ARDA final status report

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Summary

- "Genesis"

- First years

- Second phase

- Conclusions

Genesis

- A Roadmap for Distributed Analysis

  - One of the most attended workshops (Miron, Predrag, Torre etc...)

  - Held at the same time of the OGSI -> WSDL announcement (and the premature death of GT3...)

- A Realisation of Distributed Analysis

  - EGEE effort (4 persons) + 4 matching funds from WLCG

  - Initial mantra:

   - Production is understood, Analysis not yet...

First phase

- Contact with the experiments via separate contacts (one per experiments)
  - Agreement on the activity
    - Various levels of integration
    - Sometimes we were a bit side-tracked
  - Exchanges via the ARDA team
    - Exception: Ganga (was already a common project)

Activity (as imagined at the beginning)

e.g. Gaudi

Experiment Framework

e.g. Dirac

Exp.Specific Middleware

A R
D A

e.g. FireMan
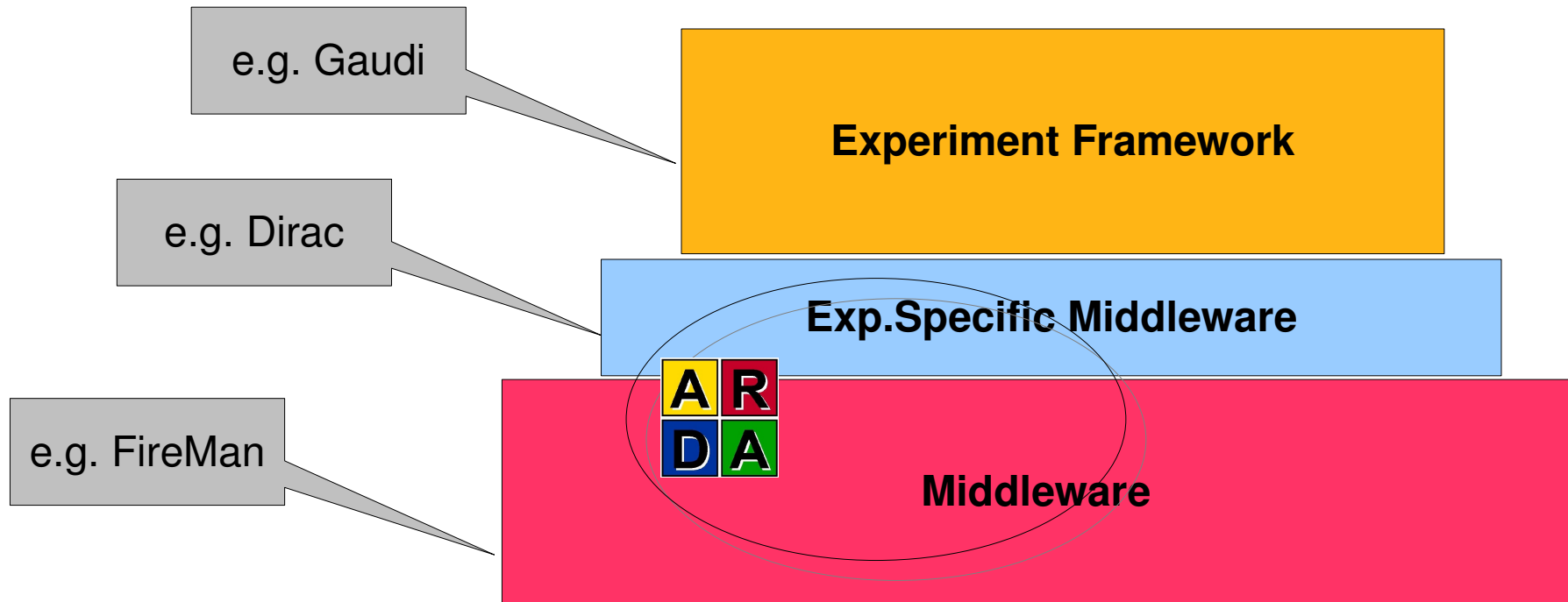
Middleware

Activity

- The relative importance of the middleware diminished (baseline services etc...)

- The scope of the application specific layer increased

- Fortunately some commonality was found

- We attracted a number of collaborators (unfunded) within and without EGEE

Experiment Framework

Exp.Specific Middleware

ARDA

Middleware
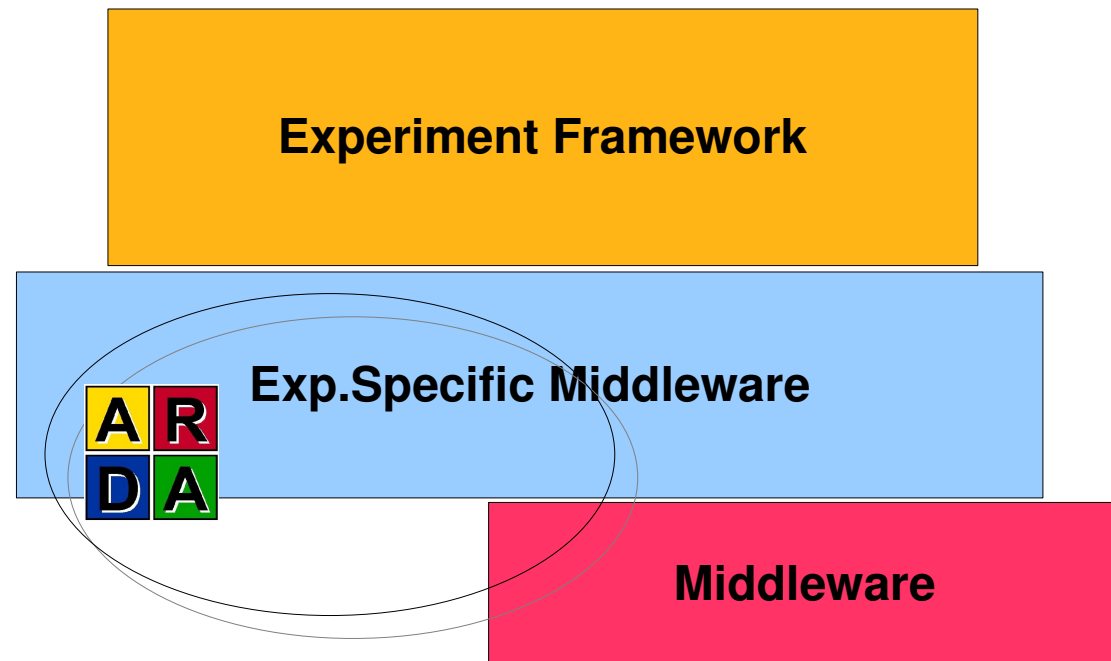
Second phase

- Closer collaboration with each experiment
  - Closer means also on "critical path" activities
  - Some prototypes have been stopped
    - e.g. the analysis system ASAP because the official tool CRAB got more and more momentum, but our contributions was reused. In this specific case, in CRAB itself and especially in the monitoring (dashboard)
  - Other activities could be expanded and attract more experiments (Dashboard)

A stroll across ARDA

Largely incomplete...

AMGA

- ARDA Metadata Grid Access

- Metadata catalogue: obvious starting point for ARDA

    - We studied existing systems in the experiments

    - Initially we contributed an I/F (it was outside of the scope of JRA1) and a working prototype (endorsed by GAG)

    - Basis a a few interesting contributions to the fields (master and PhD students)

- Eventually:

    - Part of the gLite distribution since 2006

    - Collaborative effort coordinated by the original developer but all effort coming from outside (Catania, Korea, Clermont-Ferrand,...)

   – Now coordinating the release process, adding new features etc...

AMGA

- Adopted by LHCb for their Logging and bookkeeping catalogue (used until now; migration taking place now)

- Great success in EGEE. Some examples:

  - Earth sciences:
    - Climatology (Climatology centre in Hamburg DKRZ – also under in DGrid)
    - UNOSAT (Access of satellite images)
  - Biomedical sciences:
    - Wisdom (In-silico drug searches)
    - Health-e-child
    - Digital imaging
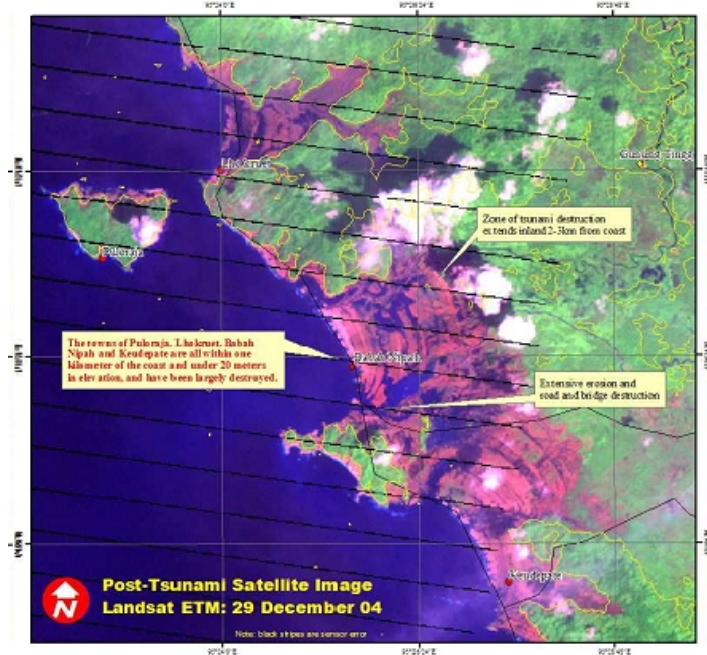 - Non-LHC partners in EGEE3 are using their resources on this subject

Case study: Health-e-Child

- Several dozens of hospitals providing case-data
- Central server with credentials for participating sites and users (replication mandatory)
- Data replicated from site to site on demand
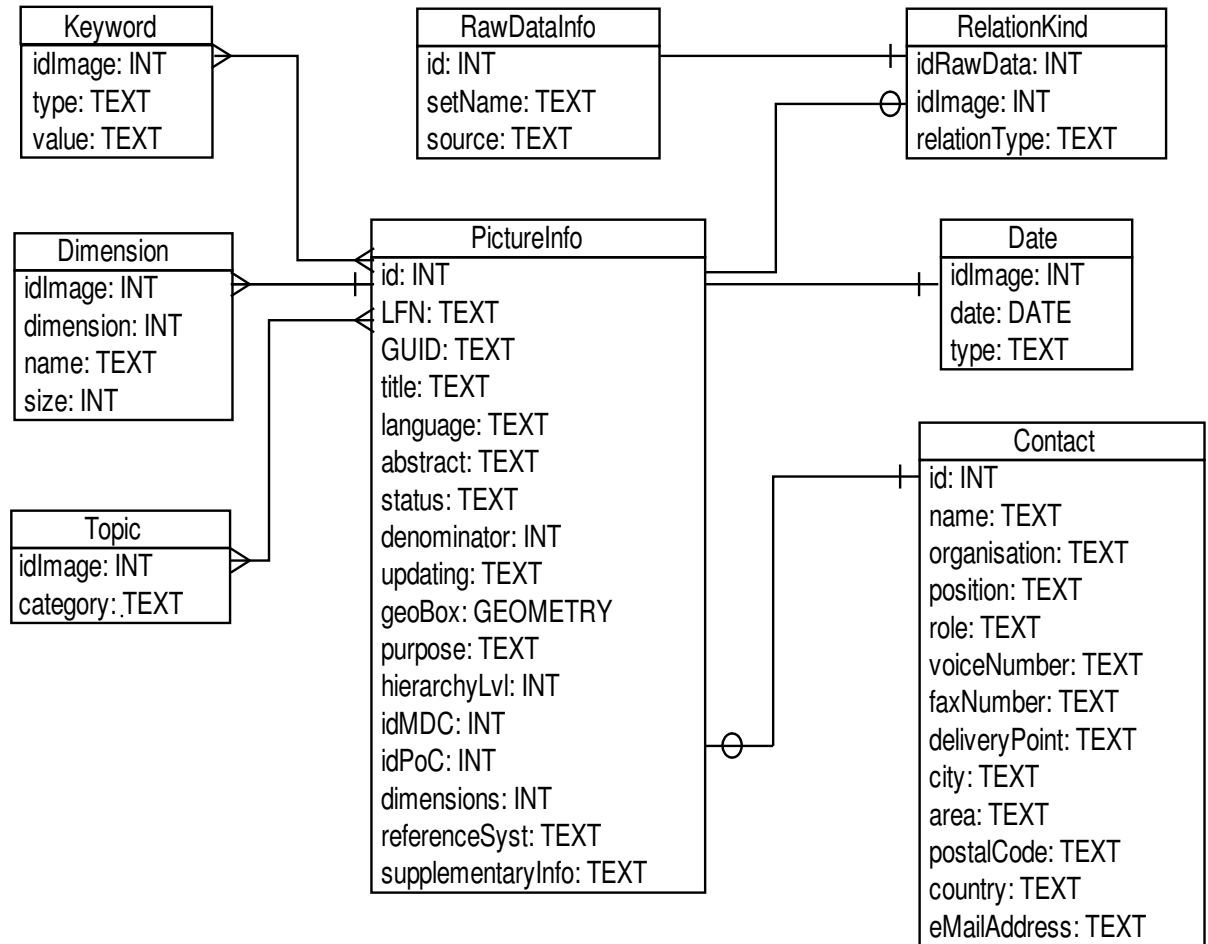 - 'Automount' mechanism for joining sites

```
/configuration
/siteA/patients
/siteB/patients
...
/common/patients
```

Union View
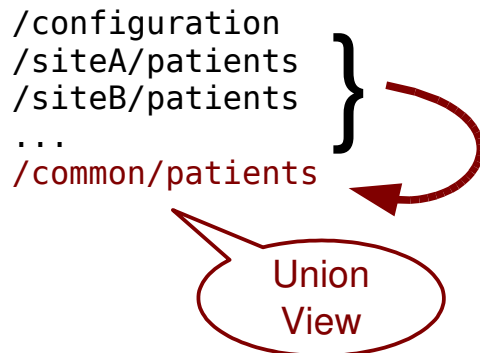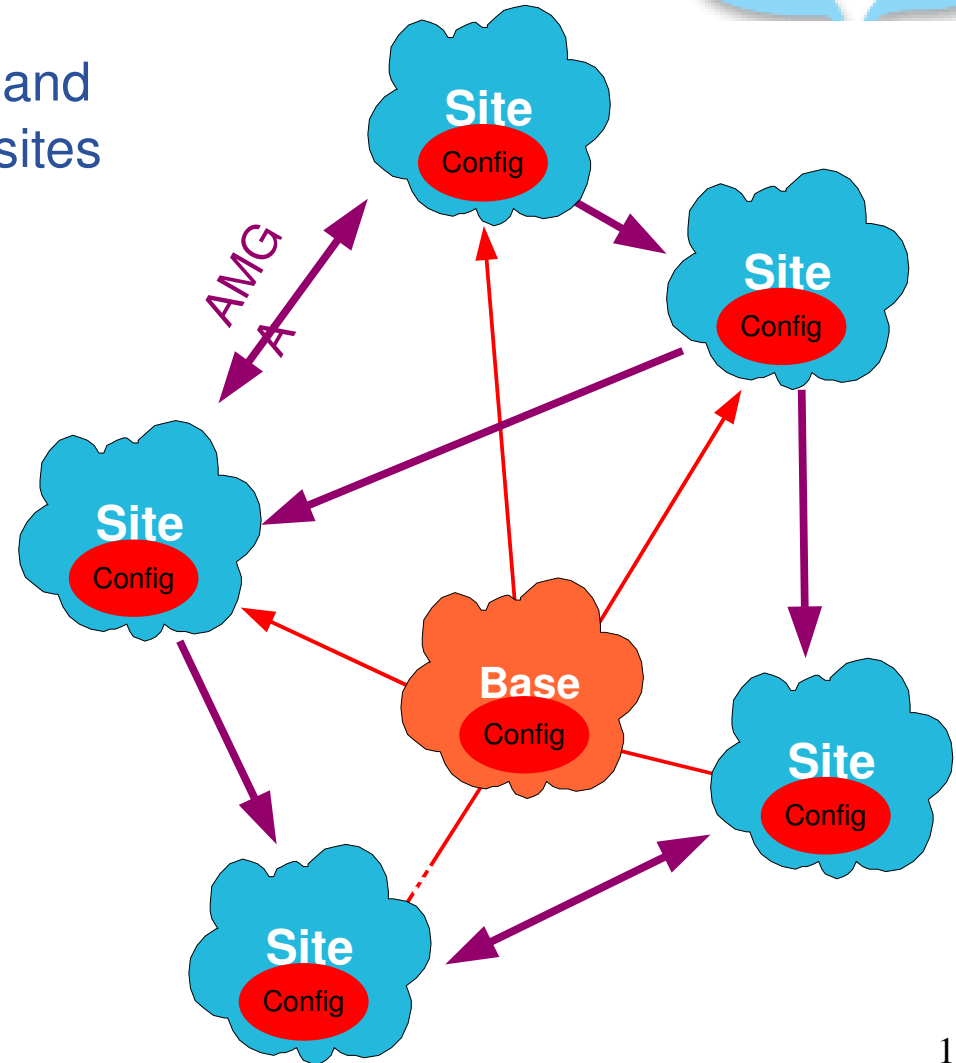
Geographic Metadata

- UnoSat prototype uses AMGA to store GIS (Geographic Information System) Metadata for images
- Accessible also via portable devices (mobile phones)

Keyword
idImage: INT
type: TEXT
value: TEXT

RawDataInfo
id: INT
setName: TEXT
source: TEXT

RelationKind
idRawData: INT
idImage: INT
relationType: TEXT

Dimension
idImage: INT
dimension: INT
name: TEXT
size: INT

PictureInfo
id: INT
LFN: TEXT
GUID: TEXT
title: TEXT
language: TEXT
abstract: TEXT
status: TEXT
denominator: INT
updating: TEXT
geoBox: GEOMETRY
purpose: TEXT
hierarchyLvl: INT
idMDC: INT
idPoC: INT
dimensions: INT
referenceSyst: TEXT
supplementaryInfo: TEXT

Date
idImage: INT
date: DATE
type: TEXT

Topic
idImage: INT
category: TEXT

Contact
id: INT
name: TEXT
organisation: TEXT
position: TEXT
role: TEXT
voiceNumber: TEXT
faxNumber: TEXT
deliveryPoint: TEXT
city: TEXT
area: TEXT
postalCode: TEXT
country: TEXT
eMailAddress: TEXT

Post-Tsunami Satellite Image
Landsat ETM: 29 December 04

UNOSAT
satellite imagery for all

Dashboard

- **Initially it was born as CMS Dashboard**

  – Reusing components of the CMS analysis prototype

  – Fundamental contribution of MonALISA

- **Its scope has progressively grown**

  – More experiments!

  – Different VOs (non HEP) interested

  – Other activities (data transfer, site status, middleware errors, ...)

CMS Dashboard - Crab Analysis Jobs

jobs per site
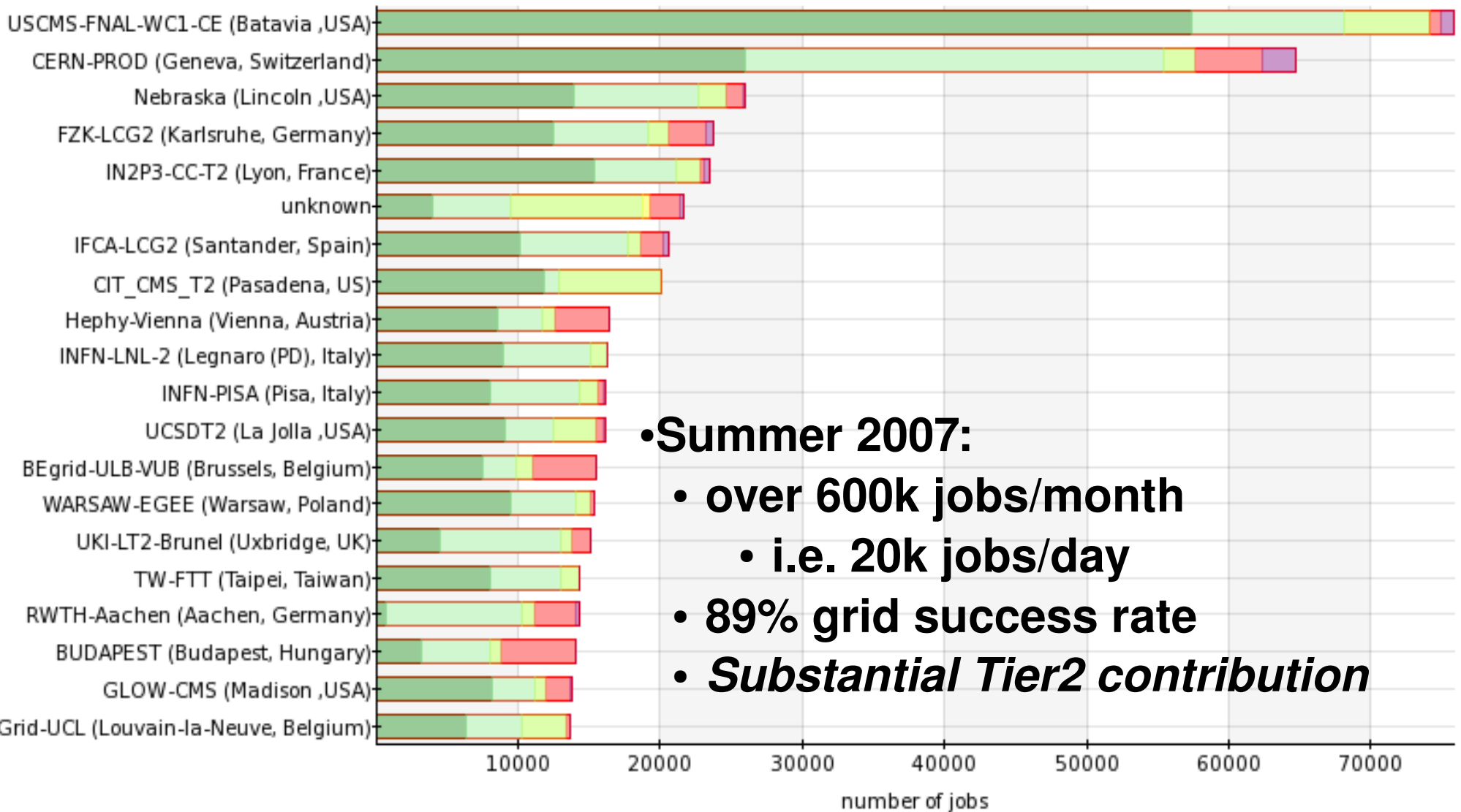
- Summer 2007:
  - over 600k jobs/month
    - i.e. 20k jobs/day
  - 89% grid success rate
  - *Substantial Tier2 contribution*

Monitoring improvements of Grid infrastructure

- CMS sites availability monitored with Dashboard application

January 2008

May 2008

September 2008
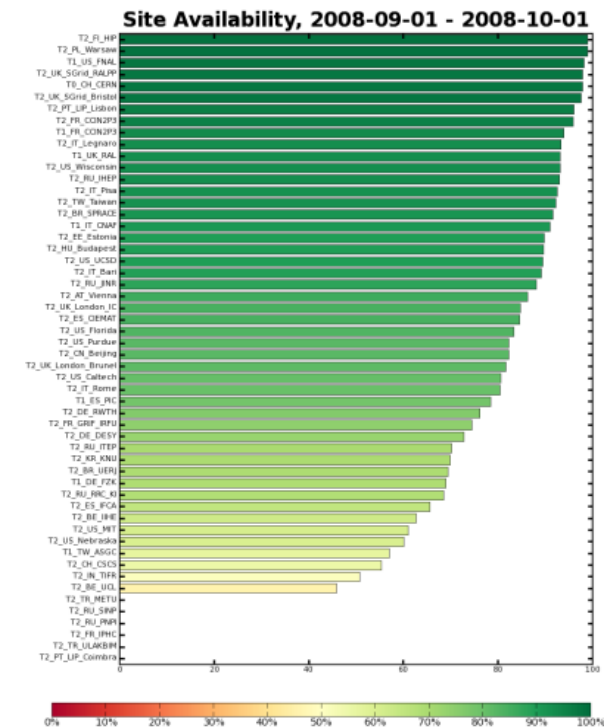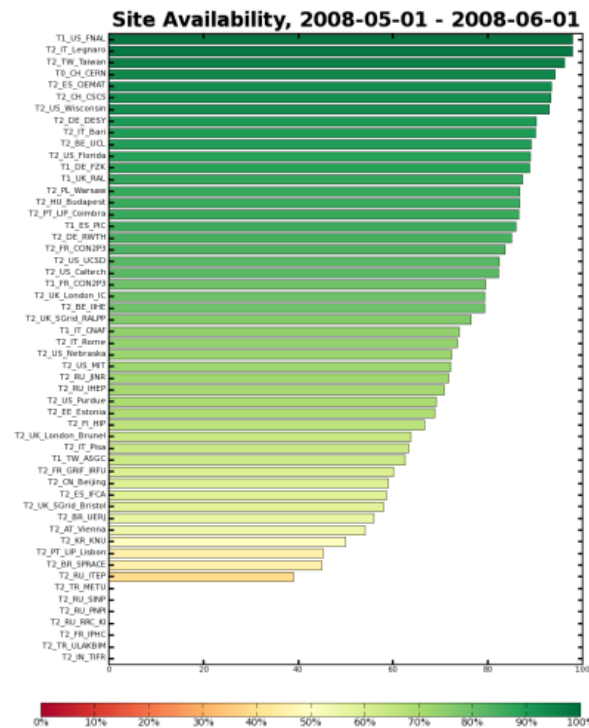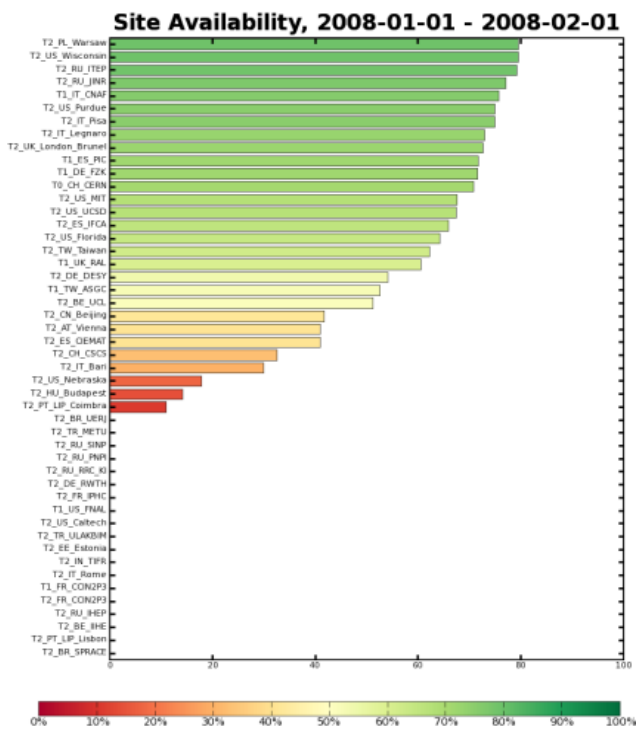
Example of GridMap – Dashboard integration

EGEE'08 - Julia Andreeva
(CERN, IT/GS)

M4 data taking August 31 2007

Throughput MB/s
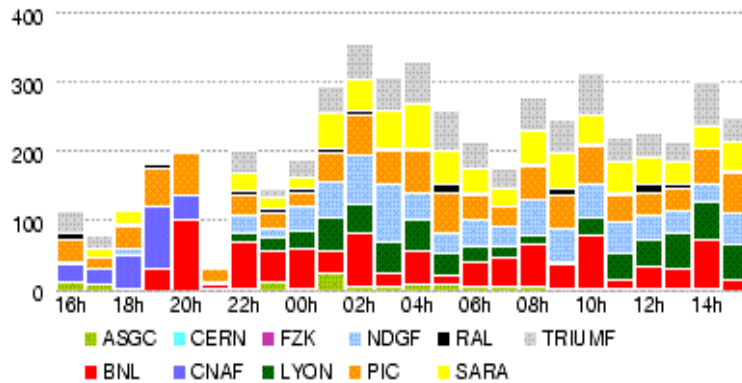
Data transferred GB
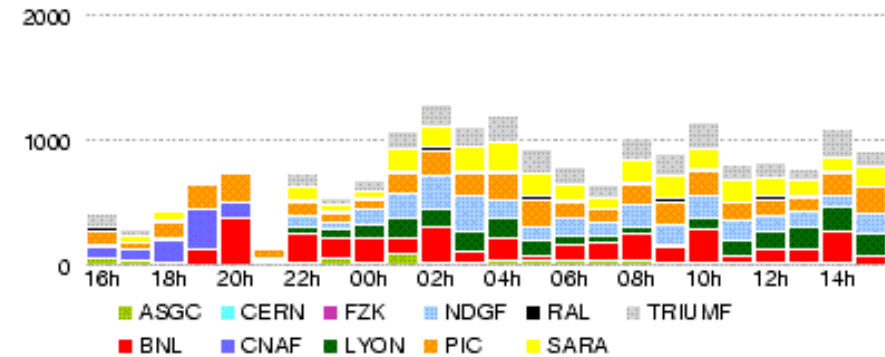
Completed file transfers
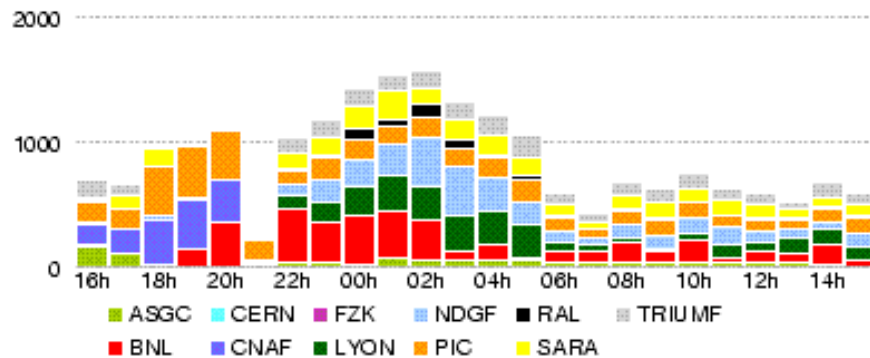
Total number of errors
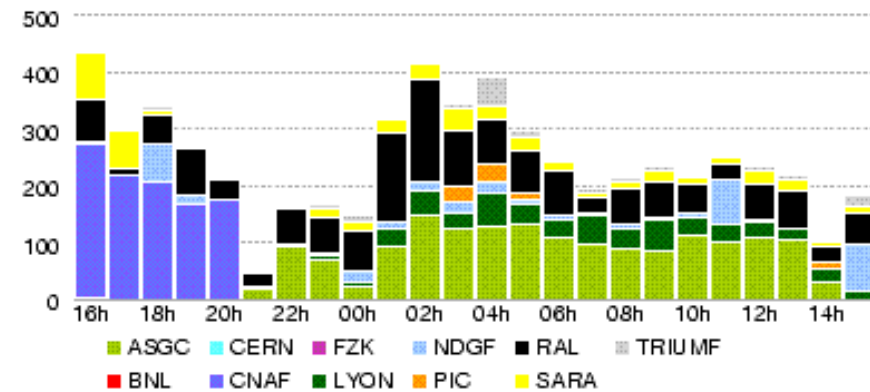
Application Overview

- Monitoring of data movement within clouds and sites
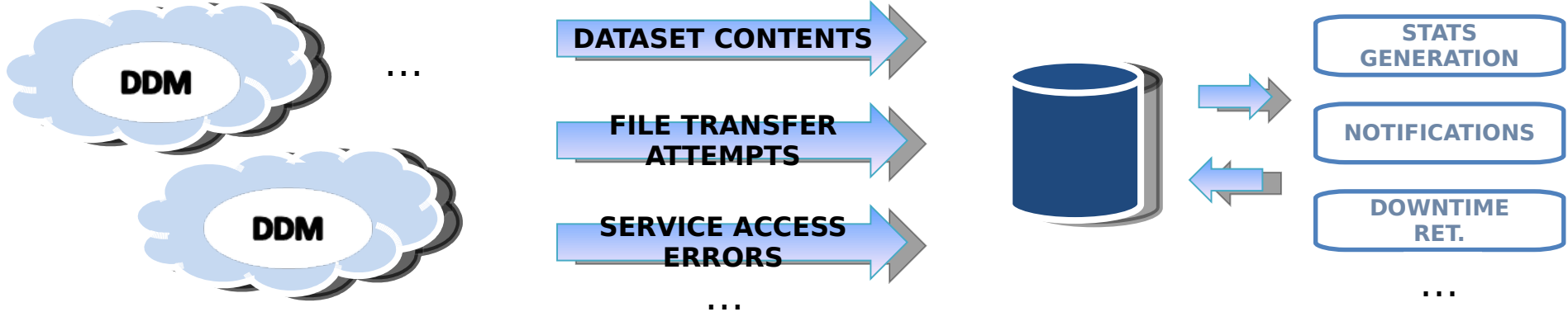
- Topology: clouds, sites, storage space tokens

- Dataset: content, location and completeness

- File: transfer attempt history, location, details on storage (src/dest surl, checksum, …)

- Resources: SAM results, downtimes

- Statistics: throughput, efficiency, error summaries, transfer attempt number, dataset queued/completion time, …

ATLAS dashboard

Data: Tier 0 | Data: Production | Jobs: Production | Jobs: Analysis | Panda: Production

Tasks | Grid jobs | Summaries | Shifters | Functional tests | Admin | User Guide | Feedback

find

view
by grid
by cloud
by dest_cloud
by executortype
by executor
by site
by cluster
by task

select cloud

BNL
LYON
CNAF
None
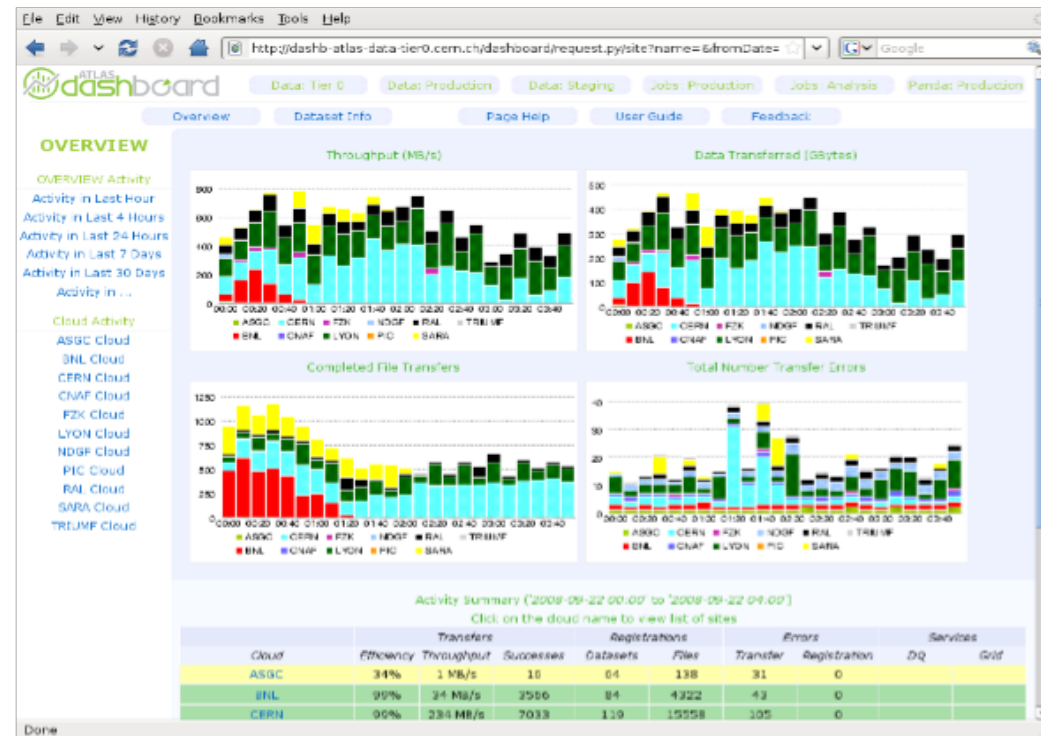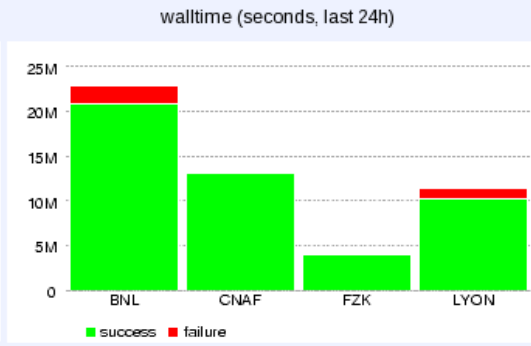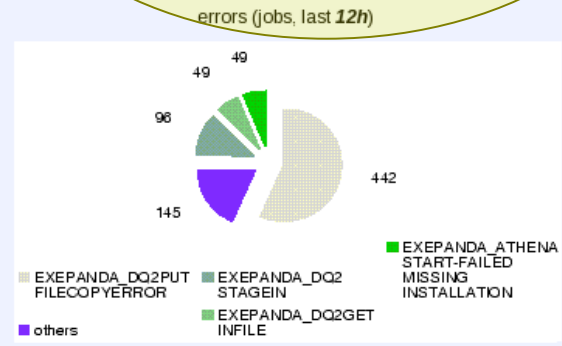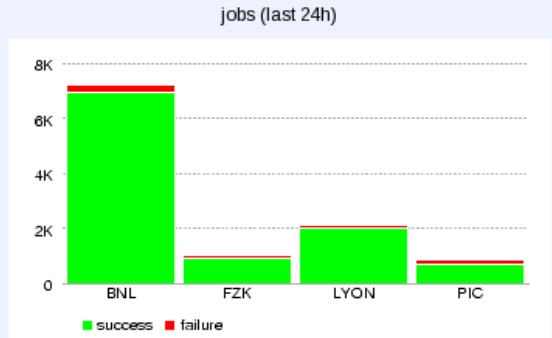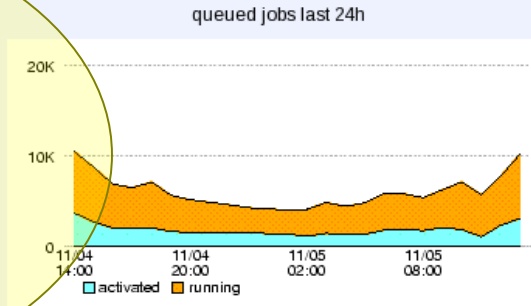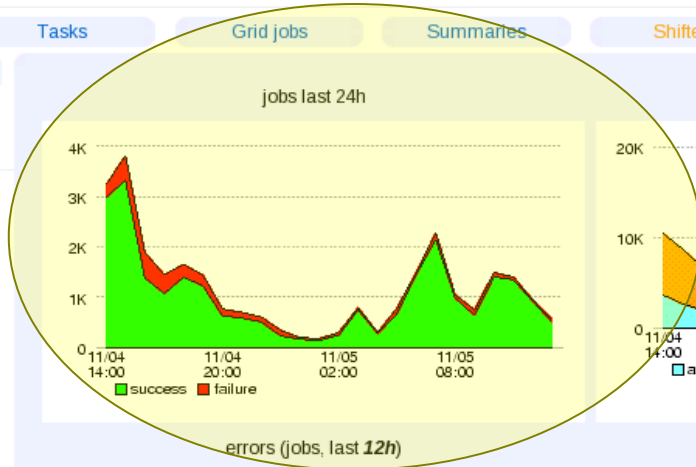FZK
NDGF
PIC
SARA
TRIUMF
ASGC
RAL
CERN

jobs last 24h

queued jobs last 24h
□ activated □ running

jobs (last 24h)
■ success ■ failure

errors (jobs, last *12h*)

49
49
96
145
442

■ EXEPANDA_ATHENA START-FAILED MISSING INSTALLATION
▨ EXEPANDA_DQ2PUT FILECOPYERROR
▨ EXEPANDA_DQ2 STAGEIN
■ EXEPANDA_DQ2GET INFILE
■ others

walltime (seconds, last 24h)
■ success ■ failure

■ success ■ failure

cloud	defined	assigned	waiting	activated	running	holding	transferring	success	failure	efficiency
BNL	0	192	0	1028	3351	1747	571	6934	310	95.7%
LYON	0	538	0	95	393	636	2030	2027	78	96.3%
FZK	0	358	0	250	303	68	327	915	100	90.1%
PIC	0	8	0	5	36	281	193	687	179	79.3%
CNAF	0	0	0	284	1718	36	196	702	104	87.1%
TRIUMF	0	0	0	0	19	410	5	6	6	50%
RAL	0	0	0	0	16	344	0	4	0	100%
None	165	17	210	1577	12	340	0	0	2	0%
NDGF	0	0	0	0	1656	0	0	0	2	0%
SARA	0	30	0	0	22	427	7	0	0	-
ASGC	0	0	0	0	20	403	0	0	0	-
CERN	0	0	0	0	0	1	0	0	0	-
total	165	1143	210	3239	7546	4693	3329	11275	781	93.5%

CRITICAL | WARNING | NORMAL | GOOD | NO_ACTIVITY

B. Gaidioz IT-GS

Google Earth Monitoring
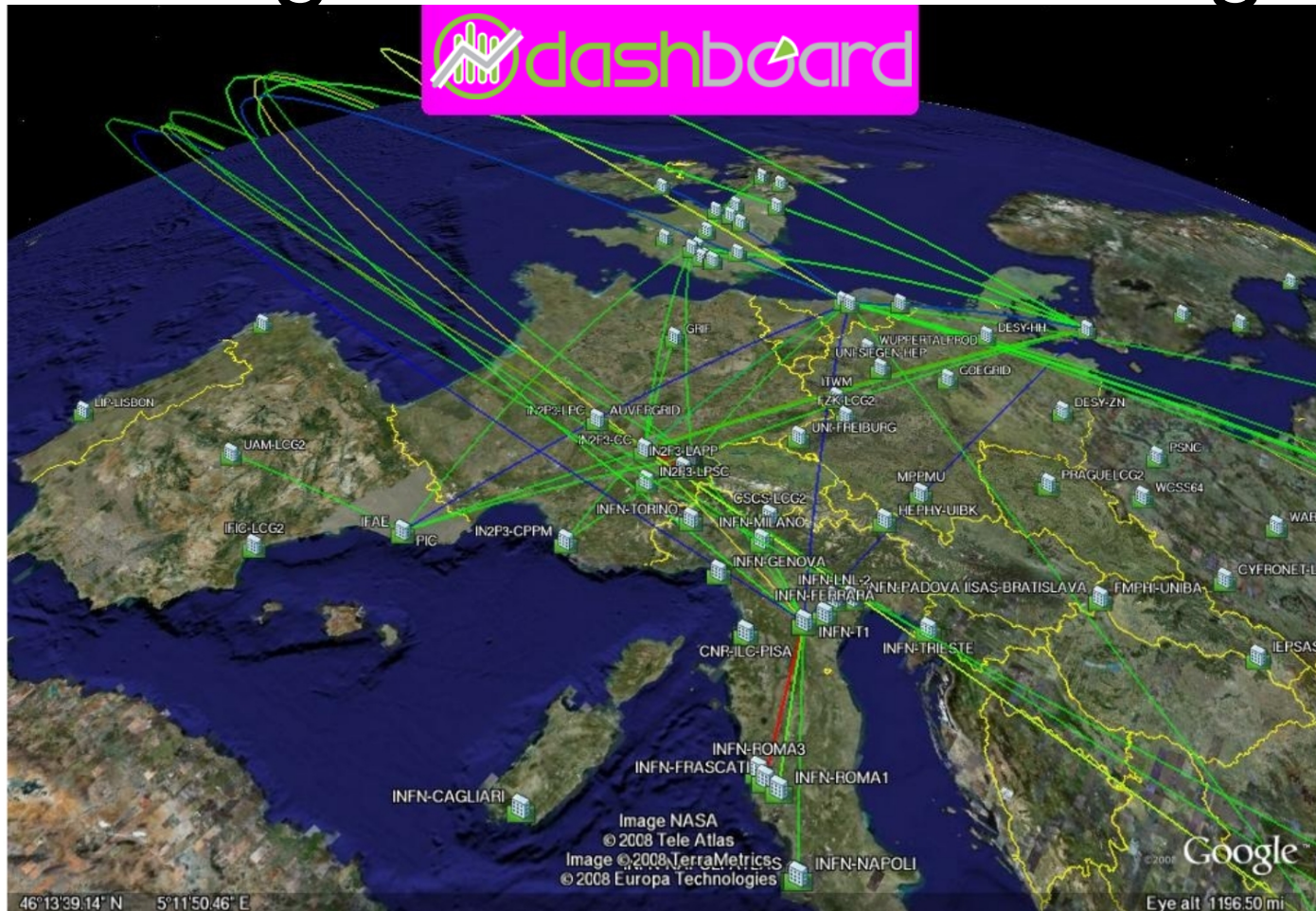
- Summaries of activity collected from DDM and ProdSys Dashboards

- Agent generating KML representation of this data

- Automatically refreshed every 10 minutes (*real time like* animation)

http://dashb-build.cern.ch/build/nightly/doc/guides/service-monitor-gearth/html/user/index.html

APIservice (ALICE)

- Analysis as an interactive service

  - Interface with gLite

- Proposed very early for ALICE

  - Inspiring for other developments in ARDA
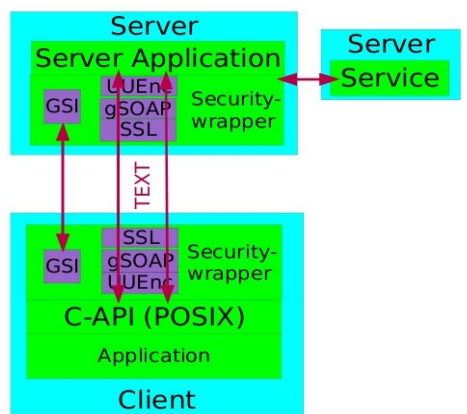

ARDA shell + C/C++ API

C++ access library for gLite has been developed by ARDA

- High performance
- Protocol quite proprietary...

Essential for the ALICE prototype
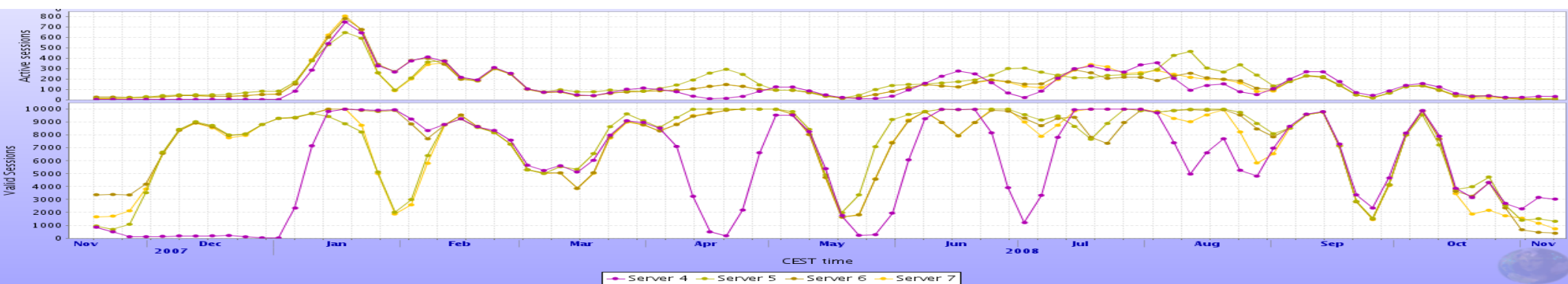
Generic enough for general use

Using this API grid commands have been added seamlessly to the standard shell
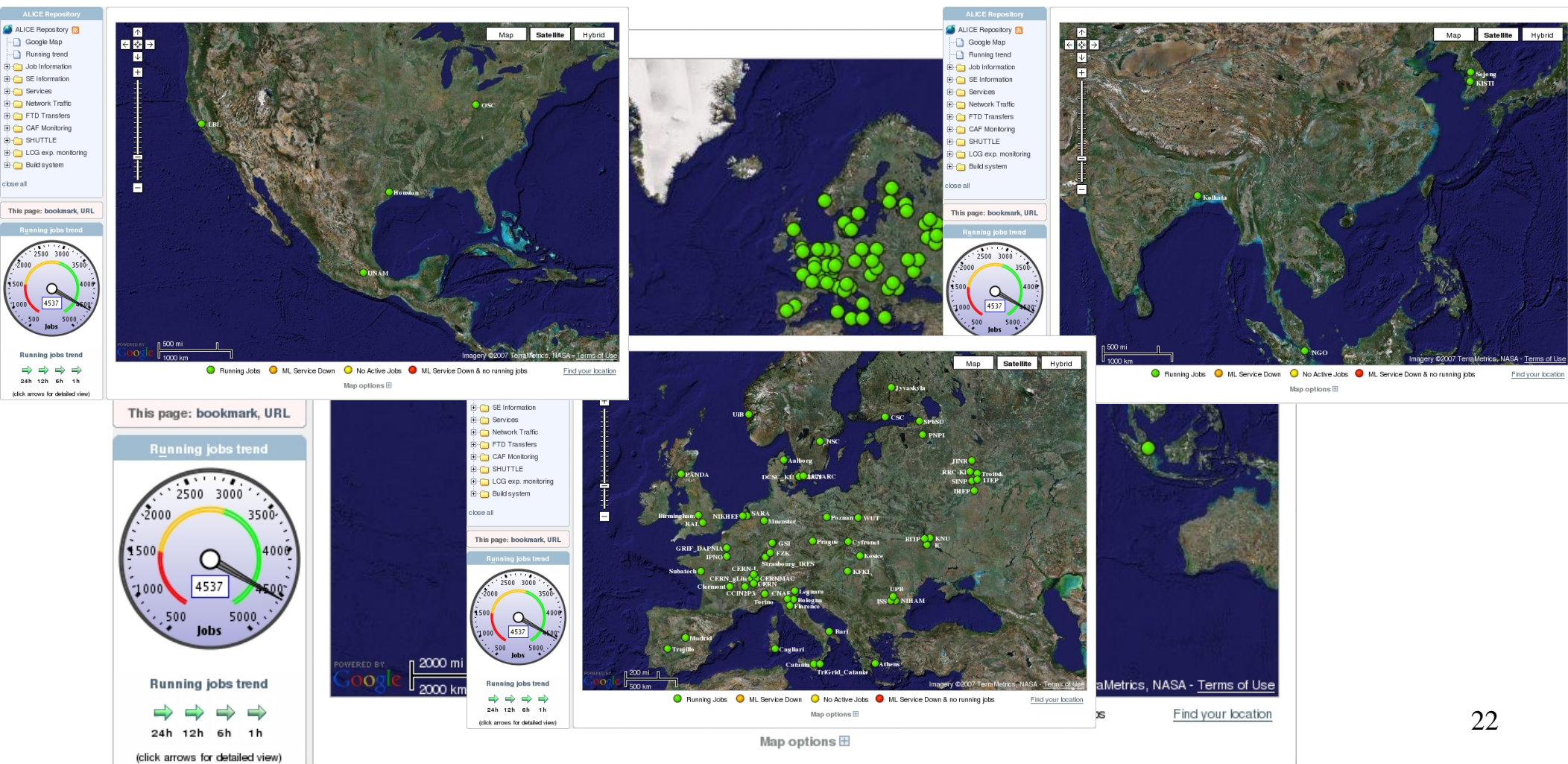
PDC 07 http://pcalimonitor.cern.ch

Ganga

- Common project (ATLAS – LHCb)
  - We started collaborating on LHCb side only
  - After ~18 months, the ARDA/ATLAS contribution joined Ganga
  - Due to the EGEE links, considera-ble interest

outside the LHC area

LHCb

ATLAS
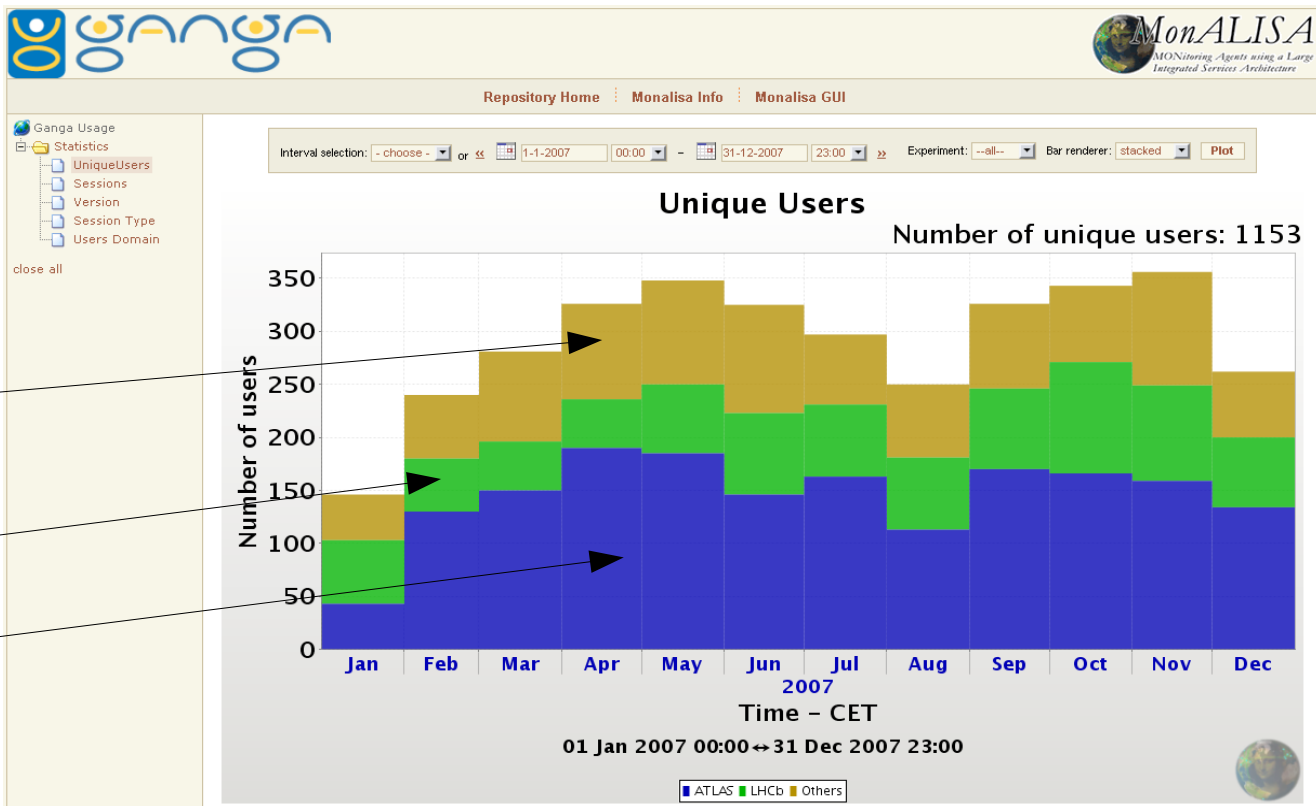
Ganga

- Excellent adoption

  - It is the entry point to the ATLAS (PanDA) and LHCb (Dirac) system

    - In the case of ATLAS, complemented by pAthena

- Excellent user feed-back

  - Several tutorials paid off!

  - In addition, we discover of communities discovering and adopting Ganga without our direct involvement (e.g. Minos – discovered by googling... :)

Ganga

Grid Access for Analysis
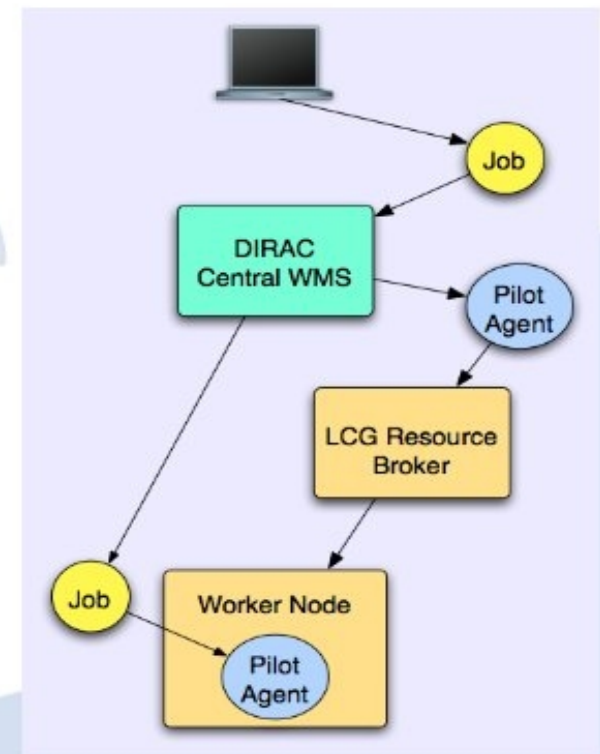
- Analysis jobs: No direct submission to LCG

- Instead:
  - Submission to the DIRAC WMS

- Advantages:
  - Provide transparent access to the LFC file catalogue for reading and writing data
  - Allow LHCb to set priorities and or restrictions for analysis jobs

- More see Stuart Paterson's talk

Ganga

LHCb Analysis Job

* Gaudi based applications:

```
In [3]: dv = DaVinci(version='v12r12')
In [4]: print dv
DaVinci {
  version = 'v12r12' ,
  extraopts = None ,
  package = 'Phys' ,
  cmt_user_path = '/afs/cern.ch/user/u/uegede/cmtuser' ,
  masterpackage = None ,
  optsfile = File {
    name = ''
  }
}
```

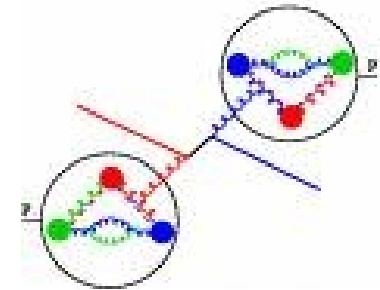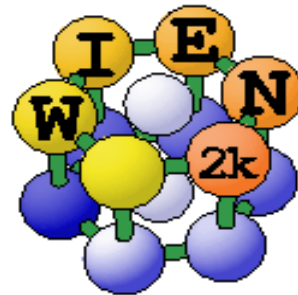Specify extra option file properties appended to the options file

Specify the package you are working on

Specify the options file to be used

A. Maier CERN   14

... other Ganga "communities" out there!
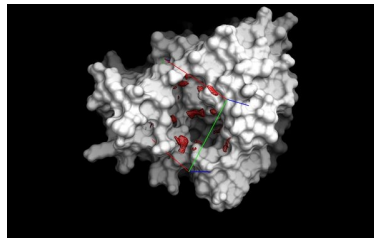
ITU conference (May-Jun 06)

International Telecommunication Union

170° E

40° S

Figure 1
The extent of the planning area for the RRC-06

➔Need on **DEPENDABILITY**
  ➔ Large production to be done on a given date within ~24 hours
➔Use of Ganga/DIANE
  ➔ client – server worker allowing to execute (grid) jobs in an efficient and dependable way)

DIANE R&D Project
http://cern.ch/DIANE

Master

Worker

User

ganga

Experience with EGEE grid

CERN responsibilities:

- Consulting in GRID technologies
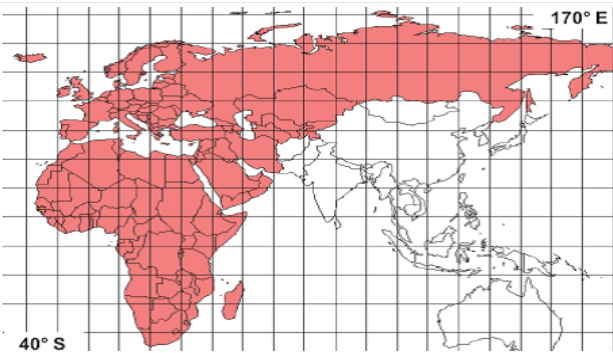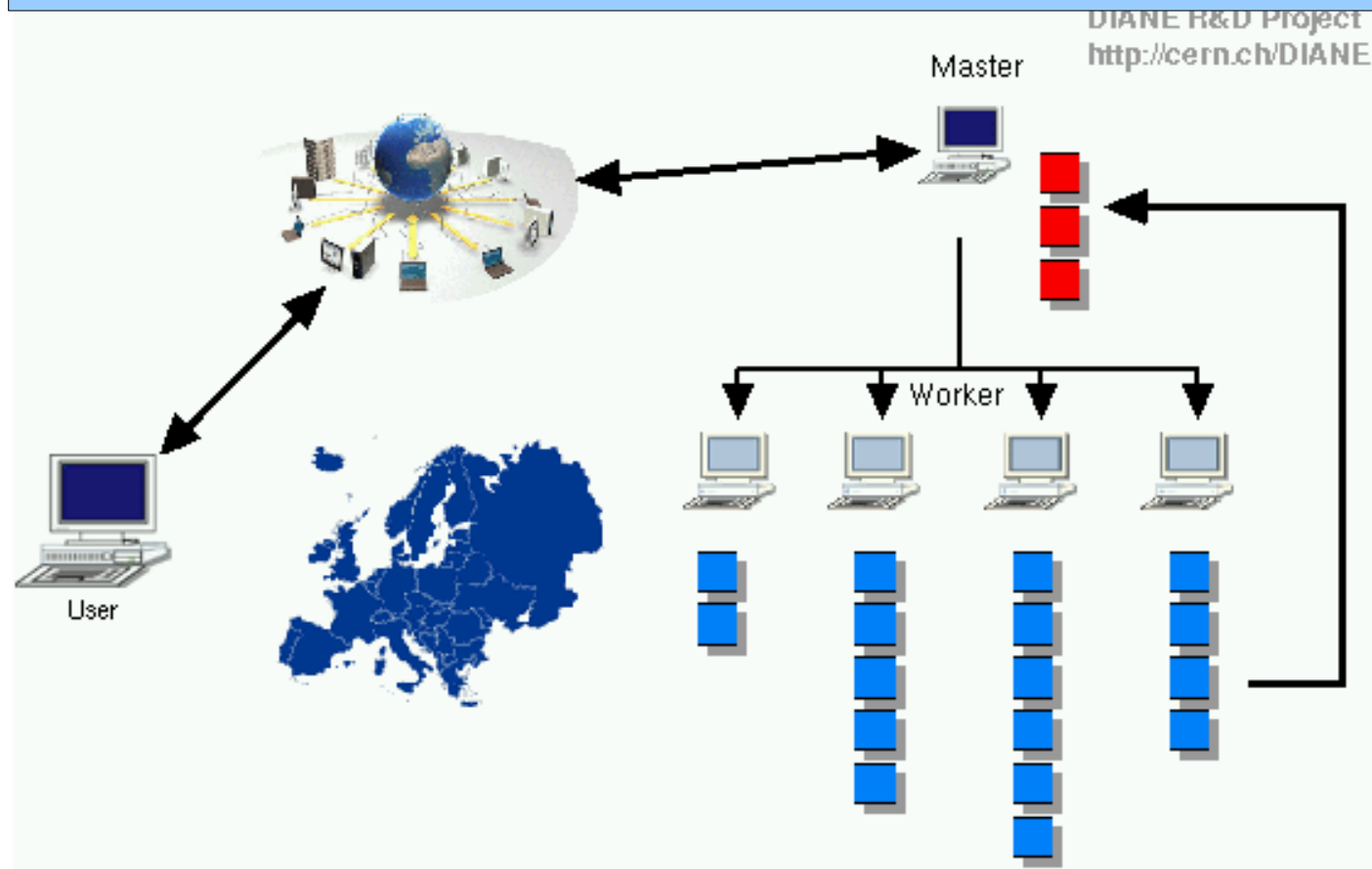- Online support before and during the Conference
- Preparation of scripts for easy operation of the GRID by ITU personnel

ITU responsibilities:

- Providing datasets
- Operation of the system

Participating institutions

CERN
INFN-CNAF Bologna
(+ sites of GridIT infrastructure)
PIC Barcelona, CNB Madrid
DESY (Hamburg, Zeuthen)
Cyfronet Krakow
Moscow State University

A. Manara
(Int. Telecomunication Union - ITU)

eGee
Enabling Grids
for E-sciencE

Theoretical physics (Lattice QCD)

•Lattice Conferences in 2007 <u>and</u> 2008
  • Ph. de Forcrand et al.
•Presented at CHEP 2007
•More activity in 2008

A QCD critical point
at small chemical potential:
is it there or not?

Philippe de Forcrand
ETH Zürich and CERN

with

Seyong Kim (U. Sejong) and Owe Philipsen (U. Münster)

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Ph. de Forcrand   LAT07, August 2007   A QCD critical point at small chemical potential: Is it there or not?

30

The legacy

- ARDA smoothly ended with EGEE2

  – CERN plays an important role in EGEE3, but with a slightly smaller effort building also on ARDA experience

- The persons from the ARDA team are in general still contributing into the LHC experiments and WLCG

  – Ganga: centre of the analysis in ATLAS and LHCb

  – Dashboard: more and more used in the experiments and in the infrastructure

- Experience was not lost

  – And "ex-ARDA" people are still providing excellent work in the various area of WLCG

31

Outlook

- I advocate the approach of close collaboration with the experiments is very positive
  - Experiments benefit from "back-office" collaboration
    - Which leads to true commonality
- Did we fulfil our initial mandate ("*production is understood, analysis not yet*")?
    - <u>Not yet</u>: analysis is a moving target
    - Analysis (in particular high-performance data access) is still evolving
- An approach à la ARDA might be useful here!