DDW'06, Cracow
11 October 2006

Networking and Grid in Russia

V.A. Ilyin

International Connectivity

International connectivity for Russian science is based today on

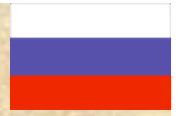
- **2.5 Gigabit/s Moscow - St-Perersburg - Stockholm.**
- **GEANT2 PoP in Moscow, 622 Mbps link.**
- **GLORIAD**

Moscow Gigabit Network Access Point (G-NAP) for R&E networks has been put into operation in the middle of 2005 where all these links are present.

Plans – to have 2.5-10 Gbps in 2007 for connectivity with GEANT2, AMS-IX and CERN by two independent links.

Russia LHC users are major customers for these links.

REGIONAL CONNECTIVITY



Moscow	**1 Gbps (ITEP, RRC KI, SINP MSU, …LPI, MEPhI)** *plans to go to 10 Gbps in 2007*
IHEP (Protvino)	**100 Mbps fiber-optic (to have 1 Gbps to 2007)**
JINR (Dubna)	**1 Gbps f/o (from December 2005)** *plans to go to 10 Gbps in mid 2007*
BINP (Novosibirsk)	**45-100 Mbps (*GLORIAD++)***
INR RAS (Troitsk)	**10 Mbps commodity Internet,** *new f/o project to start*
PNPI (Gatchina)	**2 Mbps commodity Internet,** new f/o link to St-Peterburg 1 Gbps is under testing
SPbSU (S-Peterburg)	***1 Gbps (potentially is available now,*** *but last mile …)*

Our pragmatic goal to get in 2007:

- all RuTier2 sites to have at least 100 Mbps f/o dedicated for network provision of RDIG users,
- 1 Gbps dedicated connectivity between basic RDIG sites and 1 Gbps connectivity to EGEE via GEANT2/GLORIAD.

Dedicated – means to have reliable level for FTS flows

20-30-50 Mbyte/s for Gbps links

few Mbyte/s for 100 Mbps links

!

GLORIAD: 10 Gbps Optical Ring Around the Globe by 2007

China, Russia, Korea, Japan, US, Netherlands

US: NSF IRNC Program

GLORIAD Circuits

- 10 Gbps Korea (Busan)-Hong Kong-Daejon-Seattle
- 10 Gbps Seattle-Chicago-NYC (CANARIE contribution to GLORIAD)
- 2.5 Gbps Moscow-AMS
- 2.5 Gbps Beijing-Hong Kong
- 622 Mbps Moscow-AMS-NYC
- 155 Mbps Beijing-Khabarovsk-Moscow
- 1 GbE NYC-Chicago (CANARIE)

G. Cole

Backbone links for Russia NREN - ***155 Mbps or less***

Main problem – monopoly in telecom internal market in Russia.

Examples:

- **the cost for connectivity Ekaterinburg-NY is twice cheaper than for Ekaterinburg-Moscow of the same b/w;**

- **cost for 120 km link 1Gbps Dubna-Moscow in 2006 is 5 times larger than for the same link in Slovakia in 2004.**

We recognize another serious problem:

officials do not understand that QoS costs much…

11 April 2006:

The Working Group on Networking and Distributed Computing *(WG-NetG)* has been created by Federal Agency for Science and Innovations.

Main task **– coordination of the development toward the creation of national e-infrastructure for science and education in Russia, including new generation of network and grid *(NGI)*, with integration in world-wide e-structures (*in particular, participation in EGI discussions*).**

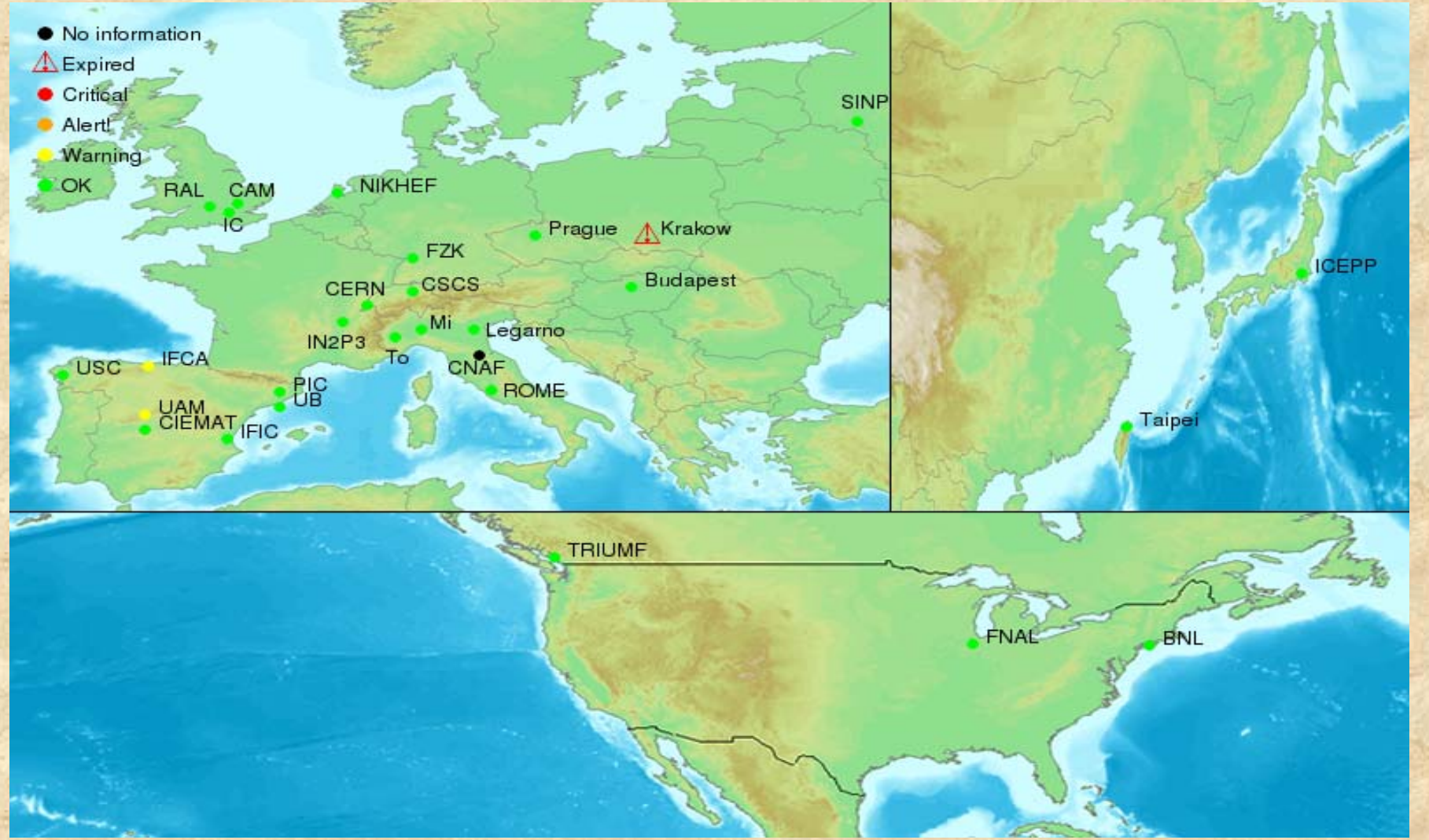
Also – recommendations on the budget proposals in the networking and grid fields.

From ~2000 dominating factor for R&E networking and grid development in Russia is LHC

…

in nearest future (most probably) this dominating role will move to ITER.

LHC Computing Grid (LCG) – start in Sept 2003



Russia Tier2 facilities in World-wide LHC Computing Grid:

- **cluster of institutional computing centers;**

- **major centers (now six ones) are of Tier2 level (RRC KI, JINR, IHEP, ITEP, PNPI, SINP MSU), other are (will be) Tier3s.**
  this mapping could be changed depending of the developing efforts of institutes;

- **each of the T2-sites operates for all four experiments - ALICE, ATLAS, CMS and LHCb.**
  this model assumes partition/sharing of the facilities (DISK/Tape and CPU) between experiments. This approach has to be developed to get workable production level.

- ***basic functions determined the main data flows:***

analysis of real data; MC generation; users data support
plus analysis of some portion of RAW/ESD data for tuning/developing reconstruction algorithms and corresponding programming.

Thus:

Real AOD – full sets for four experiments (all passes) **RuTier2 ⇐**
(plus local AOD sets)

Real (RAW)/ESD ~10% **RuTier2 ⇐**

Sim RAW/ESD/AOD generated in Russia **⇒ Tier1**
while other Sim data necessary for channels to analyze in Russia **RuTier2 ⇐**

For RuTier2 it assumes approximately equal partitioning of the storage:

Real AOD ~ Real RAW/ESD ~ SimData

Note, that

main T1 services to be supported for T2s are

- *access (or distribution point for the access) to real AOD sets*
- *storage and serving of RuTier2 MC data*

T1s for RuTier2:

- **as a result of regular T1-T2 planning procedure**

ALICE - FZK (Karlsruhe) is agreed to serve as a canonical T1 center for Russia T2 sites

ATLAS - SARA (Amsterdam) is agreed to serve as a canonical T1 center for Russia T2 sites

LHCb CERN facilities will serve as a canonical T1 center for Russia T2 sites

• in May 2006 FZK has got a decision that FZK CMS T1 will not serve Russia because of German CMS T2s are too much already for FZK CMS T1.

In this urgent situation the common solution has been found by RDMS, CMS and LCG management:

CERN agreed to act as a CMS T1 centre for the purposes of receiving Monte Carlo data from Russian and Ukrainian T2 centres. CERN will also act as the distribution point for access to CMS general AOD and RECO data.

Moreover, CERN will act as a special-purpose T1 centre for CMS, taking a share of the general distribution of AOD and RECO data as required. In particular, CMS intends to use the second copy of AOD and RECO at CERN to improve the flexibility and robustness of the computing system, and not as a general-purpose T1.

WLCG MoU

RuTier2 Cluster

2006 corrections due to the budget reduction:

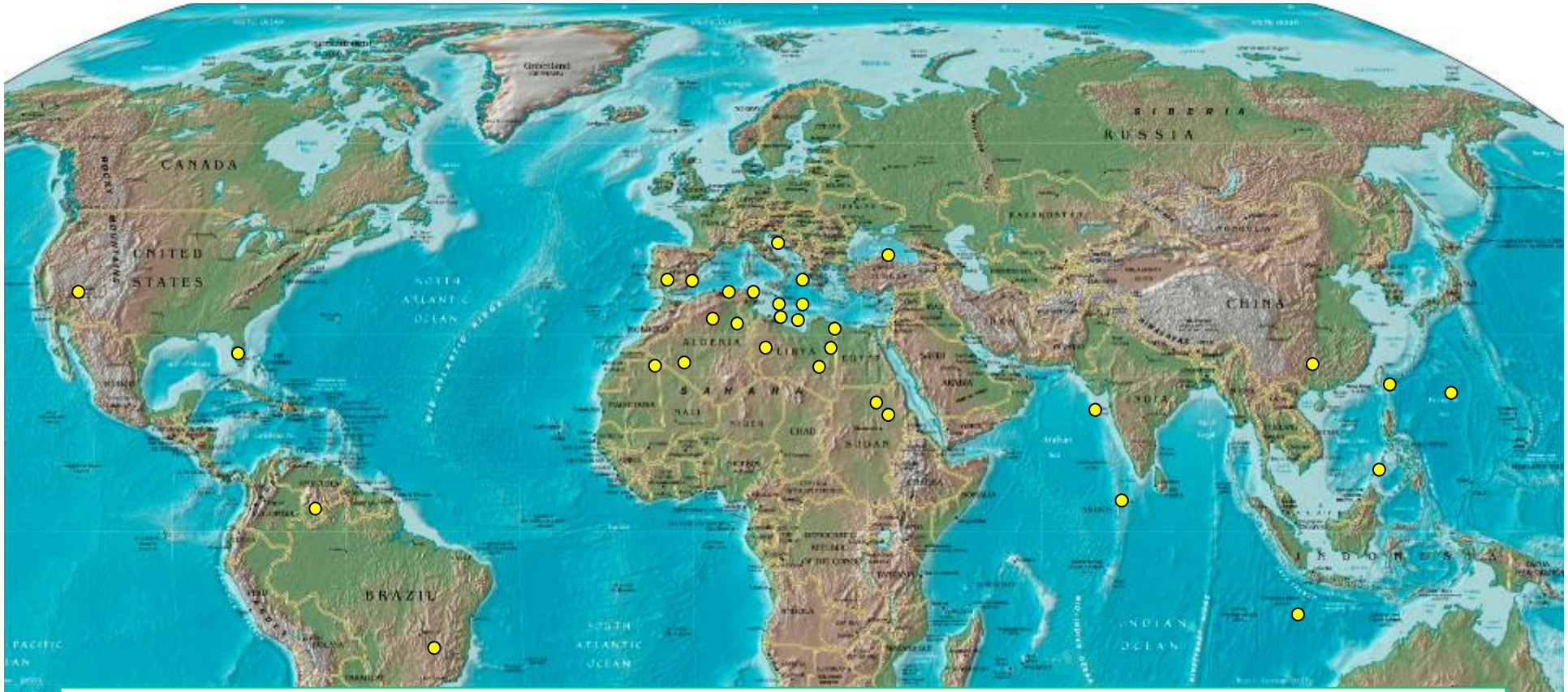
Russian Federation, RDIG(3)	Pledged	Planned to be pledged				Comment
	2006	2007	2008	2009	2010	
CPU (kSI2K)	2000	4060	5890	7870	10900	The Russian Capacities are available at the end of the year.
Disk (Tbytes)	300	1500	2400	4100	6200	
Nominal WAN (Mbits/sec)	1000	2500	2500	5000	10000	
Tape (Tbytes)	no	780	1500	2200	3500	

UK, Sum of all Federations	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	3800	3800	4800	5400	6000
Disk (Tbytes)	530	540	600	660	720
Nominal WAN (Mbits/sec)					

Some T1s
(improved figures)

FZK-GridKA, Germany	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	1030	2010	7140	11500	17400
Disk (Tbytes)	280	910	3300	5200	8100
Tape (Tbytes)	393	1050	3470	7510	11800
Nominal WAN (Mbits/sec)	10000	10000	20000	20000	20000

Nordic Data Grid Facility	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	520	1340	2610	3470	4280
Disk (Tbytes)	160	440	890	1500	2200
Tape (Tbytes)	240	435	872	1500	2260
Nominal WAN (Mbits/sec)	2000	5000	10000	20000	20000



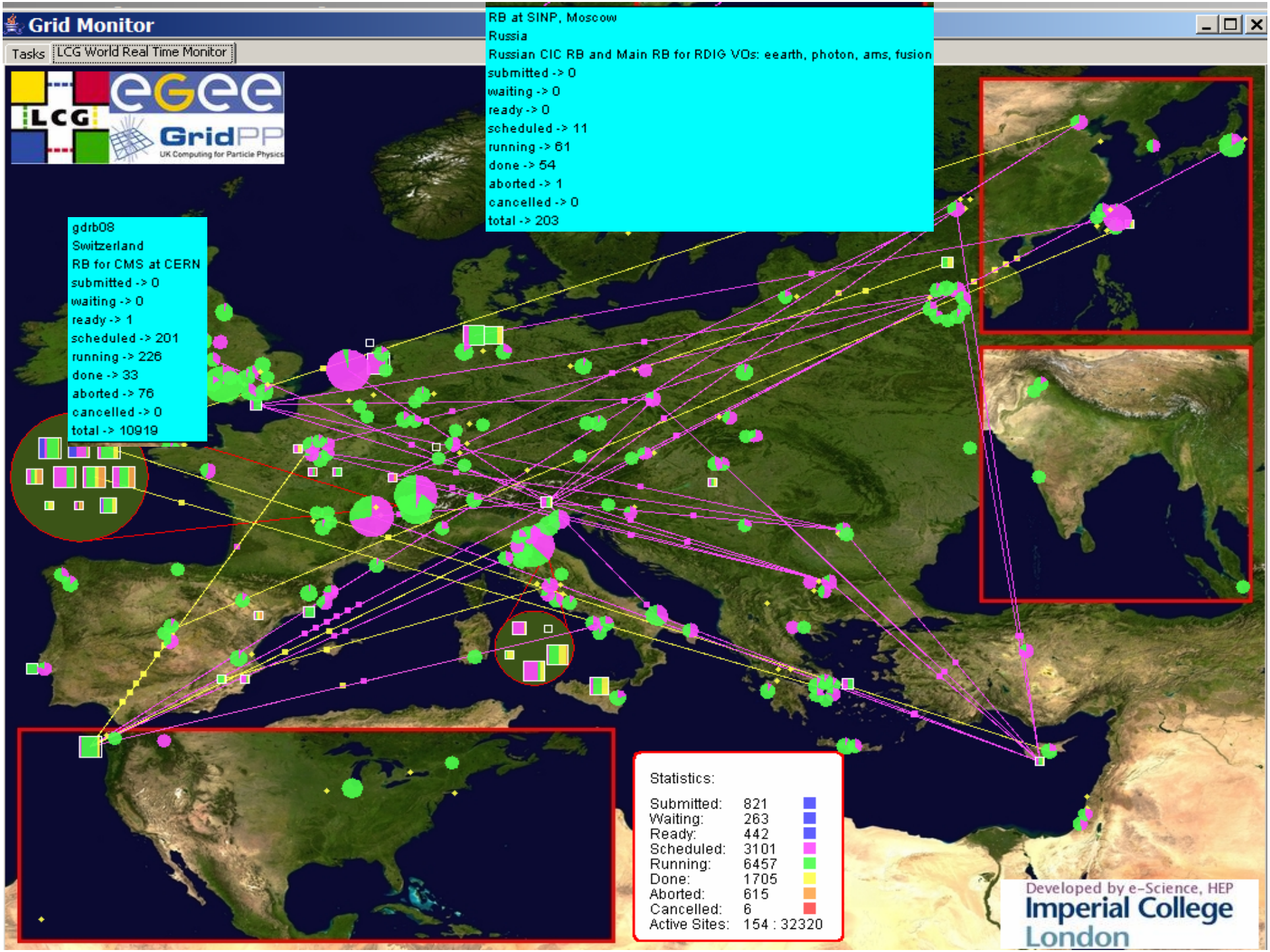
EGEE:

> 180 sites, 40 countries

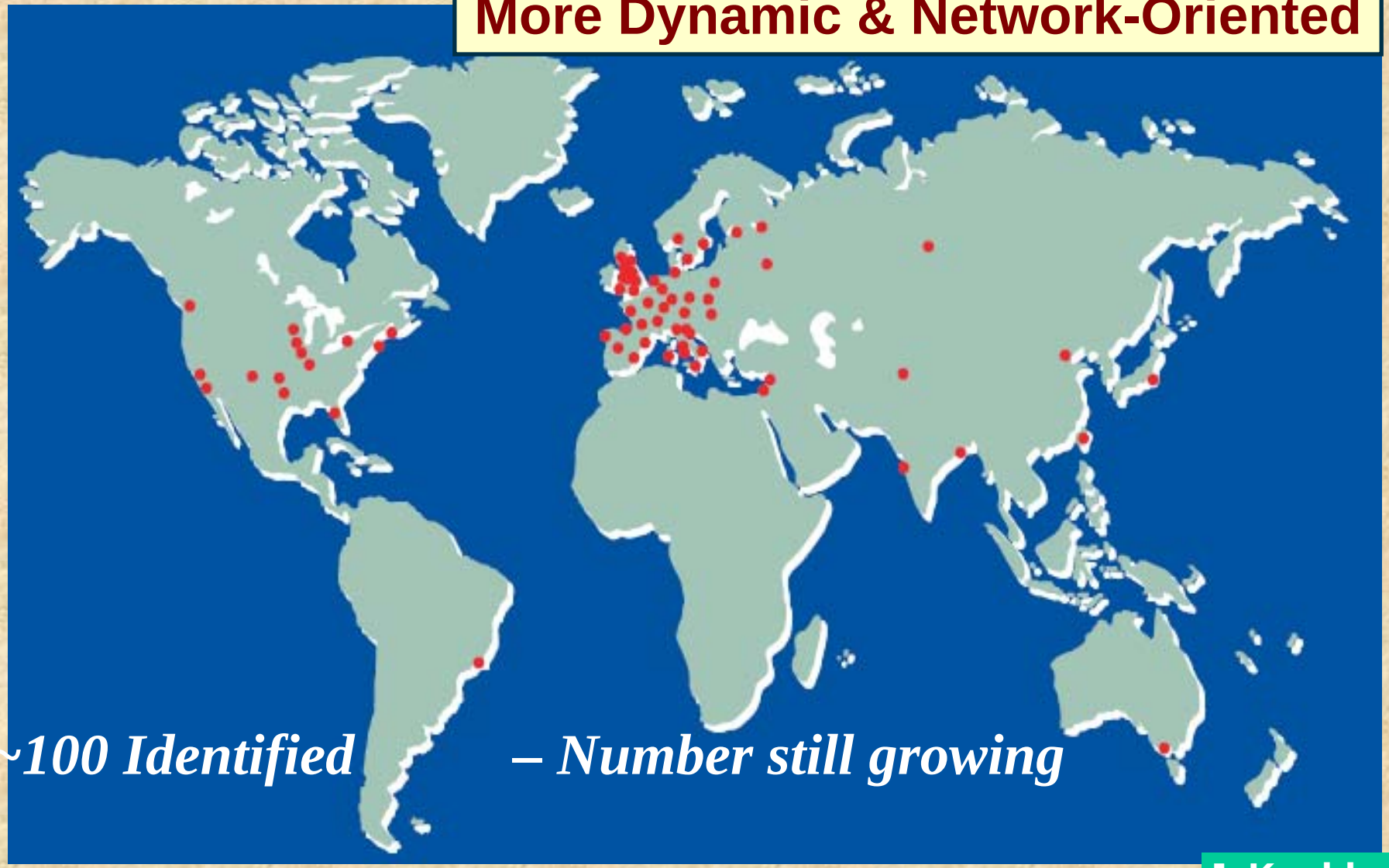
> 24000 CPUs,

~ 5 PB data

country	sites	country	sites	country	sites
Austria	2	India	2	Russia	12
Belgium	3	Ireland	15	Serbia	1
Bulgaria	4	Israel	3	Singapore	1
Canada	7	Italy	25	Slovakia	4
China	3	Japan	1	Slovenia	1
Croatia	1	Korea	1	Spain	13
Cyprus	1	Netherlands	3	Sweden	4
Czech Republic	2	Macedonia	1	Switzerland	1
Denmark	1	Pakistan	2	Taipei	4
France	8	Poland	5	Turkey	1
Germany	10	Portugal	1	UK	22
Greece	6	Puerto Rico	1	USA	4
Hungary	1	Romania	1	CERN	1


Grid Monitor
Tasks
LCG World Real Time Monitor
LCG
eGee
GridPP
UK Computing for Particle Physics
RB at SINP, Moscow
Russia
Russian CIC RB and Main RB for RDIG VOs: eearth, photon, ams, fusion
submitted -> 0
waiting -> 0
ready -> 0
scheduled -> 11
running -> 61
done -> 54
aborted -> 1
cancelled -> 0
total -> 203
gdrb08
Switzerland
RB for CMS at CERN
submitted -> 0
waiting -> 0
ready -> 1
scheduled -> 201
running -> 226
done -> 33
aborted -> 76
cancelled -> 0
total -> 10919
Statistics:
Submitted: 821
Waiting: 263
Ready: 442
Scheduled: 3101
Running: 6457
Done: 1705
Aborted: 615
Cancelled: 6
Active Sites: 154 : 32320
Developed by e-Science, HEP
Imperial College
London

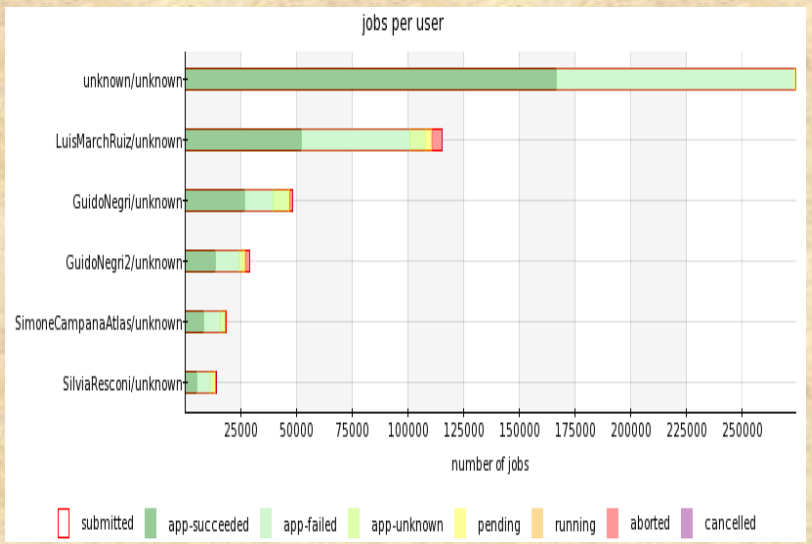
The Proliferation of Tier2s
➡ LHC Computing will be More Dynamic & Network-Oriented



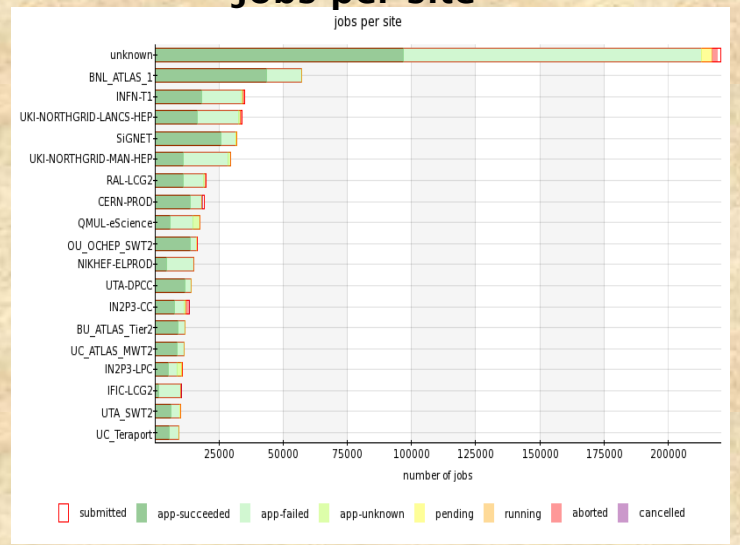
J. Knobloch

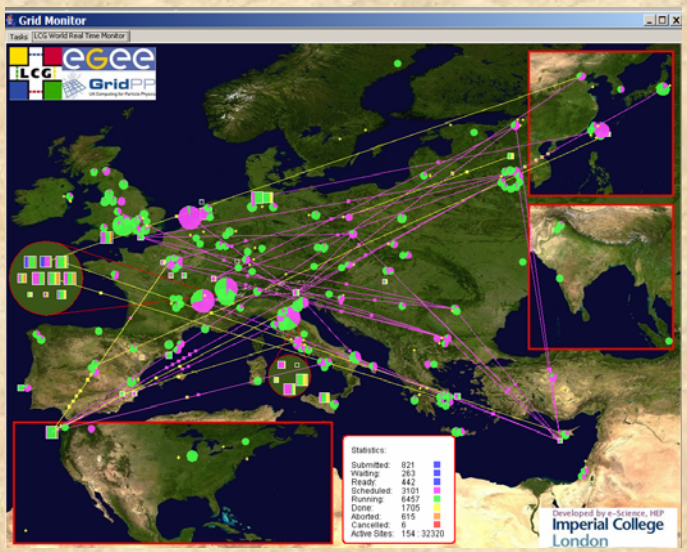
ATLAS: statistics for production jobs (Dashboard), few recent month

Jobs per user



Jobs per site





Production mode of the grid usage:

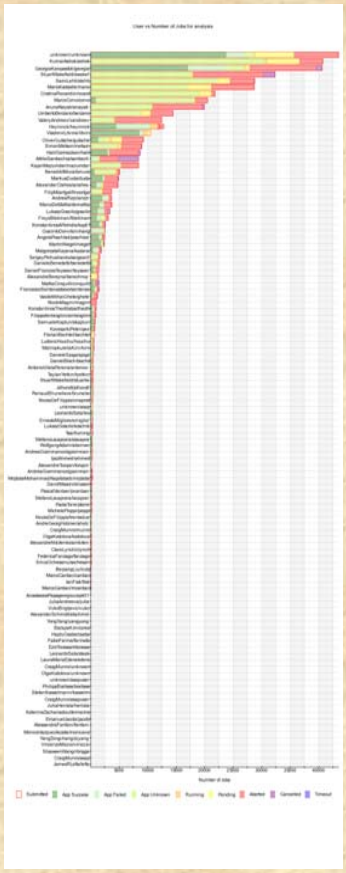
millions jobs
by few users
on hundreds sites

unique advantage

CMS: statistics for analysis jobs – last few months (ASAP Dashboard

Jobs per user

Jobs per user



Still not chaotic usage of the grid …

T2 level is not working yet!

Physicists are sleeping … Please wake up! Data will come soon …

RuTier2 in the World-Wide Grid

RuTier2 Computing Facilities are operated by
Russian Data-Intensive Grid (RDIG)

We are creating RDIG infrastructure as Russian segment of the European grid infrastructure EGEE **http://www.egee-rdig.ru**

- *RuTier2 sites (institutes) are RDIG-EGEE Resource Centers*
- *Basic grid services (including VO management, RB/WLM etc) are provided by SINP MSU, RRC KI and JINR*
- *Operational functions are provided by IHEP, ITEP, PNPI and JINR*
- *Regional Certificate Authority and security are supported by RRC KI*
- *User support (Call Center, link to GGUS in FZK) - ITEP*

25 June 2006, ~ 18:00

Enabling Grids for E-sciencE

Accounting System for Russian Data Intensive Grid

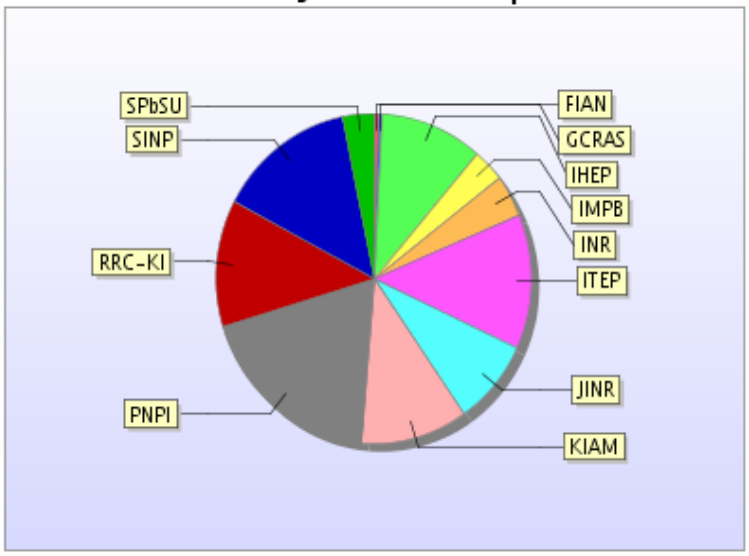
- Accounting System
- Jobs
  - Number of Jobs
- CPU Time
- Waiting time
- Physical memory
- User statistics
- Description
- RDIG monitoring

close all

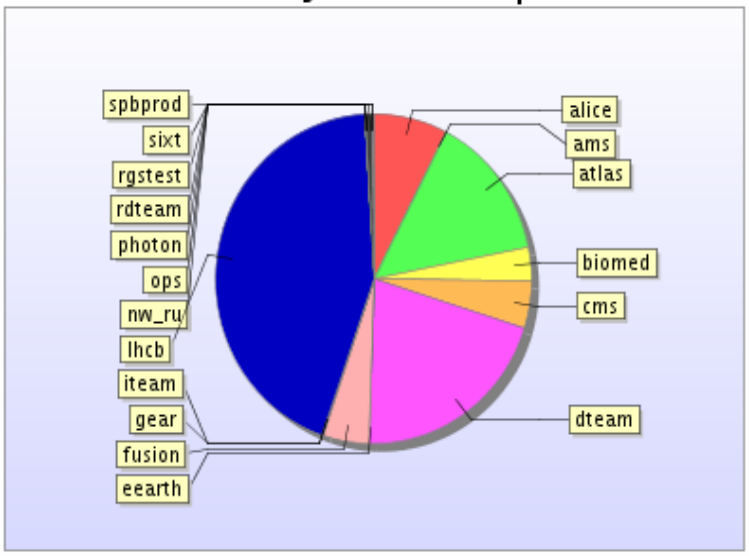
Database statistics

Total Number of Records in Database: 336393

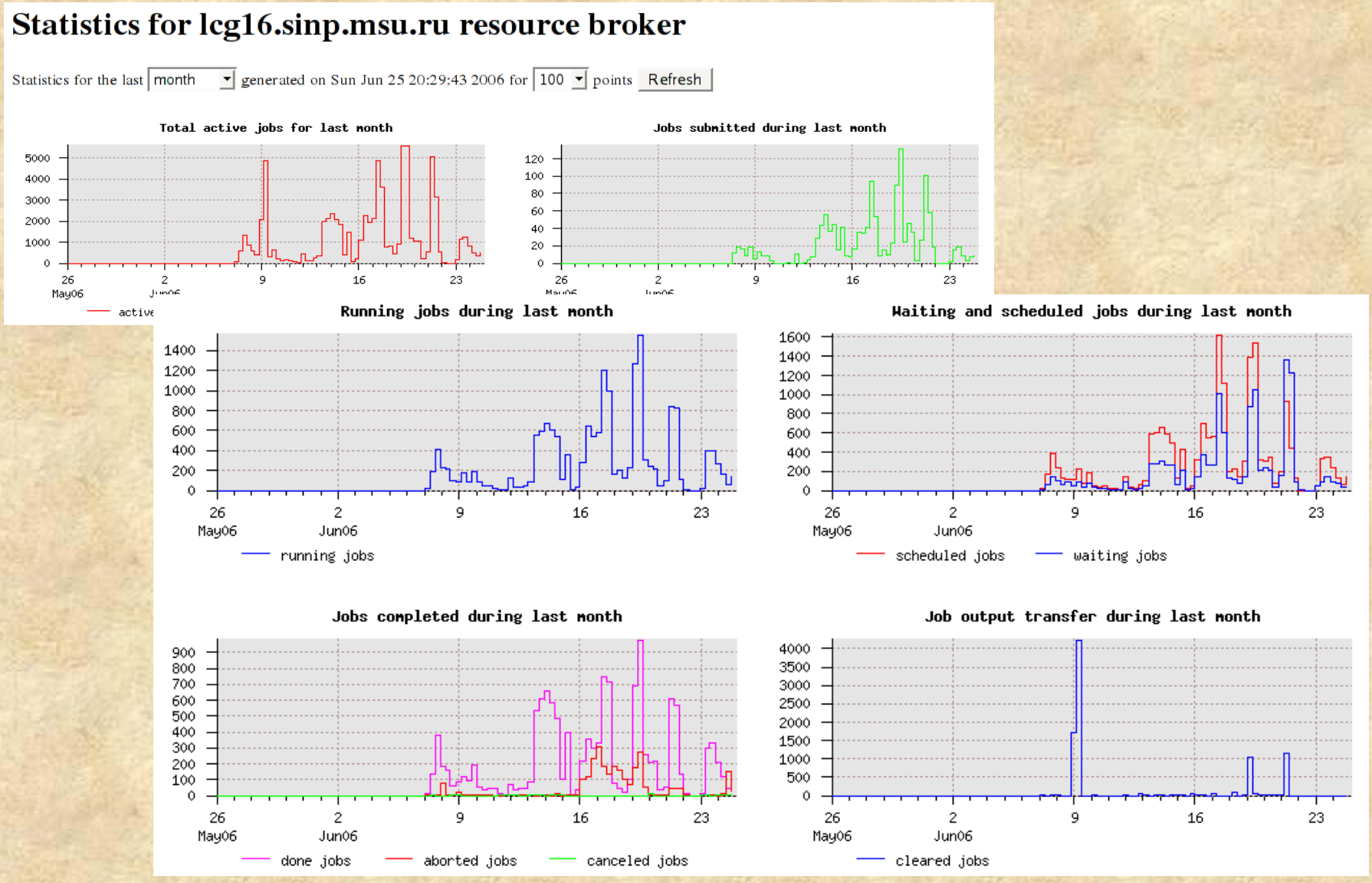
Number of Job Records per Site



Number of Job Records per VO



RDIG Resource Broker monitoring



Address http://egee.itep.ru/

EGEE Home | Intranet Home | Search | EDMS Documents | People | Calendar | Agenda maker | Glossary

egee Enabling Grids for E-sciencE

RDIG Russian Data Intensive Grid

Информационный вестник | Пресс-релизы | События | FAQs

Информация RDIG

- Центр базовых Грид-сервисов
- Региональный операционный центр
- Регистрация пользователей RDIG
- Партнеры RDIG
- Документы
- Полезные ссылки

ИТЭФ-LCG2

- Новости
- Направление работ
- Состояние
- Мониторинг
- Статистика

Контакт

Ticket statistics for timeline: 31/05/05 To 31/05/06

From: 31/05/05 To: 31/05/06

31/05/05 - 27/09/05	28/09/05 - 24/01/06	25/01/06 - 31/05/06
44	66	91

Ticket Stats:

Type	Open from before 31/05/05	Opened during	Closed during	Open on 31/05/06
All Sum.	12			
top priority	0			
urgent	1			
very urgent	0			
less urgent	0			
ROC Russia	0	0	0	0
SEND to GGUS	0	5	0	5
OPER Ticketing System	2	20	22	0
SUPP SITE IMPB	1	15	16	0
SUPP SITE ITEP	0	6	6	0
SUPP SITE IHEP	1	21	22	0
SUPP SITE SINP	1	14	15	0
SUPP SITE JINR	1	7	8	0
SUPP SITE KIAM	0	14	14	0
SUPP SITE GCRAS	2	12	14	0
SUPP SITE INR	2	18	20	0
SUPP SITE RRC KI	0	15	15	0
SUPP SITE PNPI	2	18	20	0
SUPP SITE KHARKOV	0	8	7	1
SUPP SITE FIAN	0	5	5	0
SUPP SITE StPbUniver	0	11	11	0
SUPP VO Russian	0	1	1	0
Site Security Challenge	0	11	11	0

Type	Less than one	Between one and two	Between two and three	Between three and four	More than four days
Closed	5	9	3	11	179
Open	0	1	5	0	0

Address http://ca.grid.kiae.ru/RDIG/certificates/valid.html

Google | Search | 35 blocked | Check | AutoLink | AutoFill | Options

сертификаты — корневой (PEM) — действительные — CRL (PEM) — поли

— получить сертификат — список RA — работа с сертификатом

Действительные сертификаты

Формат списка — серийный номер сертификата, имя сертификата, время и дата окончания действия
Текущие время и дата: 15:09, 25/06/2006 GMT.

Обратите внимание: если вы получали сертификат в Russian DataGrid CA, то его в этом списке нет.
непосредственно на странице выданных сертификатов в Russian DataGrid CA.

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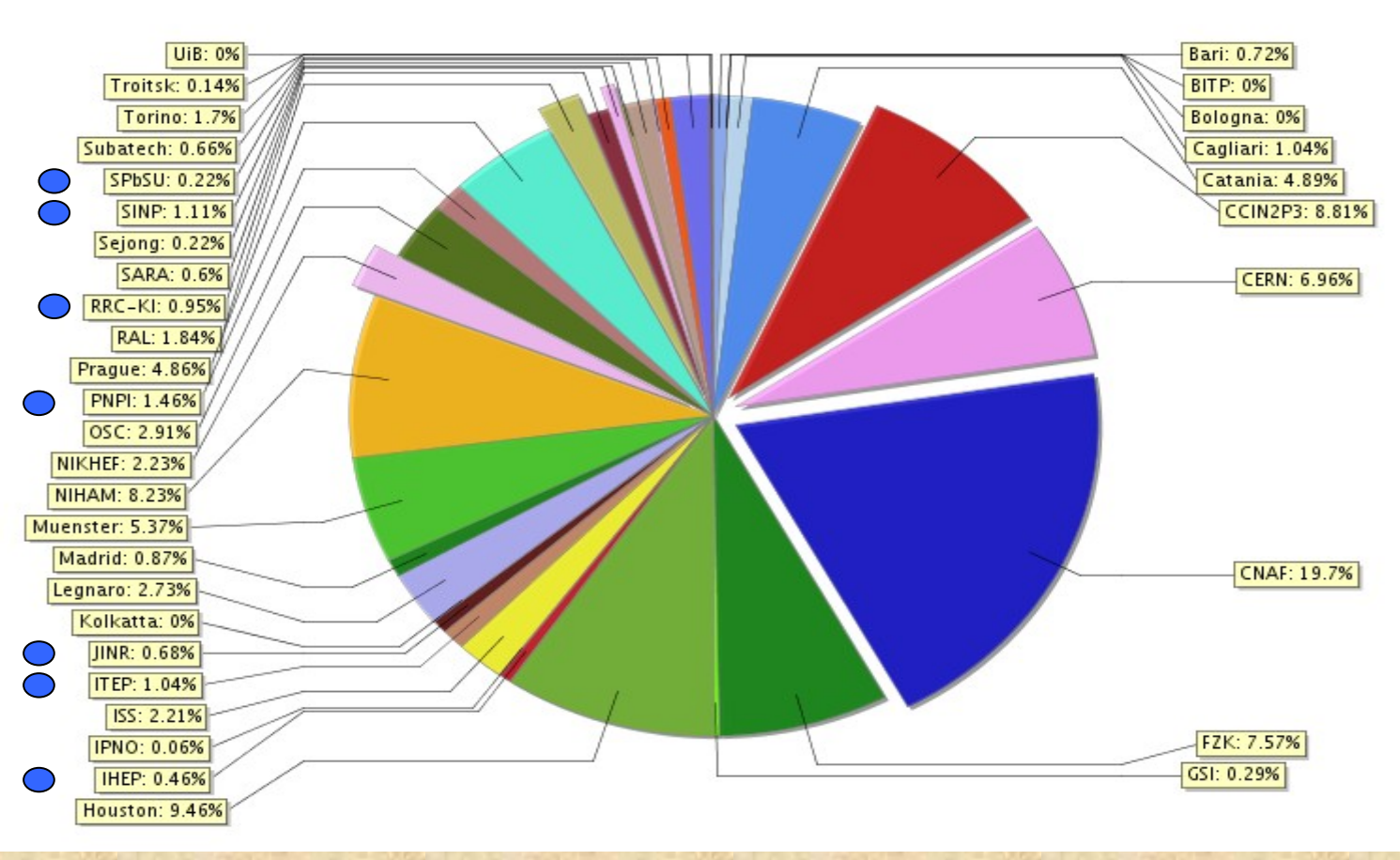
0141, /C=RU/O=RDIG/OU=users/OU=csa.ru/CN=Alexey Evlampiev, 06:45:19, 20/06/2007
0142, /C=RU/O=RDIG/OU=users/OU=jinr.ru/CN=Artem Petrosyan, 14:41:25, 22/06/2007

Всего сертификатов: 307
Пользовательских сертификатов: 175
Сертификатов узлов: 126
Сертификатов сервисов: 6

ALICE Resources statistics

- **Resources contribution (normalized Si2K units): 50% from T1s, 50% from T2s**
  - **The role of the T2 remains very high!**



ATLAS

Productions in Russia

- Assuming that
  - 40% performed at Tier-1s and 60% at Tier-2s
  - Russian Tier-2 is 7.3 % of full Tier-2 resources
- Data is produced at Tier-2 and replicated to associated Tier-1 (NIKHEF/SARA)

	Number of events (Million)	CPU Power kSi2k	CPU for 3 months kSI2k.months	T1D0 (Hits) TB	T1D1 (ESD) TB	T0D1 (AOD) TB
Q4-2006	20	95	285	1.8	0.9	0.1
Q1-2007	48	227	682	4.2	2.1	0.2
Q2-2007	96	455	1365	8.4	4.2	0.4

25 Sept. 2006 G. Poulard - CERN PH-ATC 7

Per year ~40-50 Tbyte

… before LHC start …

Statistics on CMS Phedex SC4 Data Transfers
(23.05.2006 - 30.06.2006)

DESTINATION	MBPS_TOT	GB_TOT	SUCC	HRS	DAYS	MBPS_HRAVG
T1_ASGC_Load	0	261	6%	168	7	0
T1_CERN_Load	23	13424	47%	168	7	23
T1_CNAF_Load	22	13216	43%	136	7	28
T1_FNAL_Load	2	1247	30%	168	7	2
T1_FZK_Load	3	1922	26%	164	7	3
T1_IN2P3_Load	1	357	11%	116	7	1
T1_PIC_Load	7	4267	44%	168	7	7
T1_RAL_Load	1	301	3%	168	7	1
T2_Bari_Load	19	11112	58%	168	7	19
T2_Beijing_Load	0	0	N/A	168	7	0
T2_Belgium_Load	3	1486	67%	168	7	3
T2_Budapest_Load	2	965	25%	167	7	2
T2_CSCS_Load	7	4096	62%	168	7	7
T2_Caltech_Load	35	20769	73%	168	7	35
T2_DESY_Load	0	0	N/A	168	7	0
T2_Demokritos_Load	0	0	N/A	168	7	0
T2_Estonia_Load	21	12237	64%	168	7	21
T2_Florida_Load	0	0	N/A	168	7	0
T2_GRIF_Load	0	0	N/A	168	7	0
T2_HIP_Load	0	0	N/A	168	7	0
T2_ITEP_Load	2	1384	51%	168	7	2
T2_Imperial_Load	0	0	N/A	168	7	0
T2_JINR_Load	2	1433	65%	164	7	2
T2_KNU_Load	0	0	N/A	168	7	0
T2_Legnaro_Load	9	5214	61%	168	7	9
T2_MIT_Load	0	40	0%	62	7	0
T2_Nebraska_Load	9	5085	59%	168	7	9
T2_Pisa_Load	0	0	0%	65	5	0
T2_Purdue_Load	5	3165	37%	163	7	6
T2_Rio_Load	0	0	N/A	157	7	0
T2_Rome_Load	0	0	N/A	168	7	0
T2_SINP_Load	2	1056	56%	163	7	2
T2_Spain_Load	3	2023	39%	168	7	3
T2_Taiwan_Load	12	7309	70%	168	7	12
T2_UCSD_Load	4	2138	70%	168	7	4
T2_Wisconsin_Load	4	2479	76%	168	7	4
T3_Minnesota_Load	0	113	25%	136	7	0
T3_RWTH_Load	16	9194	87%	168	7	16

ITEP

JINR

SINP

3.8 TB have been transferred

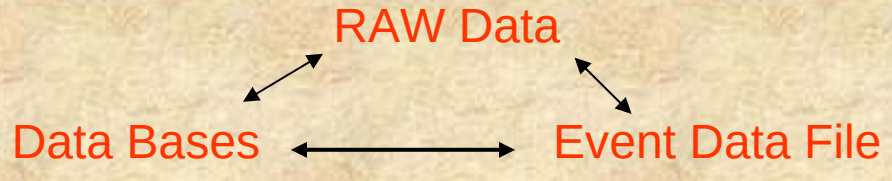
CMS Magnet Test and Cosmic Challenge 2006

The magnet test going on now in CERN (April-July) is a milestone in the CMS construction. It completes the commissioning of the magnet system (coil & yoke) before its eventual lowering into the cavern. The MTCC06 have 4 components: Installation validation, Magnet Commissioning, Cosmic Challenge, Field Mapping

The cosmic challenge including DAQ and Network tests on cosmic data (850 GB/day)

- Build an intelligible event from several subdetectors
- Validate hardware chain
- Validate integration of subdetectors into DAQ framework, Run Control, DCS
- Use of databases and network scaled down from final architectures
- Testing Offline Condition Service and Online-to-Offline(O2O) Transfer

Concentrate on core SW functionality required for raw data storage, quality monitoring and further processing (a must for all three sub-systems @ MTCC):



The possibility to transfer data from DAQ to RuTier-2 will be tested

Plans for CSA06

(Computing and Software Analysis Challenge)

RDMS sites are planning to participate in CSA06 starting on 1 October and running until 15 November

The RDMS resources which will be provided for CSA06 are now under determination

History of LHCb DCs in Russia

2002	**130K** events, **1%** contribution	
2003	**1.3M** events, **3%** contribution	
2004	**9.0M** events, **5%** contribution	☻
2005	**5.0M** events, **3%** contribution	
2006	**3.5M** events, **2%** contribution	☹

Since 2004 we have not increased our resources

Expecting considerable improvements in a few months...