

Grid Operations: Evolution of operational model over the first year

eGEE
Enabling Grids
for E-science



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- Introduction
- LCG/EGEE operations structure
- A year back ...today
- Operations process
- The “4 pillars for operations”
- Operations procedure
- Documentation and Training
- Operator-on-duty activity
- On-going and future work



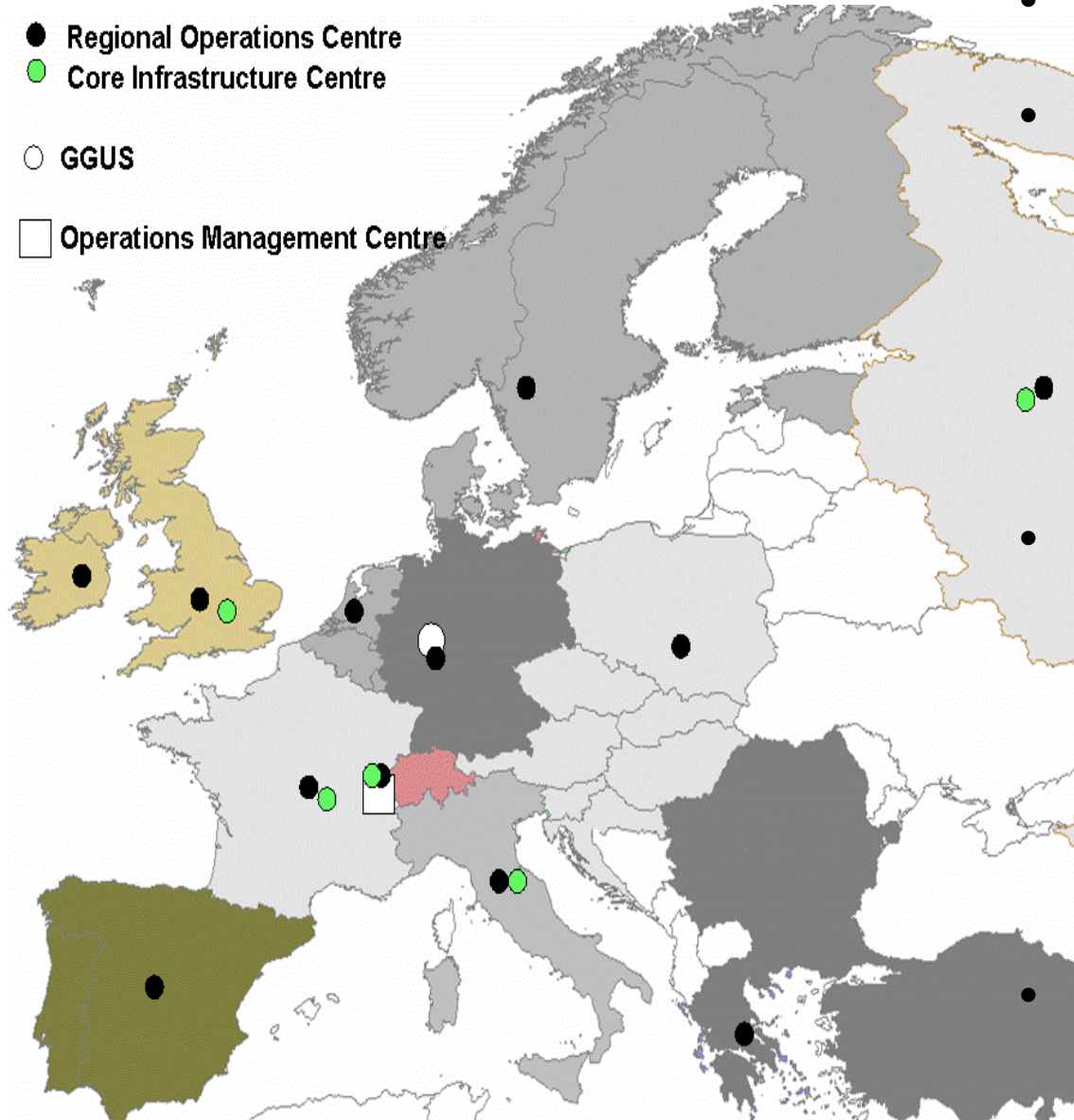
- Motivation
 - Maintain acceptable service level for all grid users
 - Scale of infrastructure: ~200 sites, 70+ institutions, ~20000 CPUs
 - Quite complex s/w running on heterogeneous h/w and OSes
- Elements from operations in EGEE/LCG
 - monitoring (tools, methods,...)
 - service maintenance
 - problems followup
- Procedures, problem tracking, collecting knowledge



EGEE Operations Structure



- Regional Operations Centre
- Core Infrastructure Centre
- GGUS
- Operations Management Centre



- Operations Management Centre (OMC)
- Core Infrastructure Centres (CIC)
 - Manage daily grid operations
 - oversight, troubleshooting
 - “Operator on Duty”
 - Run infrastructure services
 - UK/I, Fr, It, CERN, Ru, Taipei
- Regional Operations Centres (ROC)
 - Front-line support for user and operations issues
 - Provide local knowledge and adaptations
 - One in each region – many distributed
- User Support Centre (GGUS)
 - In FZK: provide single point of contact (service desk) + portal.

Operations Model, CHEP, Mumbai, February 13th-17th 2005



Beginning of operations



- Initial tools:
 - TestZone Tests (later SFT)
 - Savannah - task tracker
 - Rollout mailing list - first step for notifications
 - GOC DB - to get contact email addresses
 - Mail client - to send notifications
- Work done manually:
 - notifications sent from normal email client
 - ticket expiration date checked using Savannah web interface
- Only one person
- No clear procedures or even recommendations



Initial tools

Last tests results (on 2005-0)

Colours definition

SD	Scheduled downtime	#a3a3a3
JL	Job list match failed	#aab3ff
JS	Job submission failed	#f4876b
CT	Critical tests failed	#f9d48e
NT	Non-critical tests failed	#f2f98e
OK	OK	#b2f98e

Display Criteria: Browse with the follow-up query query form and Simple selection.

Item Group: Any, Category: Any, Additional constraint: Any, Show 50 items at once.

New Message window: Send, Chat, Attach, Address, Fonts, Colors, Save As Draft. To: [], Cc: [], Subject: []

Summary

Public Areas: Main | Homepage | Co >> Submit a task | Browse

Administration: Main | Cookbook | Sup

Details

Should Start On: 1 February 2006

Category: Unknown, Item Group: Unknown, Action taken: Unknown, Percent Complete: Unknown, Response: [], Summary: []

Original Submission: []

* Mandatory Fields

10.	OK	France	LCG-LCG2	set@ecp.fr	01-24 06:05:51	2 3 0	2 3 0	OK	OK	FAILED	OK	OK	OK	OK
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Operations Model, CHEP, Mumbai, February 13th-17th 2005



A year and a half ago...



- Initial workload:
 - about 60 sites
 - all work done manually by one person
 - contacting directly site admins
 - providing full support and expertise for problem resolution
- First phase: small team at CERN:
 - initial escalation procedure as unofficial documentation
 - training for new operator(s)



Back 1 year ago



- Number of sites started to grow quickly →
 - 4 federations involved
- Objectives for the management of operations”
 - Transparency
 - Information sharing between CICs
 - Full Core Infrastructure Services functionality on a “24x7” basis
- Procedures, tools, static info and dynamic monitoring
 - Easy and fast transfer of responsibilities
 - Information sharing
 - Troubleshooting in conjunction with federations



...Today



- Started November 2004
- 6 teams working in weekly rotations between
 - CERN, IN2P3, INFN, UK/I, Ru, Taipei
- Procedures described in Operations Manual
- Crucial in improving site stability and management

- Operations coordination
 - Weekly operations meetings
 - Regular ROC, CIC managers meetings
 - Series of EGEE Operations Workshops

- Geographically distributed responsibility
 - **Tools are developed/hosted at different sites:**
 - GOC DB (RAL), SFT (CERN), GStat (Taipei), CIC Portal (Lyon)



Monitoring resources&services



- Global view of the status of the infrastructure
- Monitoring services developed and operated by CERN, Academia Sinica (Taiwan) and GridPP (UK).
- Availability of resources and service, stored in GOCDDB
- Keeping this information up to date is a shared responsibility between the site and the ROC/Tier1
 - Sites are regularly checked. Results publicly available.
 - Check of consistency of the dynamic information published in the information system.
 - VO managers may use this information for finer site selection.



SFT - report



- Shows results matrix with all sites and provides detailed test log.
- SFT service
 - Submission every 3 hours
 - Used for CIC on Duty operations.
- SFT tests
 - plug-in modules
 - Current tests set part of framework
 - Add new (i.e. VO specific) tests.

Test summary							Colours definition			Test abbreviations															
	SD	JL	JS	CT	OK	total	SD	JL	JS	CT	NT	OK	cs	sw	rg	dirac-test	ver	wn	ca	crl	rm	votag	js	bi	
dteam	15	12	4	6	139	176	Scheduled downtime	Job list match failed	Job submission failed	Critical tests failed	Non-critical tests failed	OK	CSH test	VO software directory	R-GMA	Dirac full test	Software Version (WN)	WN host name	CA certs version	CRL timestamp test	Replica Management	VO Tag management	Job submission	BrokerInfo	
lhcb	15	81	5	35	39	175	#a3a3a3	#aab3ff	#f4876b	#f9d48e	#f2f98e	#b2f98e													

	St.	Site Name	Site CE	VO dteam											VO lhcb						
				St.	js	ver	wn	ca	rgma	bi	cs	rm	votag	swdir	crl	St.	js	dirac-test			
AsiaPacific																					
1.	CT	INDIACMS-TIFR	ce.indiacms.res.in	CT	O	2	6	0	I	O	O	O	O	O	X	O	O	!!!	JL	X	??
2.	OK	TW-NCUHEP	grid01.phy.ncu.edu.tw	OK	O	2	6	0	I	O	O	O	O	O	O	O	O	!!!	JL	X	??
3.	OK	TOKYO-LCG2	dgce0.icepp.jp	OK	O	2	4	0	I	O	O	O	O	O	O	O	O	!!!	JL	X	??
4.	OK	Taiwan-LCG2	lcg00125.grid.sinica.edu.tw	OK	O	2	6	0	I	O	O	O	O	O	O	O	O	!!!	JL	X	??
5.	OK	Taiwan-IPAS-LCG2	testbed001.phys.sinica.edu.tw	OK	O	2	6	0	I	O	O	O	O	O	O	O	O	!!!	JL	X	??
6.	OK	GOG-Singapore	melon.ngpp.ngp.org.sg	OK	O	2	6	0	I	O	O	O	O	O	O	O	O	!!!	JL	X	??
7.	OK	Taiwan-NCUCC-LCG2	ce.cc.ncu.edu.tw	OK	O	2	6	0	I	O	O	O	O	O	O	O	O	!!!	OK	O	O
8.	OK	LCG_KNU	cluster50.knu.ac.kr	OK	O	2	5	0	I	O	O	O	O	O	O	O	O	!!!	CT	O	!!!
BNL																					
9.	SD	BNL-LCG2	lcg-ce01.usatlas.bnl.gov	SD	X	??	??	??	??	??	??	??	??	??	??	??	??	??	SD	X	??
Canada																					
10.	JL	TORONTO-LCG2	bigmac-lcg-ce.physics.utoronto.ca	JL	X	2	6	0	I	O	O	O	O	O	W	O	!!!	OK	O	O	
11.	SD	CARLETONU-LCG2	lcg02.physics.carleton.ca	SD	X	??	??	??	??	??	??	??	??	??	??	??	??	??	SD	X	??
12.	OK	TRIUMF-LCG2	lcgce01.triumf.ca	OK	O	2	6	0	I	O	O	O	O	O	O	O	O	!!!	OK	O	O
13.	OK	Umontreal-LCG2	lcg-ce.lps.umontreal.ca	OK	O	2	6	0	I	O	O	O	O	O	W	O	!!!	OK	O	O	



GIIS Monitor (GStat)



- Information System monitor
- Help diagnosis of Grid failures
 - Missing, irregular/conflicting entries
 - Gather usage, performance metrics
 - RC
- Future Development
 - Hierarchical plug-in framework
 - Output plug-ins
 - Separation for application and presentation logic
 - Distributed architecture to improve scalability and reliability

GStat: 12:48:18 11/08/05 GMT

[home](#) [alert](#) [table](#) [service](#) [regional](#) [service](#) [metrics](#) [links](#) [?](#) [prod](#) [test](#) [seegrid](#)

CERN-PROD Status: OK OK GOC graphs

GOCDB Configuration information:
status: Certified, type: Production
giis url: ldap://ce02-slc3.cern.ch:2170/mds-vo-name=CERN-PROD,o=grid

To test site GIIS: ldapsearch -x -H ldap://ce02-slc3.cern.ch:2170 -b mds-vo-name=CERN-PROD,c

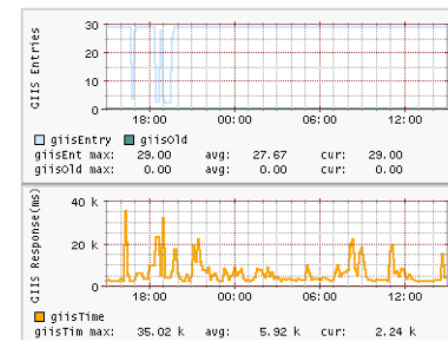
BDII Node Check: . alert history [?](#)

CERN SE Check . alert history [?](#)

No BDII Node to check in GOCDB
test: ldapsearch -xLLL -l 15 -h -p 2170 -b 'GlueSEUniqueID=lxn1183.cern.ch,mds-vo-name=cer

GIIS Perf Check: ok alert history [?](#)

Query Response Time (ms): 2594.3 - OK
GIIS Entries Found: 29 - OK
GIIS Old Entries Found: 0 - OK

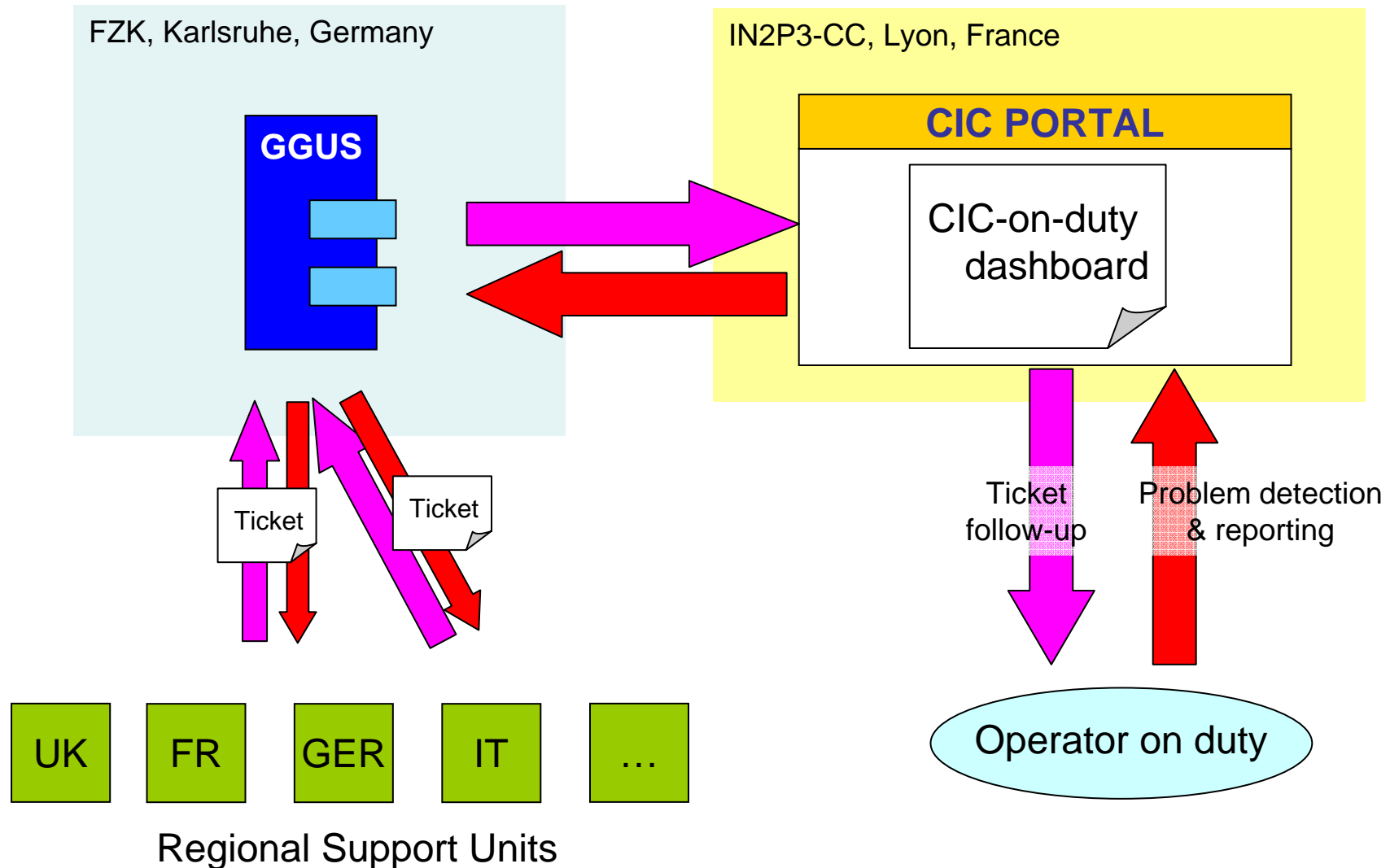


GIIS Sanity Check: ok alert history [?](#)

Passed



Ticketing System: GGUS





Integration



CIC-on-duty Dashboard - Mozilla

https://cic.in2p3.fr/dashboard/index.php?view=v1

CIC-on-duty dashboard

GGUS Tickets | Monitoring | Scheduled Downtimes | Other tests & tools | Hand over

Bad sites

List updated on **Wed, 25 Jan 2006 15:35:11 +0100** sorted by decreasing number of CPUs (biggest sites first)

Site name	NB CPUs	Node name and SFT status	Failing test	GStat	Open tickets	Expired tickets
CERN-PROD	2504	ce101.cern.ch	JL	OK	-	-
OSG	1592	bandicoot.uits.indiana.edu	JS	WARN	1409	1022
		cmsgrid02.hep.wisc.edu	JL			
		cmsfbsrv01.fnal.gov	JL			
		cmsosgce.fnal.gov	JL			
		cmssrv09.fnal.gov	JL			
		fnpp-osg.fnal.gov	JL			
		ftb.cac.purdue.edu	JL			
		rtrgid1.rts.uiowa.edu	JL			
		t2cms02.sdsc.edu	JL			
		t2dev-01.luchicago.edu	JL			
testwulf.hpc.c.tu.edu	JL					
inatl.physics.indiana.edu	CT					
osg.rcac.purdue.edu	OK					
uforklapp.phys.uni.edu	OK					
TORONTO-LCG2	497	bigmac-lcg-ce.physics.utoronto.ca	JS	WARN	1476	-
INFN-CATANIA	328	grid012.ct.infn.it	OK	MAINT	-	-
SHEFFIELD-LCG2	162	lcgce0.shef.ac.uk	CT	OK	1516	1507
UCL-CCC	152	ce-a.ccc.ucl.ac.uk	JS	OK	1515	1508
NSC-BLUESMOKE	96	lcg-ce.bluesmoke.nsc.liu.se	CT	OK	1400	-
BUDAPEST	91	grid109.kfki.hu	SD	MAINT	1296	-
LIVHEP-LCG2	76	hepgrid2.ph.liv.ac.uk	CT	OK	1499	1433
CGG-LCG2	54	ce1.egee.fr.cgg.com	JL	WARN	-	-
GOG-Singapore	54	melon.ngpp.ngp.org.sg	SD	OK	1419	-
CAVENDISH-LCG2	44	serv03.hep.phy.cam.ac.uk	JL	MAINT	1513	-
			1495			
			1418			
CS-CS-LCG2	36	ce01-lcg.projects.cscs.ch	JL	OK	1469	-
GR-03-HEPNTUA	32	ce42.hep.ntua.gr	OK	OK	-	-
SPAC1-LECCE-IA64	28	ce2.egee.unile.it	SD	INFO	-	-
INFN-CNAF	10	gridit-ce-001.cnaf.infn.it	JL	WARN	-	-
cpDIASie	4	gridgate.cp.dias.ie	SD	MAINT	-	-

CIC-on-duty Dashboard - Mozilla

https://cic.in2p3.fr/dashboard/index.php?view=9&ticket_creator_formid=25&site=INFN-CATANIA&task=133

CIC-on-duty dashboard

GGUS Tickets | Monitoring | Scheduled Downtimes | Other tests & tools | Hand over

Create GGUS ticket and contact INFN-CATANIA (problem type : SITES FUNCTIONAL TESTS)

Ticket (Data for ticket creation in the GGUS system)

Site: INFN-CATANIA

Node: unknown or not related to any specific node
 grid012.ct.infn.it (CT)
 grid005.ct.infn.it (SD)
 Other

Priority: Normal

Assign To: ROC Italy

Should be finished on: 2006-02-01

Summary: Job list switch fails

Item Group: SITES FUNCTIONAL TESTS

Submitter: Gilles Mathieu

Mail (Data for contacting site INFN-CATANIA)

From: CIC on Duty (Gilles Mathieu) <gilles.mathieu@in2p3.fr>

To: grid-prod@ct.infn.it (Site contact - leave empty for LUG federation)
 #roc@ct.infn.it (Helpdesk for Italy)

Cc: projectegee-sft-followup@cern.ch (Other contacts, Use commas for separation)

Subject: SITES Functional Tests of (INFN-CATANIA) - GGUS task number will automatically be added

Ticket original submission / mail body

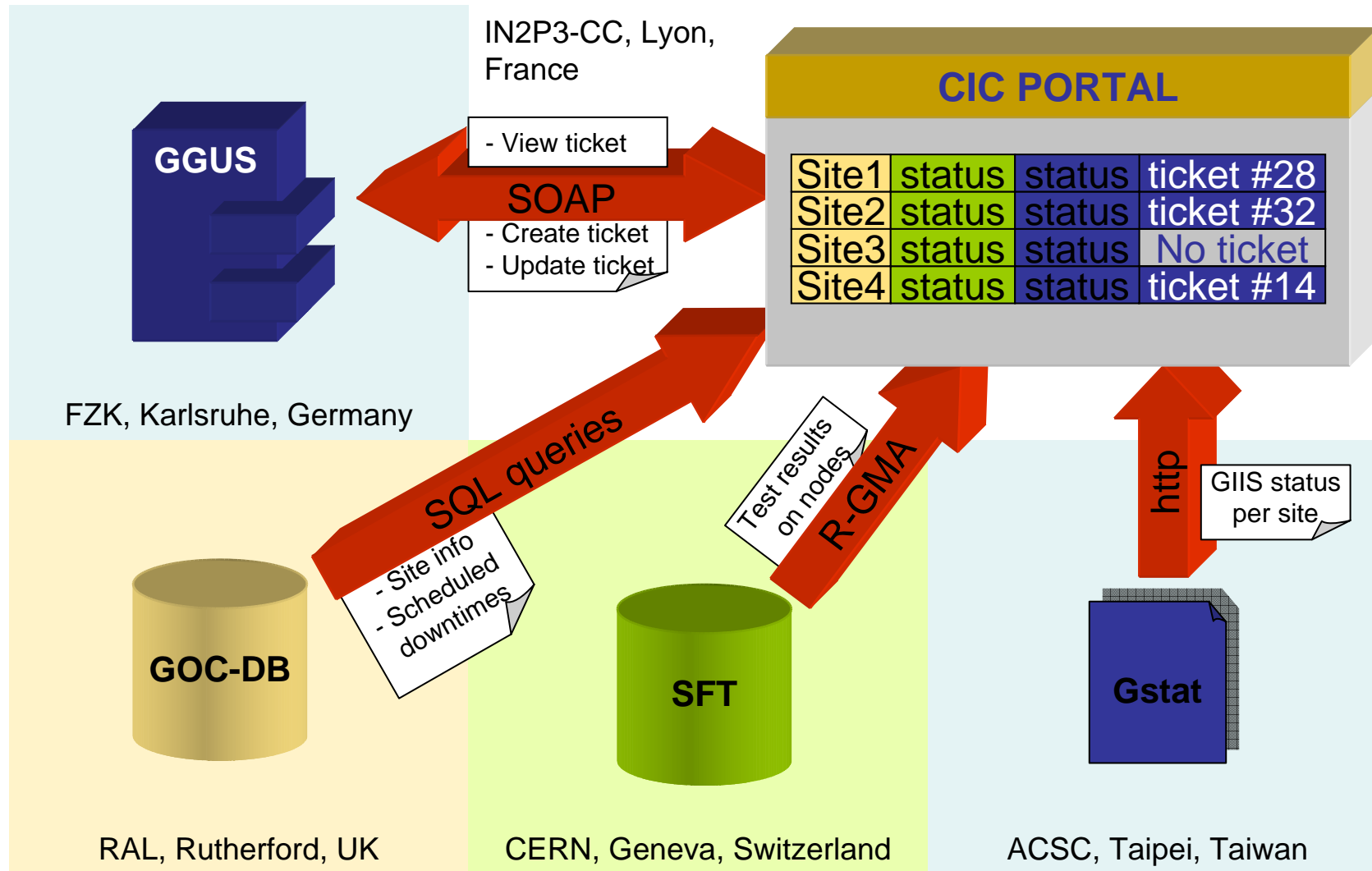
site : INFN-CATANIA
 Dear Site Administrators,
 According to Sites Functional Tests (SFT) page (<https://log-sft.cern.ch/9493/sft/latestreport.cgi>)
 Job list switch fails at your site.
 Could you have a look at it please ?
 Thank you
 The EGEE CIC on Duty team
 Browse this page for information about CIC-on-duty : http://cic.in2p3.fr/index.php?id=home&iconduity_info=1

List updated on **Wed, 25 Jan 2006 16:46:50 +0100**

ID	GGUS ID	Site	Node	SFT	State	Summary	Item Group	Created on	Expires on	Priority
1022	6905	OSG		JL	WARN	OSG inter fail various tests	MISCELLANEOUS	2006-01-17 10:07:34Z	2006-01-20	Low
E 1480	6307	BTLAB-LCG		OK	OK	Test message please reply (BTLAB-LCG)	MISCELLANEOUS	2006-01-23 13:30:47Z	2006-01-23	Normal
E 1479	6308	BHAM-LCG2		OK	OK	Test message please reply (BHAM-LCG2)	MISCELLANEOUS	2006-01-23 13:33:52Z	2006-01-23	Normal
E 1478	6303	KALFF-LCG		OK	OK	Test message please reply (KALFF-LCG)	MISCELLANEOUS	2006-01-23 12:46:01Z	2006-01-23	Normal
E 1337	6003	CEADAPNA-SACLAY				replication failed (CEADAPNA-SACLAY)	SITES FUNCTIONAL TESTS	2006-01-18 13:41:32Z	2006-01-23	Normal
E 1510	6366	CAVENDISH-LCG2		SD	MAINT	test message please reply (CAVENDISH-LCG2)	MISCELLANEOUS	2006-01-24 19:27:54Z	2006-01-24	Normal
E 1512	6365	BHAM-LCG2		OK	OK	test ticket please reply (BHAM-LCG2)	MISCELLANEOUS	2006-01-24 19:23:19Z	2006-01-24	Normal
E 1511	6364	UR-LT2-IC-LaSC		OK	OK	test ticket please reply (UR-LT2-IC-LaSC)	MISCELLANEOUS	2006-01-24 19:14:42Z	2006-01-24	Normal
E 1510	6363	UR-LT2-IC-HEP		JS	WARN	test ticket please reply (UR-LT2-IC-HEP)	MISCELLANEOUS	2006-01-24 19:13:56Z	2006-01-24	Normal
E 1509	6362	UCL-HEP		OK	OK	test ticket please reply (UCL-HEP)	MISCELLANEOUS	2006-01-24 19:10:06Z	2006-01-24	Normal
E 1508	6361	UCL-CCC		OK	OK	test ticket please reply (UCL-CCC)	MISCELLANEOUS	2006-01-24 19:08:50Z	2006-01-24	Normal
T 1463	6271	OXFORD01-LCG2		CT	OK	replication failed (OXFORD01-LCG2)	SITES FUNCTIONAL TESTS	2006-01-18 13:09:56Z	2006-01-26	Normal
T 1393	6035	MPTC-LCG2@64		SD	MAINT	replication failed (MPTC-LCG2@64)	SITES FUNCTIONAL TESTS	2006-01-03 13:14:10Z	2006-01-25	Normal
+ 1476	6267	TORONTO-LCG2		JS	WARN	info not published (TORONTO-LCG2)	648	2006-01-23 10:56:26Z	2006-01-26	Normal
+ 1475	6266	IRWIS-Andran		JS	WARN	info not published (IRWIS-Andran)	618	2006-01-23 10:51:28Z	2006-01-26	Normal



The 4 pillars of daily operations

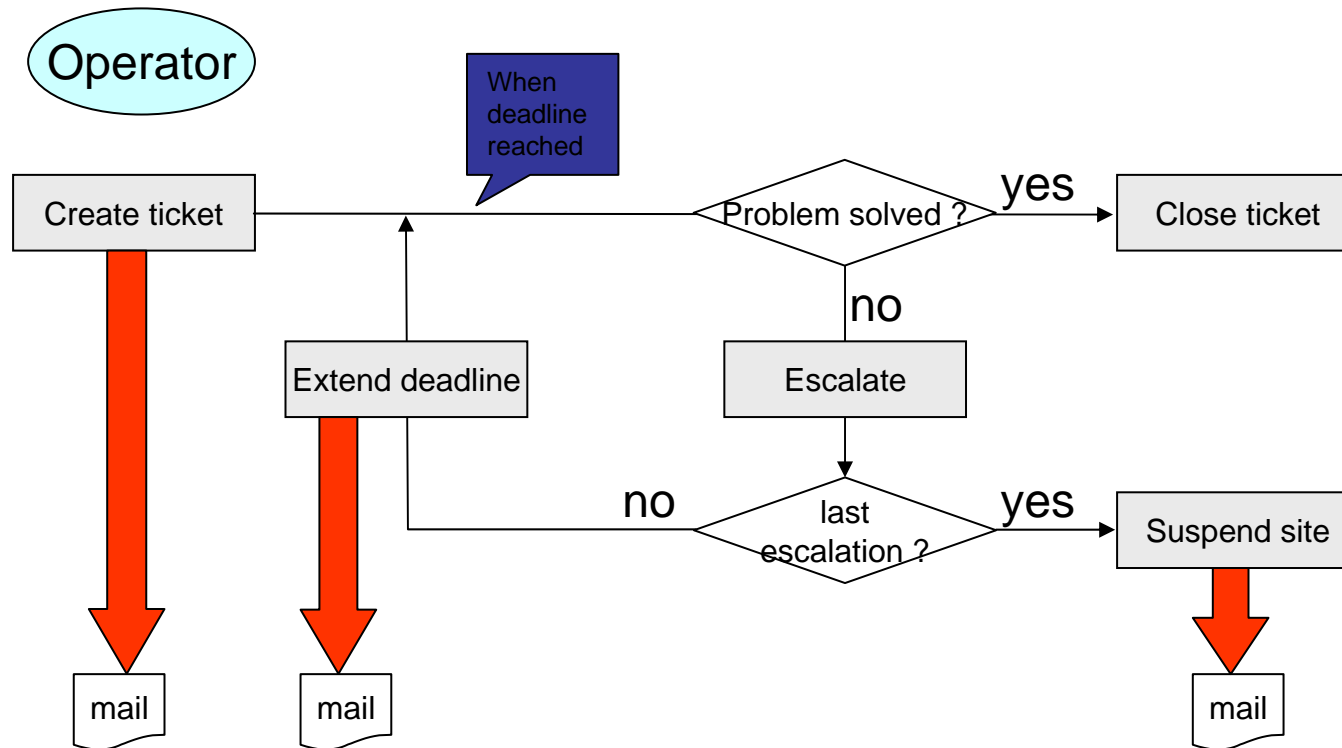




Operator on duty/ops procedure



- Global operation model of LCG/EGEE is distributed
 - One site has responsibility for the operation of the whole grid by weekly shifts
 - Involving at the moment 6 (FR, UK, IT, RU, CERN, Taipei)
- Responsibilities of operator on duty
 - Look at emerging alarms and the monitoring tools
 - Diagnose the causes of the sites and services failures
 - Open and follow-up operations-related tickets
- Mechanisms
 - Weekly operations meeting (by phone)
 - Hand-over logs available through the operator-on-duty portal
- Quarterly face-to-face meetings
 - For improving procedures and tracking progress on the on-going development of the operations-oriented tools and their integration.



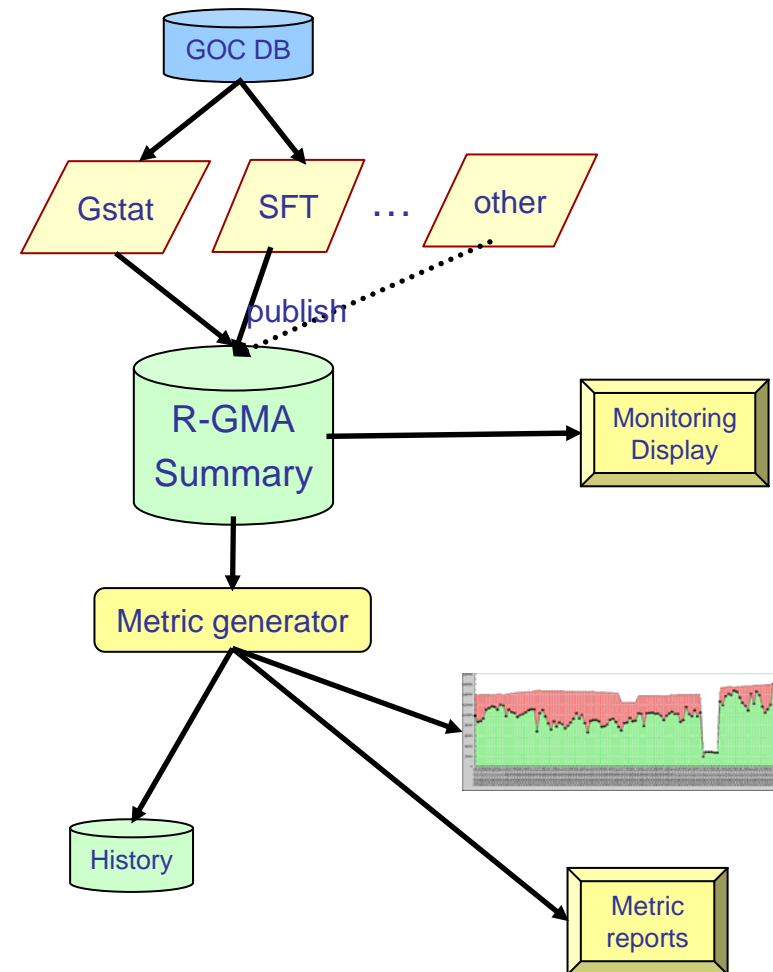


- Knowledgebase holding Grid operations and user related information
- Wiki selected for collaborative authoring features
- Sections
 - Admin Guides Administrator Howtos
 - Troubleshooting Guide Common errors, their possible solutions
 - LCG Install Issues Middleware release related issues
 - User Guide User Howtos
 - User FAQ Common errors encountered by users
 - Operation Documents COD related tools and procedures
 - User Tools Tools for the user community
 - Work In Progress Middleware and related software projects
- Future version offers easier editing with WYSIWYG interface



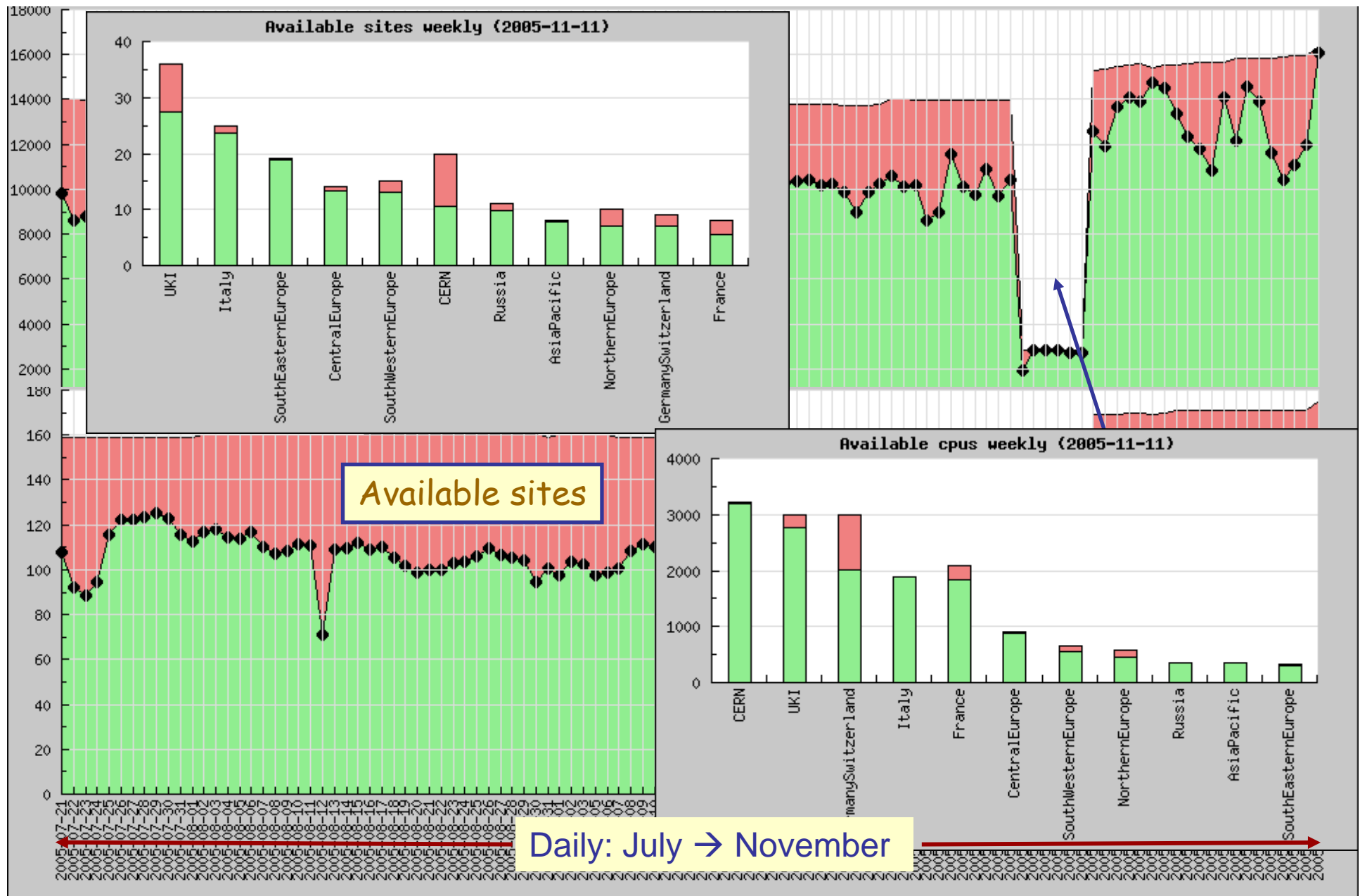
- Establish Grid foundation knowledge
 - Study LCG-2 User Guide
 - Practice installation and configuration
- Familiarize with Operations procedures and trouble shooting techniques
 - Operations manual
 - GOCWiki
- Shadow experience COD staff
 - Cover missing gaps in documentation
 - Recommend two week period

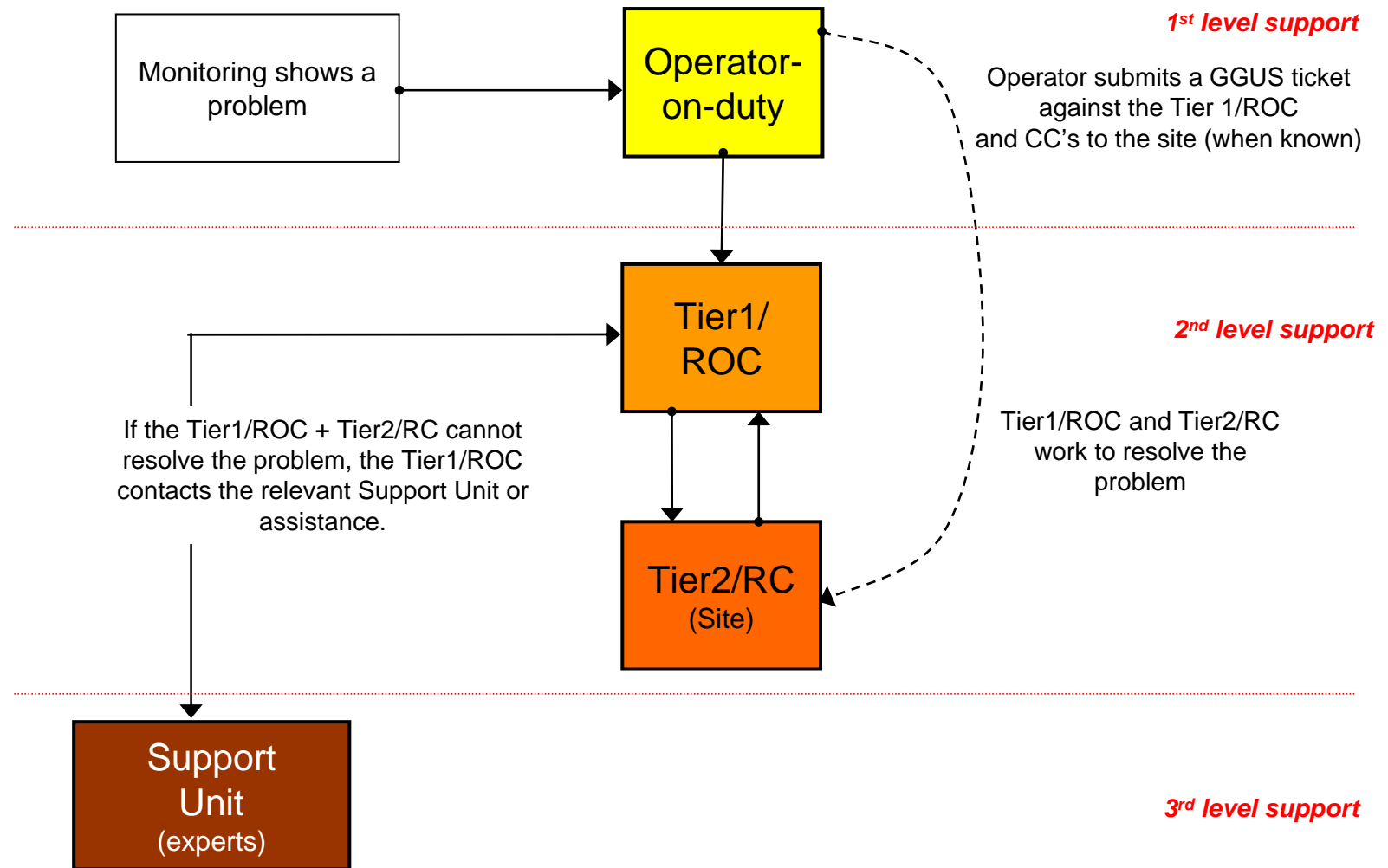
- R-GMA is used as the “universal bus” for monitoring information
- Aggregate views and provide Summary information on site availability
- SFT and GStat both publish results to R-GMA using common schema
- Framework – longer term
 - Include various tools results
 - Aggregate disparate data
 - Generate alarm





Evolution of SFT metric







Present situation...Workplan



- COD6, IFAE, January 17th-18th 2005.
- Number of tickets av. : 100/week
- Ratio of sites /SFT checked has doubled
- Integration of CE and SEE federations by EGEE II
- Metrics for operations within SA1
- Interoperability of grids
- Scalability « with time and space »
- Monitoring and operations tools and procedures



What COD brought along ...



- Collaborative distributed work
- Debriefing on weekly meetings GDA based
- on the handover of the previous week on-duty team.
- Quarterly meetings on the scope of the current work.
- Outside the initial inner scope of CIC-on duty
- through actors' views:
- ROC weekly reports, SFT submission for site certification for production and suggests processes to federations
- Enhance communication : EGEE broadcast
- Facilitate VO management : FCR and VO dashboard
- Ease-up VO initial registration and resource allocation through Operations Advisory Group