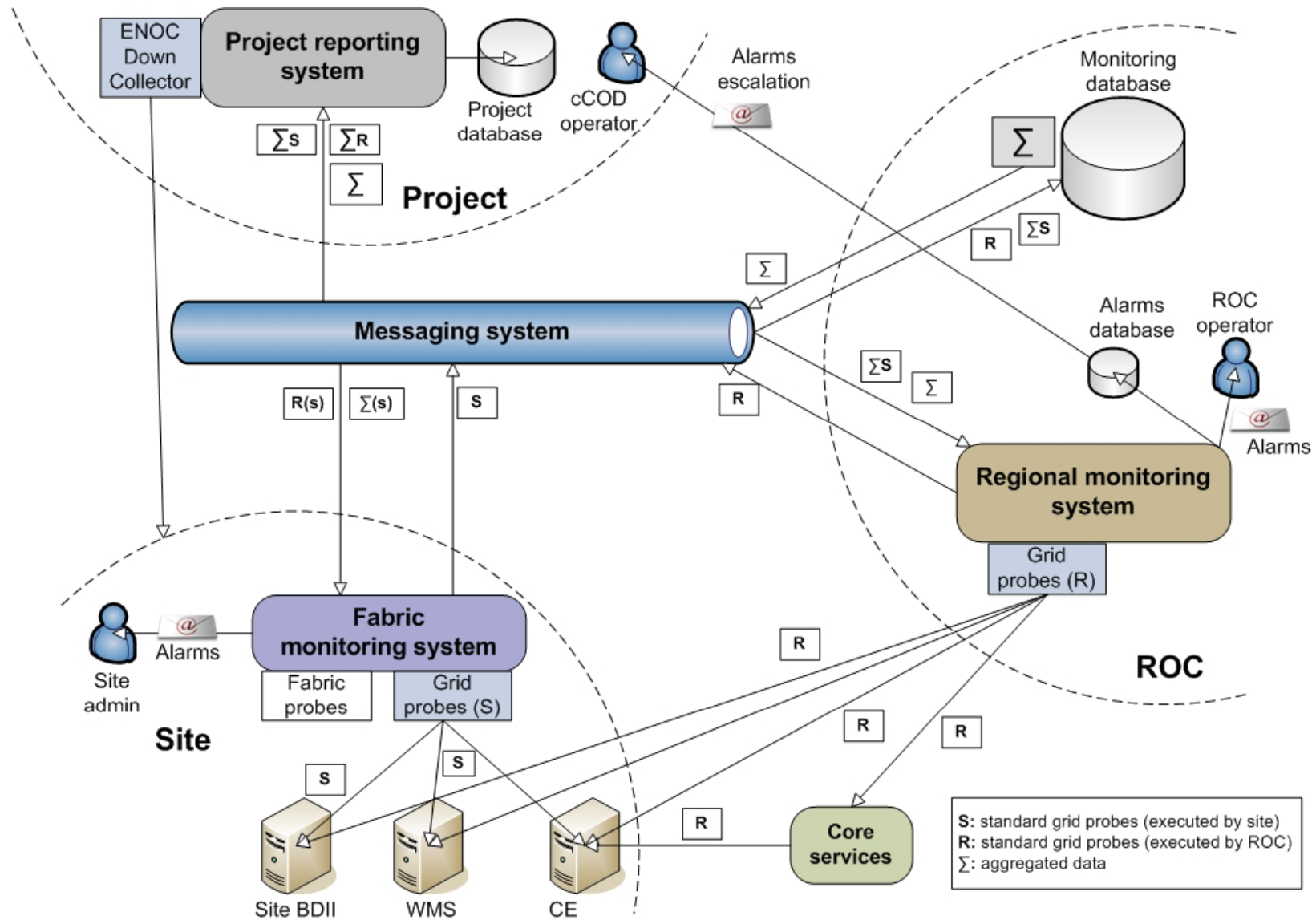




- **Site Availability Monitoring (SAM):**
  - Provides monitoring of grid services from a user perspective
  - Main source of monitoring information for site availability calculations
  - All information stored centrally
- **Changes to move grid monitoring information to the sites**
  - As a part of standard site monitoring, so it can raise alarms, etc
  - First phase: feed grid monitoring results to sites
  - Later, standard set of sensors to be run at the sites, they will push the information to a central repository
  - Site status monitoring: after survey, most widely used are Nagios (open source) and Lemon
    - Prototype based on the Nagios fabric monitoring system developed within the CE ROC
    - enables sites to receive instant notification in case of failures
    - Provides them with results from global monitoring systems such as SAM and ENOC DownCollector

# EGEE Site, regional and central monitoring

Enabling Grids for E-science



### Monitoring

- Tactical Overview
- Service Detail
- Host Detail
- Hostgroup Overview
- Hostgroup Summary
- Hostgroup Grid
- Servicegroup Overview
- Servicegroup Summary
- Servicegroup Grid
- Status Map
- 3-D Status Map

- Service Problems
- Host Problems
- Network Outages

Show Host:

- Comments
- Downtime

- Process Info
- Performance Info
- Scheduling Queue

### Reporting

- Trends
- Availability
- Alert Histogram
- Alert History
- Alert Summary
- Notifications
- Event Log

### Configuration

- View Config

[View Notifications For This Host](#)  
[View Service Status Detail For All Hosts](#)

## Service Status Details For Host 'se1-egee.srce.hr'

Host ↑↓	Service ↑↓	Status ↑↓	Last Check ↑↓	Duration ↑↓	Attempt ↑↓	Status Information
se1-egee.srce.hr	<a href="#">MyProxy-host-cert-valid-OPS-remote</a>	OK	10-01-2007 13:39:25	7d 0h 21m 57s	1/1	SAM status: ok
	<a href="#">RGMA-host-cert-valid-OPS-remote</a>	OK	10-01-2007 13:42:48	7d 0h 19m 4s	1/1	SAM status: ok
	<a href="#">SE-lcq-cp-Atlas-remote</a>	OK	09-22-2007 07:01:04	9d 7h 34m 48s	1/1	SAM status: ok
	<a href="#">SE-lcq-cp-DTeam-remote</a>	OK	10-01-2007 14:05:31	7d 0h 40m 58s	1/1	SAM status: ok
	<a href="#">SE-lcq-cp-OPS-remote</a>	OK	10-01-2007 13:39:25	7d 0h 21m 57s	1/1	SAM status: ok
	<a href="#">SE-lcq-cr-Atlas-remote</a>	OK	09-22-2007 07:01:04	9d 7h 34m 48s	1/1	SAM status: ok
	<a href="#">SE-lcq-cr-DTeam-remote</a>	OK	10-01-2007 14:05:31	7d 0h 40m 58s	1/1	SAM status: ok
	<a href="#">SE-lcq-cr-OPS-remote</a>	OK	10-01-2007 13:39:25	7d 0h 21m 57s	1/1	SAM status: ok
	<a href="#">SE-lcq-del-Atlas-remote</a>	OK	09-22-2007 07:01:04	9d 7h 34m 48s	1/1	SAM status: ok
	<a href="#">SE-lcq-del-DTeam-remote</a>	OK	10-01-2007 14:05:35	7d 0h 40m 58s	1/1	SAM status: ok
	<a href="#">SE-lcq-del-OPS-remote</a>	OK	10-01-2007 13:39:25	7d 0h 21m 57s	1/1	SAM status: ok
	<a href="#">ch.cern.RGMA-ServiceStatus</a>	OK	10-01-2007 14:28:28	6d 23h 47m 24s	1/4	OK
	<a href="#">hr.srce.CAdist-Version</a>	OK	09-30-2007 17:17:58	6d 23h 12m 59s	1/4	Official IGTF version is 1.16. Valid distribution version found.
	<a href="#">hr.srce.DPNS-List</a>	OK	10-01-2007 14:21:43	6d 23h 53m 34s	1/4	Listing content of /dpm succeeded. Directory contains domain srce.hr subdirectory.
	<a href="#">hr.srce.GridFTP-Transfer</a>	OK	10-01-2007 14:25:28	6d 23h 49m 10s	1/4	Upload to remote computer succeeded. Download from remote computer succeeded. File successfully removed from remote computer. Received file is valid.
	<a href="#">hr.srce.MyProxy-CertLifetime</a>	OK	09-30-2007 17:29:13	6d 22h 59m 45s	1/4	Certificate will expire in 320.17 days (Aug 15 19:34:35 2008 GMT).
	<a href="#">hr.srce.MyProxy-ProxyLifetime</a>	OK	10-01-2007 14:32:58	6d 23h 55m 20s	1/3	Certificate will expire in 17.10 days (Oct 18 14:50:37 2007 GMT).
	<a href="#">hr.srce.MyProxy-Store</a>	OK	10-01-2007 14:21:43	6d 23h 53m 34s	1/4	MyProxy credential created. Querying stored credential succeeded. MyProxy credential successfully removed from remote computer. Received file is valid.
	<a href="#">hr.srce.SRM-Transfer</a>	OK	10-01-2007 13:39:25	7d 0h 21m 57s	1/1	Upload to remote computer succeeded. Download from remote computer succeeded. File successfully removed from remote computer. Received file is valid.
	<a href="#">hr.srce.SRM1-CertLifetime</a>	OK	09-30-2007 17:22:28	5d 23h 47m 56s	1/4	Certificate will expire in 320.16 days (Aug 15 19:34:35 2008 GMT).
	<a href="#">hr.srce.SRM1-Ping</a>	OK	10-01-2007 14:28:28	6d 23h 47m 24s	1/4	Pinging successful.
	<a href="#">hr.srce.SRM2-CertLifetime</a>	OK	09-30-2007 17:22:28	5d 23h 47m 56s	1/4	Certificate will expire in 320.18 days (Aug 15 19:34:35 2008 GMT).
	<a href="#">org.egee.ngm.MON-remote</a>	OK	10-01-2007 14:32:07	7d 0h 11m 42s	1/1	OK
	<a href="#">org.egee.ngm.PROX-remote</a>	OK	10-01-2007 14:32:07	7d 0h 11m 44s	1/1	OK
	<a href="#">org.egee.ngm.SE-remote</a>	OK	10-01-2007 14:32:10	7d 0h 11m 42s	1/1	OK
	<a href="#">org.nagios.BDL-Check</a>	OK	10-01-2007 14:26:13	7d 0h 3m 17s	1/4	LDAP OK - 0.048 seconds response time
	<a href="#">org.nagios.GridFTP-Check</a>	OK	10-01-2007 14:29:58	6d 23h 58m 52s	1/4	FTP OK - 0.007 second response time on port 2811 [220 se1-egee.srce.hr DPM GridFTP ready.]
	<a href="#">org.nagios.GridCE-Check</a>	OK	10-01-2007 14:33:43	6d 23h 56m 52s	1/4	GridCE OK - 0.007 second response time
	<a href="#">org.nagios.SRM1-PortCheck</a>	OK	10-01-2007 14:28:28	6d 23h 47m 24s	1/4	SRM1 OK - 0.007 second response time on port 8445
	<a href="#">org.nagios.SRM2-PortCheck</a>	OK	10-01-2007 14:28:28	6d 23h 47m 24s	1/4	SRM2 OK - 0.007 second response time on port 8446
	<a href="#">org.nagios.Tomcat-Check</a>	OK	10-01-2007 14:28:28	6d 23h 47m 24s	1/4	Tomcat OK - 0.007 second response time on port 8443

31 Matching Service Entries Displayed

- **SAM widely used by LHC VOs, plugging their own VO-specific SAM tests, to determine which sites are suitable**
- **Experiment dashboards extensively used by the LHC community**
- **VLMED VO (biomed) using the dashboard for a year now, others interested**
- **Dashboard framework also used in other areas:**
  - Experiment specific: ATLAS DDM, ATLAS ProdSys
  - New applications for FTs monitoring and channel administration being developed
  - Interest in reusing some of the visualization technology for operational dashboards
    - SAM, CMS SAM visualization application
- **Evolution similar to operations grid monitoring:**
  - Feed VO monitoring results to the sites
  - Common mechanism

SAM VISUALIZATION

---

Latest Results
Historical View
Feedback
Help

**Sites**

Tier1s + Tier0

- All Tier1s + Tier0
- T0\_CH\_CERN
- T1\_DE\_FZK
- T1\_ES\_PIC
- T1\_FR\_CCIN2P3
- T1\_IT\_CNAF
- T1\_TW\_ASGC

**Service Types**

VO critical

- Select All
- CE
- SE
- SRM

**Test Types**

CMS Tests

- Select All
- CE-cms-basic
- CE-cms-frontier
- CE-cms-mc
- CE-cms-prod
- CE-cms-squid
- CE-cms-swinst

**Test Exit Status**

All Exit Status

- na
- ok
- down
- degraded
- partial
- maint
- error

Show Results

---

**Legend:** NA OK MAINTENANCE ERROR WARNING INFO NOTE CRITICAL

Note: brightest colors: test is 0 - 6 hours old, ... lightest colors: test is more that 24 hours old

[Link to the table](#)

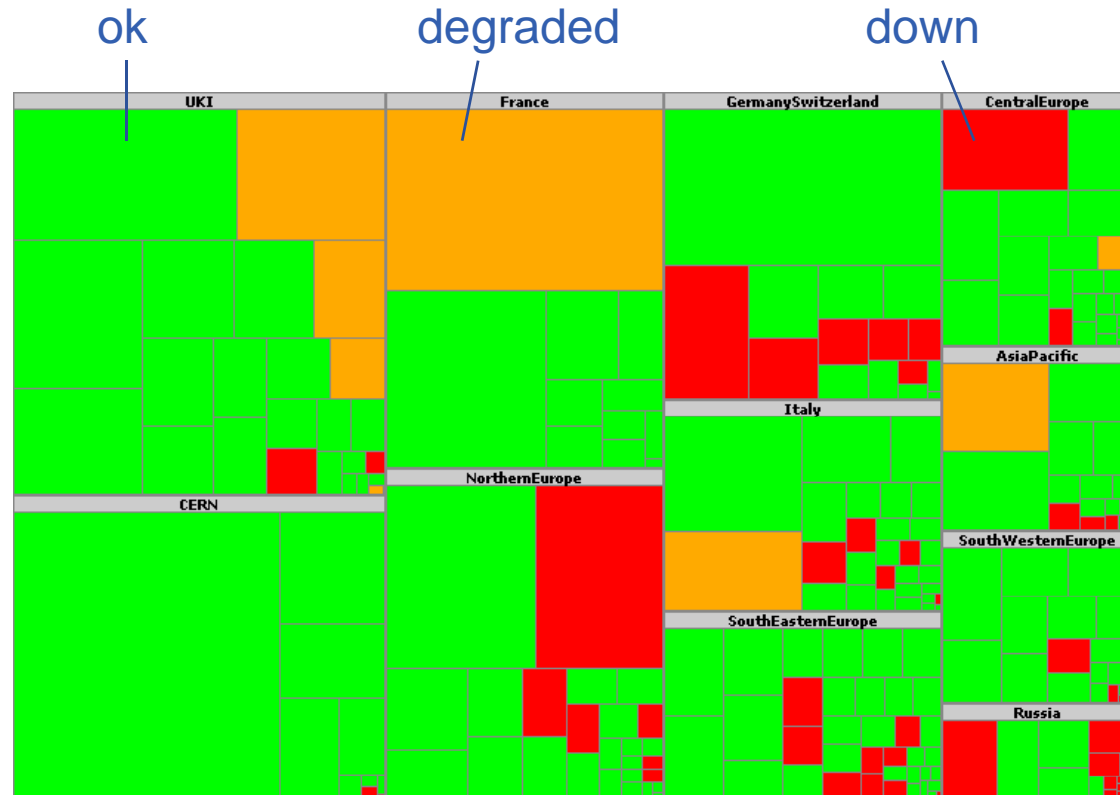
Sitename	Service Type	Service Name	jsprod	basic	frontier	squid	swinst	js	mc	getmeta	del	put	getpfn	get
T0_CH_CERN	CE	ce101.cern.ch	ok	warn	ok	ok	ok	ok	ok					
		ce102.cern.ch	ok	warn	ok	ok	ok	ok	ok					
		ce103.cern.ch	ok	warn	ok	ok	ok	ok	ok					
		ce104.cern.ch	ok	warn	ok	ok	ok	ok	ok					
T1_DE_FZK	CE	a01-004-128.gridka.de	ok	warn	ok	ok	ok	ok	error					
		ce-2-fzk.gridka.de	ok	warn	ok	ok	ok	ok	ok					
	ce-fzk.gridka.de	ok	warn	ok	ok	ok	ok	ok						
T1_ES_PIC	CE	ce05.pic.es	ok	ok	ok	ok	ok	ok	ok					
		ce06.pic.es	ok	ok	ok	ok	ok	ok	ok					
		ce07.pic.es	ok	ok	ok	ok	ok	ok	ok					
	SRM	srms-disk.pic.es								ok	ok	ok	ok	ok
T1_FR_CCIN2P3	CE	srmscms.pic.es								warn	warn	warn	error	warn
		cclgcell01.in2p3.fr	error	warn	ok	ok	ok	error	ok					
		cclgcell03.in2p3.fr	ok	warn	ok	ok	ok	ok	ok					
		cclgcell04.in2p3.fr	ok	warn	ok	ok	ok	ok	ok					

## **GridMap** – high-level visualization of the grid availability

- Collaboration with Industry – unfunded collaboration with EDS via CERN's openlab project
- <http://gridmap.cern.ch/gm>
- **Display monitoring data in a way that operators can absorb it, using advanced visualization techniques**
  - visualize the Grid by using *Treemaps*  
(Grid + Treemap = *GridMap*)
- **GridMap is a visualization tool for looking at Service Availability and Reliability**
  - Condenses all EGEE sites into a single view
  - More important problems are visually more distinctive
- **Used in production by grid and operators**
  - Looking at other uses of the technique and technology
    - E.g. Showing #Jobs, data transfer rates between sites from a **VO perspective**

- **Idea**
  - visualize the Grid by using *Treemaps*  
(Grid + Treemap = *GridMap*)

- **Example *GridMap***



Colour of rectangle is e.g.

- SAM status of site / service
- Availability of site / service
- ...

- **ROC-Site SLA modeled on the service management recommendations of ITIL**
  - ~10 draft iterations, constructive input from both parties (ROCs and Sites), latest version: April '08
  - Areas covered:
    - HARDWARE AND CONNECTIVITY CRITERIA
    - DESCRIPTION OF SERVICES COVERED
    - SERVICE HOURS
    - AVAILABILITY
    - SUPPORT
    - SERVICE REPORTING AND REVIEWING
- **“SLAs relate to the measurement, reporting and reviewing of service quality as delivered by IT to the business”:**
  - Two ROCs have already signed SLAs with sites (SWE:8, SEE:2), others on-going.
  - EGEE site availability metrics published since start of 2008.





## EGEE Availability and Reliability Report

Region Summary - Sorted by Name

March 2008

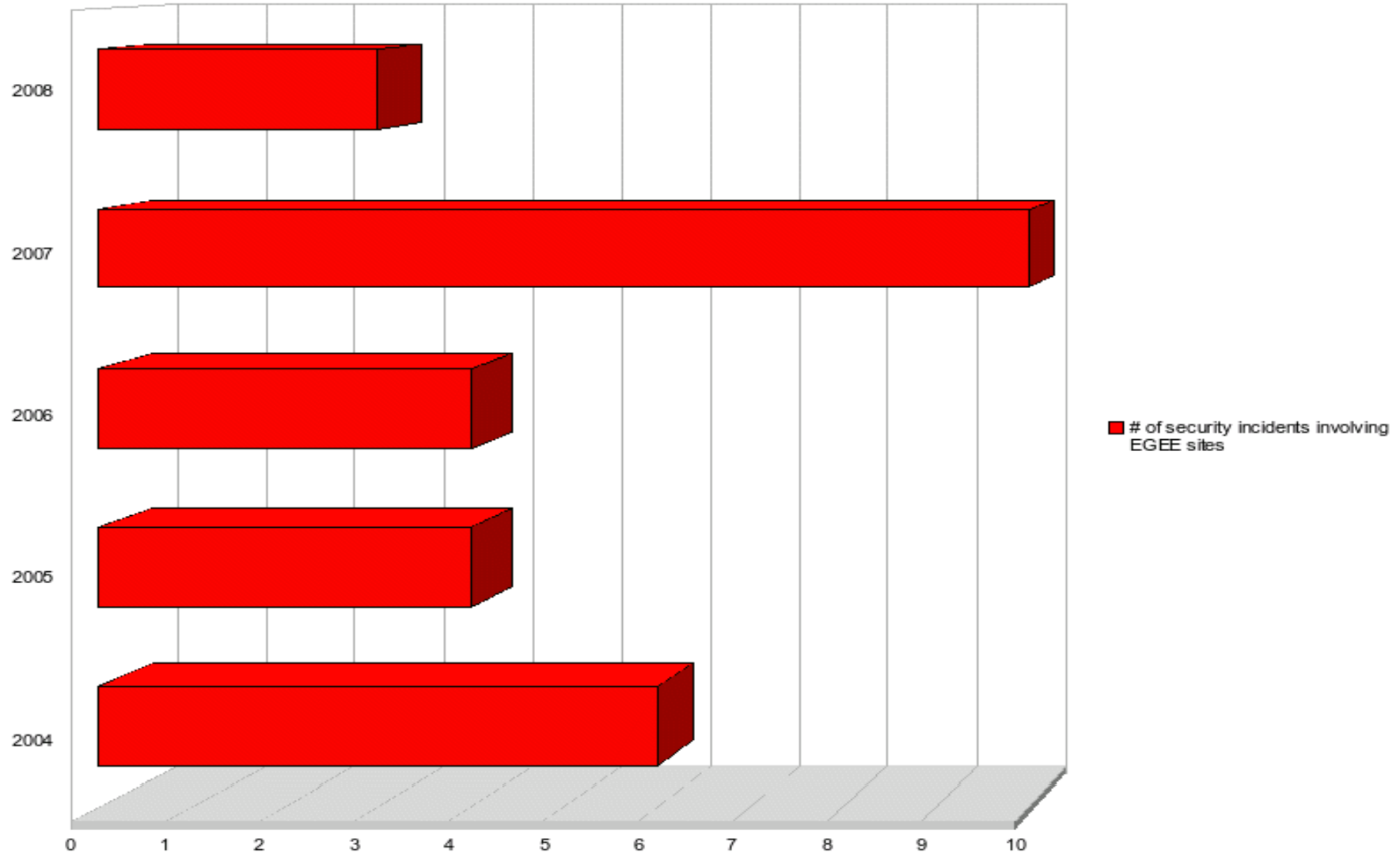
Critical SAM Tests - <http://sam-docs.web.cern.ch/sam-docs/docs/htmldocs/MANUserManual/node22.html>

Availability = % of successful tests  
 Reliability = Availability / Scheduled Availability  
 Reliability and Availability for Region - average of all sites in the Region

Colour coding : < 30% < 60% < 90% >= 90%

Region	Avail-ability	Reli-ability
AsiaPacific	74 %	75 %
CERN	70 %	66 %
CentralEurope	83 %	81 %
France	92 %	93 %
GermanySwitzerland	86 %	86 %
Italy	69 %	79 %
NorthernEurope	82 %	83 %
OpenScienceGrid	64 %	10 %
Russia	77 %	76 %
SouthEasternEurope	79 %	81 %
SouthWesternEurope	76 %	83 %

- Operational Security Coordination Team (OSCT)



S

- **JSPG**
  - **Revised JSPG mandate**
    - *Prepare and maintain security policies for its primary stakeholders*
      - to be approved and adopted by Grid management bodies
    - **Jointly owned by EGEE and WLCG** (including a subset of OSG and NDGF)
    - *May also advise on any policy-related security matter*
  - **New and reworked policies in the last year**
    - *Virtual Organisation Operations Policy (approval in progress)*
      - <https://edms.cern.ch/document/853968>
    - **Grid Security Traceability and Logging Policy** (approval in progress)
      - <https://edms.cern.ch/document/428037>
    - *Approval of Certification Authorities (approval in progress)*
      - <https://edms.cern.ch/document/428038>
    - *Policy on Grid Multi-User Pilot Jobs (approval in progress)*
      - <https://edms.cern.ch/document/855383>
- **EUGridPMA and IGTF**
  - The European Policy Management Authority for Grid Authentication in e-Science
  - Establish requirements and best practices for grid identity providers
  - Enable a common trust domain applicable to authentication of end-entities

- **Completed the production of robust, easily deployable tools for the scheduling and execution of network monitoring and the collection of data for later analysis**
  - NPM rewritten and upgraded
  - e2emonit
- **Produced a set of services for providing access to network monitoring data that adhere to the latest OGF NM-WG standards**
  - And interoperate with other tools
- **Network status information has been made available to sites through Nagios**
- **Dissemination:**
  - <http://www.egee-npm.org/>
  - Several presentations, abstracts and demos

- **EGEE SA1 results:**
  - Reliable, multi-VO, large scale production infrastructure
  - Operational processes and tools
  - Worldwide collaboration between ROCs and sites
- **Built together with other national and international grid infrastructures**
  - Cooperation ensures geographical growth
- **WLCG relies heavily on the present EGEE operations service and is dependent on its future continuation.**
  - This is an assurance for the durability of the EGEE operations results.
- **We believe we have a sustainable operations model**
- **In EGEE III we want to make it more distributed and automated to reduce the effort**
  - Automation, monitoring, SLAs
- **We are then setting the groundwork for the migration to an NGI based model**

- **Infrastructure has continued to increase in size, scale and usage**
- **EGEE operations is able to cope with the increase without major changes in structure, processes or tools**
  - **We have the right model**
- **Interoperation is a fact – used in production**
- **Distribution and automation, keys to reduce the effort in the coming years**
  - Tool automation, monitoring, SLAs
  - Setting the groundwork for the migration to an NGI based model