

# LIP Computing Activities

LIP workshop 2012

# Overview

IT services & infrastructures  
e-Science & WLCG



# Computing @ LIP

- Activities
  - Information Technology services
    - IT infrastructure, computing and network services
    - Supporting daily research activities
  - Research and development
    - Computer science is also a research line
- Group
  - Team of 10 persons
  - Mix of engineers, technicians and PhDs
  - Extensive experience in e-Science, advanced computing and distributed computing
  - Boosted by grid computing R&D activities on distributed data processing for the LHC experiments



# IT services

- Enabling the LIP research activities and participation in international scientific collaborations
  - The largest scientific computing infrastructure in the country
    - Two LIP computer centres in Lisbon and Coimbra
    - Main grid node in partnership with FCCN and LNEC
    - For internal users, HEP experiments and other user communities
- Provisioning of services
  - Management of computing equipment and networks
  - Standard and advanced IT services for the LIP community
  - Support helpdesk for LIP users
  - Also support for e-Science activities



# IT physical infrastructure



Complex distributed infrastructure

- > 1900 CPU cores
- > 240 worker nodes
- > 42 TB or RAM
- > 340 servers
- > 110 disk arrays
- > 1400 disks in arrays

# Projects and Initiatives

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>DataGrid</b>											
	<b>CrossGrid</b>										
	<b>WLCG</b>										
			<b>EGEE</b>								
					<b>EELA</b>						
					<b>EGEE-II</b>						
					<b>int.eu.grid</b>						
							<b>EGEE-III</b>				
						<b>main node</b>					
						<b>middleware</b>					
									<b>EGI InSPIRE</b>		
						<b>IBERGRID</b>					
										<b>TIMBUS</b>	

# Portuguese WLCG Tier-2

WLCG:

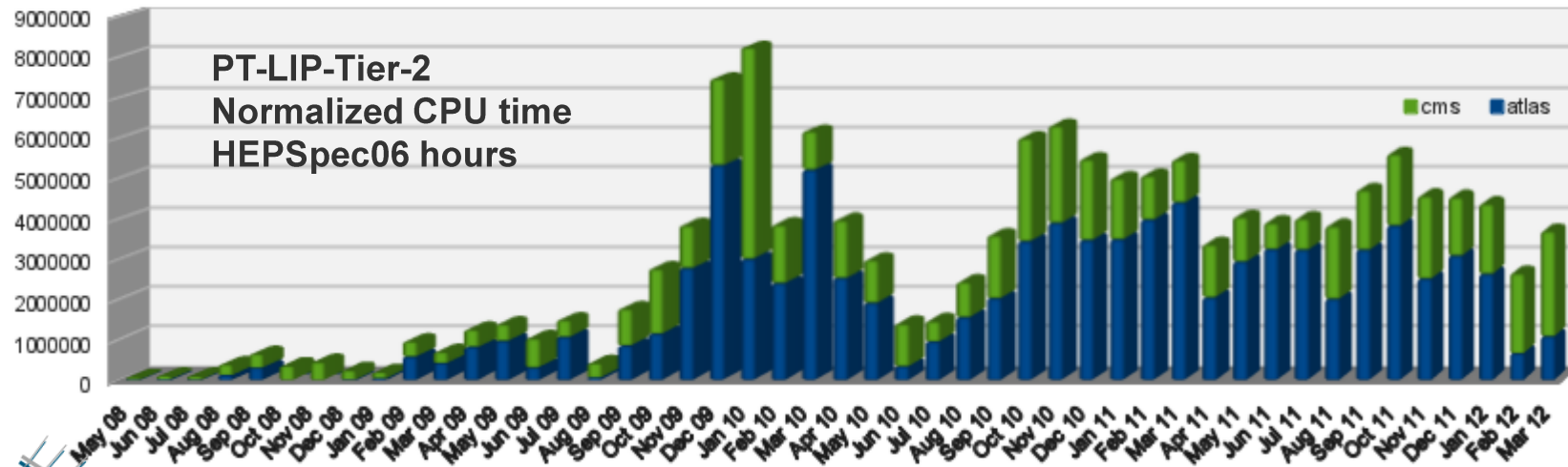
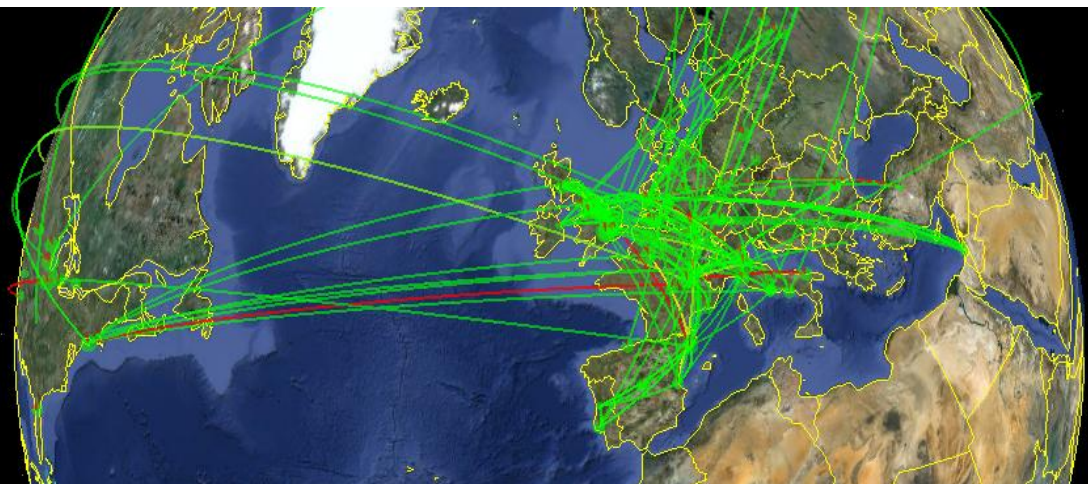
**36 countries**

**170 datacentres**

LIP federated Tier-2

**12<sup>th</sup> worldwide T2**

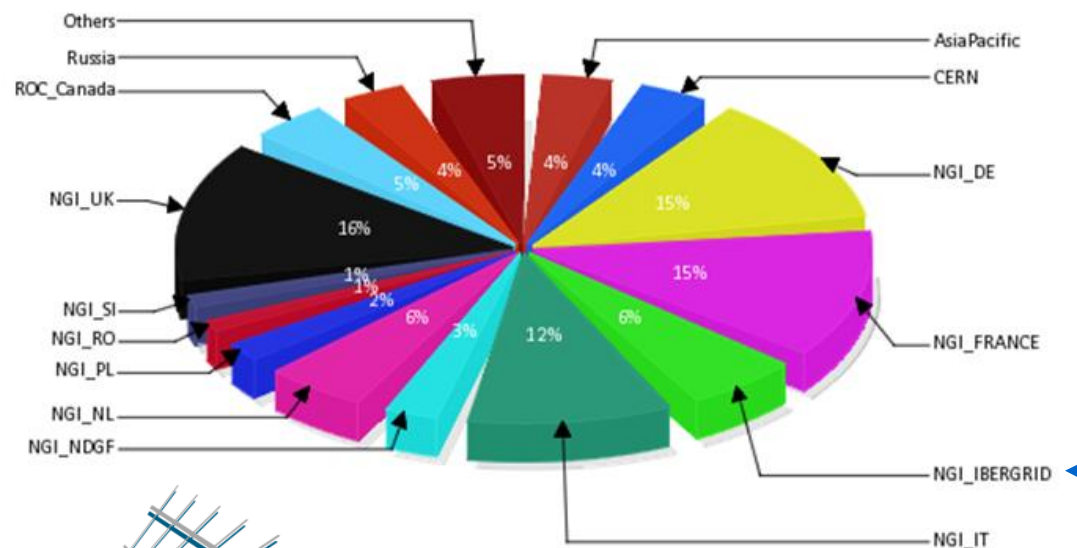
**9<sup>th</sup> European T2**



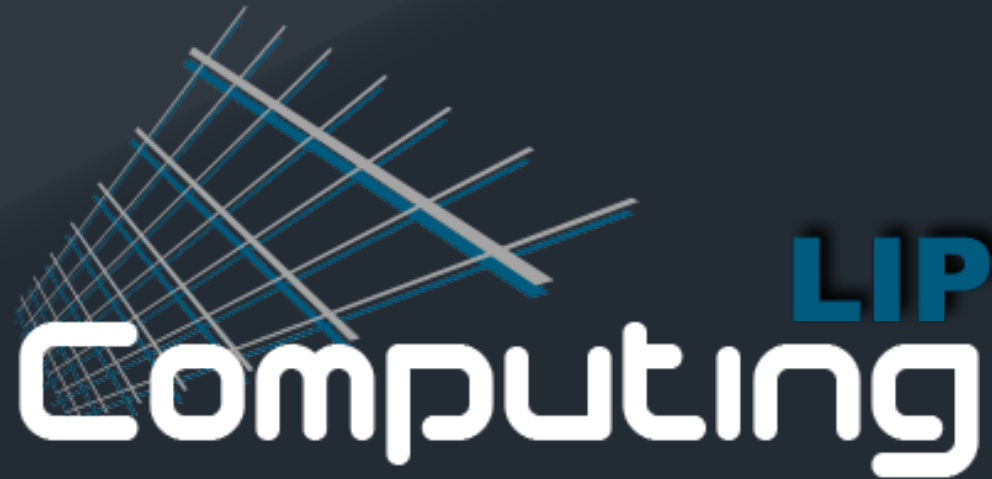


# e-Science

- Supporting multiple scientific domains  
Biomed, chemistry, oceanography, fusion...
- Leading edge grid infrastructures
- Integrating computing resources
- Infrastructure coordination
- User and site support







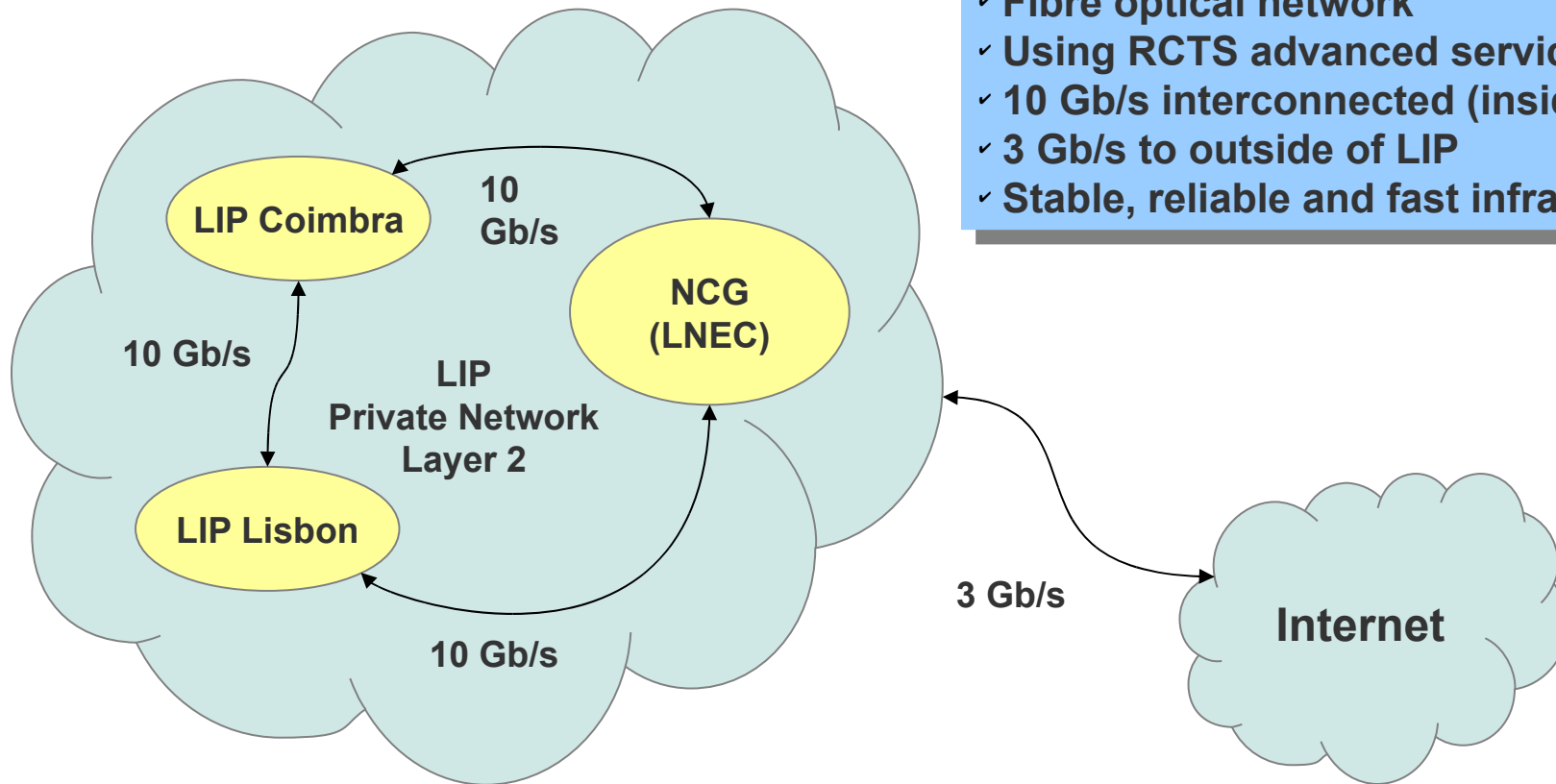
LIP Computing Activities

# IT Infrastructure

## Web and other services

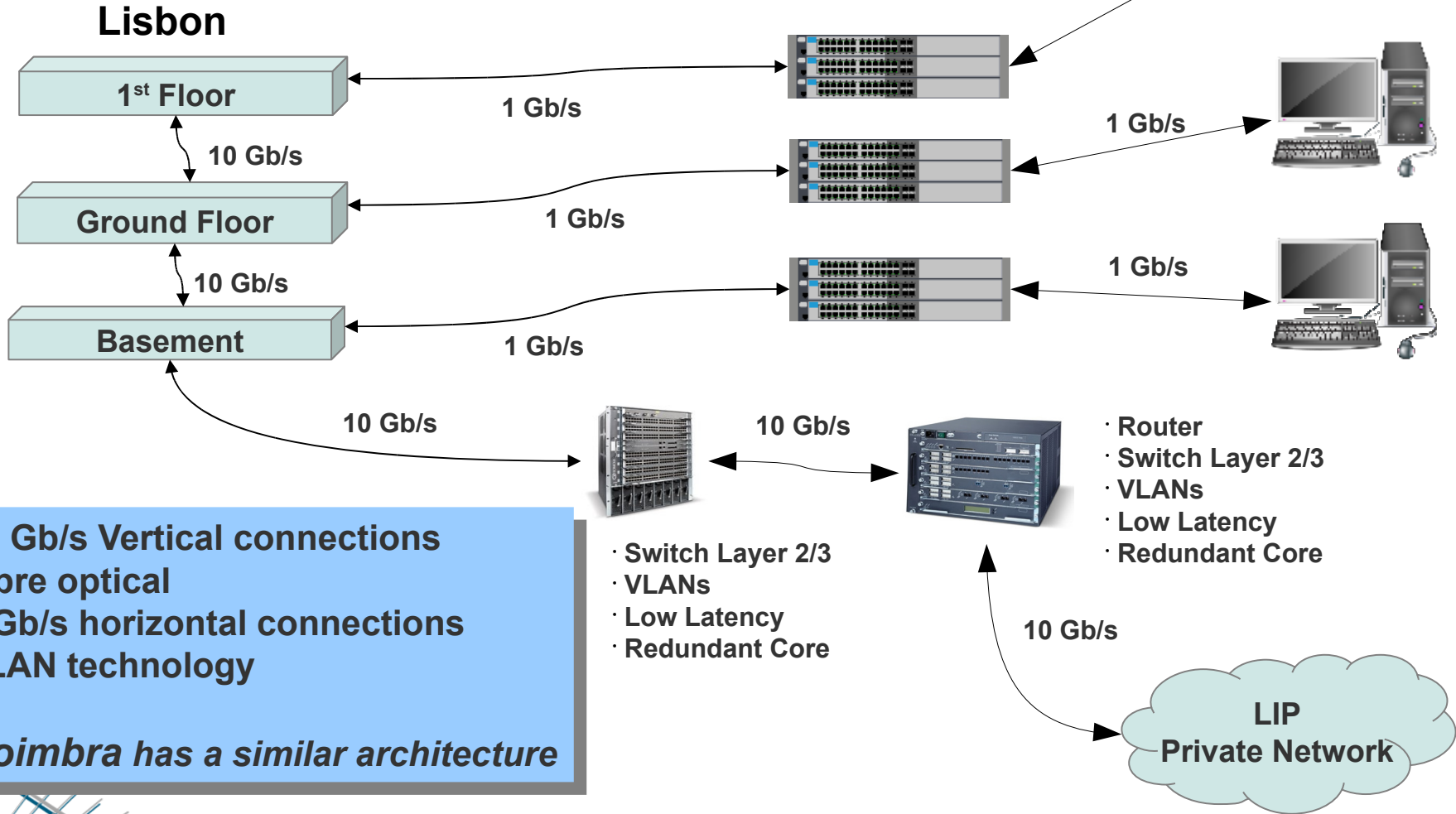


# Wide Area Network @ LIP



- ✓ Managing 3 network centres
- ✓ Fibre optical network
- ✓ Using RCTS advanced services
- ✓ 10 Gb/s interconnected (inside Layer 2)
- ✓ 3 Gb/s to outside of LIP
- ✓ Stable, reliable and fast infrastructure

# Local Area Network @ LIP



# Wireless @ LIP



## Lisbon

LIP-WLAN-2  
LIP-WLAN-5

Standard b/g/n  
150 Mb/s (Max)

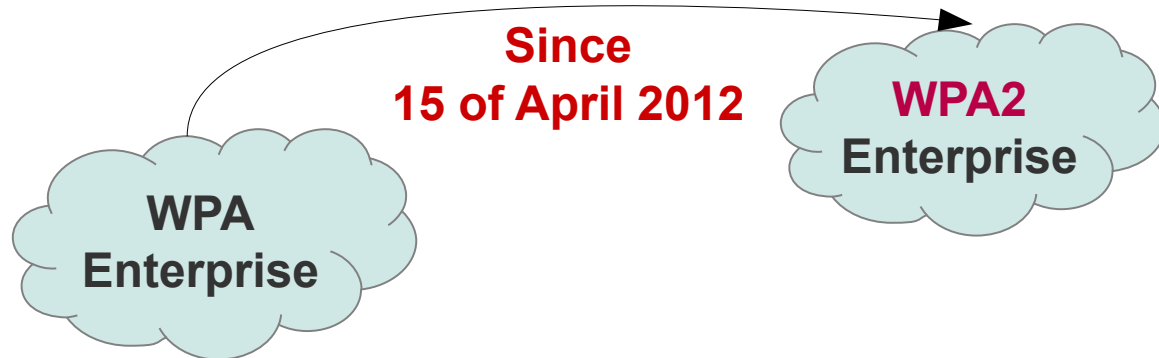


## LIP internal wireless network

- ✓ Provides connection to internal LIP Lisbon network

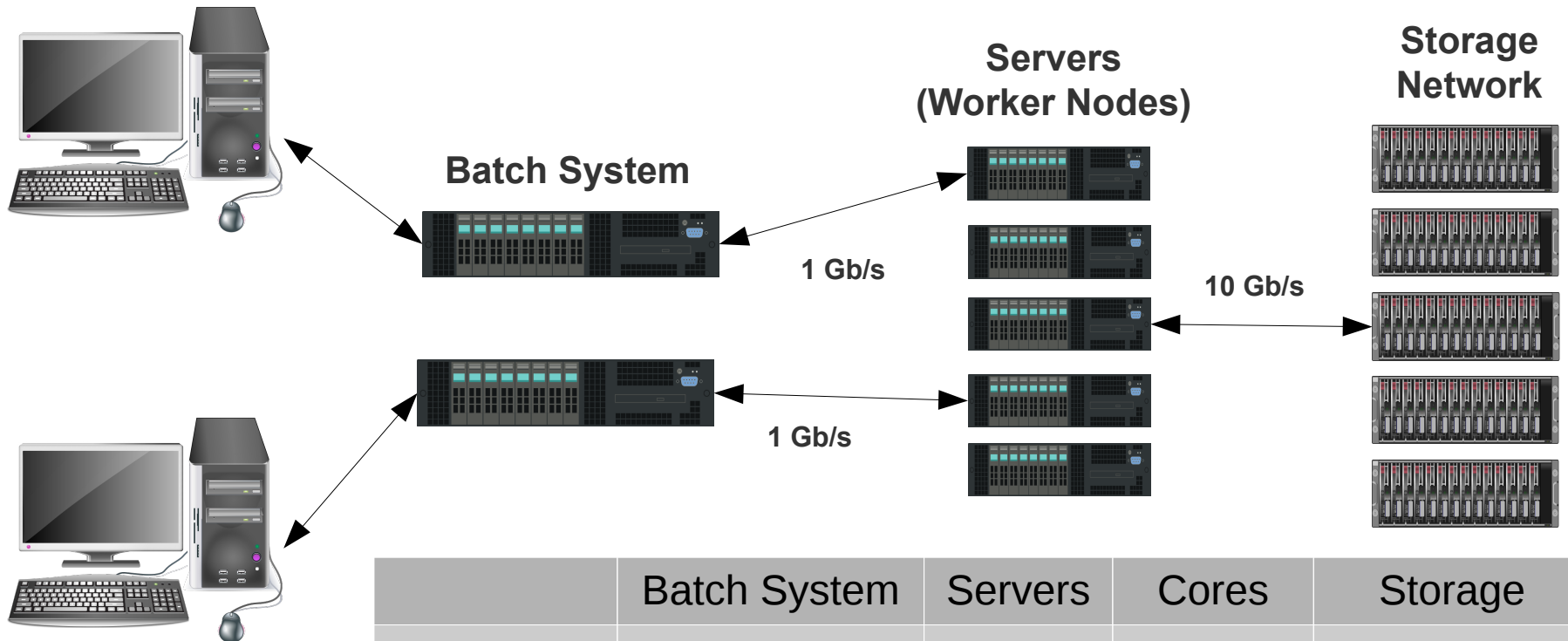
## Eduroam

- ✓ Supported since one year ago
- ✓ Worldwide network for users in roaming
- ✓ LIP issues eduroam credentials (Lisbon and Coimbra)
- ✓ Upgrade of technology
- ✓ New hardware



# F<sub>arm</sub> @ LIP

- ✓ A set of WNs controlled by a batch system
- ✓ Used by local users and GRID

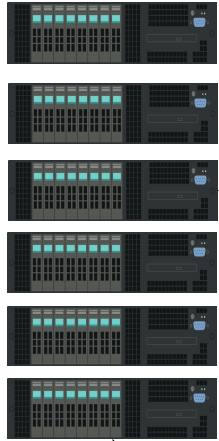


	Batch System	Servers	Cores	Storage
Coimbra	Torque Maui	46	184	146 TB
Lisbon	Grid Engine	139	532	310 TB

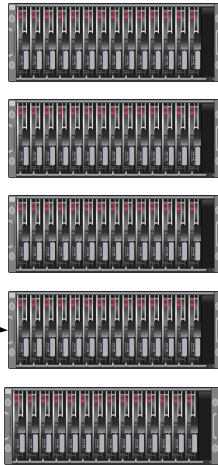


# GRID @ LIP

**Servers  
(worker nodes)**



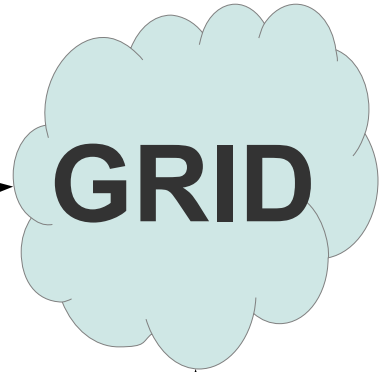
**Storage  
Network**



**Gateway for  
Storage**



**GRID**



**Gateway for  
Computing**



**Lisbon, Coimbra and NCG**

# HPC + Medusa @ NCG



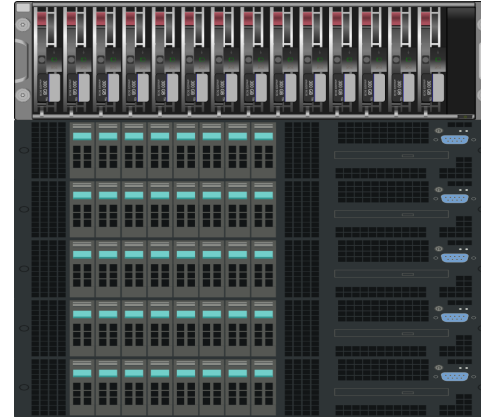
Storage  
11 TB

216 Cores

- ✓ 2 Blade Centres
- ✓ Low latency
- ✓ Interconnected with Infiniband

## High Performance Computing (HPC)

- ✓ Fully dedicated to parallel jobs
- ✓ Service to the Portuguese Scientific Community



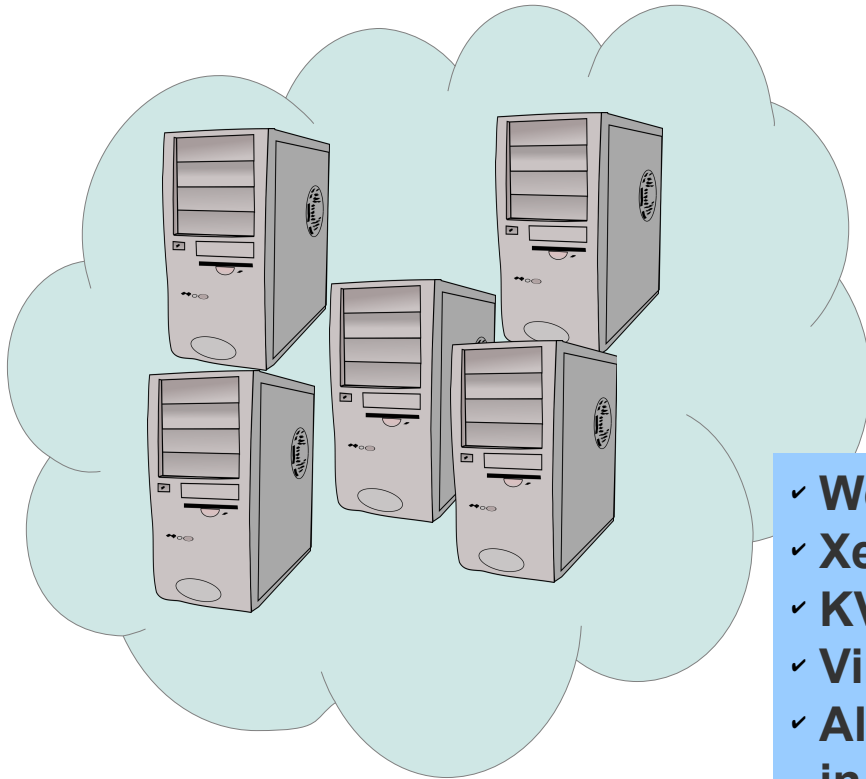
Storage  
12.8 TB

248 Cores

## Cluster LNEC (Medusa)

- ✓ Managed by LIP (NCG Centre agreement)
- ✓ Connected to the LIP Private Network

# Virtualization @ LIP



- ✓ We use extensively VMs to provide services
- ✓ Xen technology used at the beginning
- ✓ KVM technology are used now
- ✓ Virtualization platform
- ✓ Allows running multiple machines in the same hardware
- ✓ Optimization of resources
- ✓ Easy migration of machines

# Backups @ LIP



- ✓ Amanda backup system
- ✓ TAPE Library
- ✓ 302 tapes
- ✓ LTO4 (800 GB)
- ✓ ~242 TB (Not enough to backup all the data in storage)

- ✓ Mail
- ✓ Homes
- ✓ Webpages
- ✓ Databases

- ✓ Data
- ✓ /lustre (not everything)

# Improvements

- ✓ **Since March 2011: Implementation of a “greener CC” at LIP Lisbon**
  - ✓ **Automatic shutdown of idle machines**
  - ✓ **Automatic shutdown of desktop machines**
  - ✓ **Decommissioning of old and inefficient hardware, both computing and storage.**
  - ✓ **Tuning of air conditioning**
  - ✓ **Implementation of cold and hot corridors in the Datacentre**
  - ✓ **Power factor correction**

# World Wide Web @ LIP



LABORATÓRIO DE INSTRUMENTAÇÃO E  
FÍSICA EXPERIMENTAL DE PARTICULAS

Lisboa Coimbra Minho

Português [change] Login



**Sobre o LIP**  
Notícias  
Mapa do Site  
Localização  
Contactos

LIP Lisboa  
LIP Coimbra  
LIP Minho

**IWSSS'12**  
2012-04-10

Workshop Internacional sobre Estrutura e Espectroscopia Hadrônica terá lugar em Lisboa - Portugal

**Digital Counting Photosensors**  
2012-04-10

The IDPASC School will be held at LIP-Lisboa

**Reunião da Colaboração COMPASS**  
2012-04-10

Reunião a realizar em Lisboa - Portugal, organizada pelo LIP

**notícias ciência**

Vaga para Investigador 2012-03-21

Curso 'Physics at the LHC' 2012-04-17

Relatório Ibergrid 2011 2012-02-20

INGRID - Protegendo a Lagoa de Aveiro 2012-01-26

João Varela designado Deputy Spokesperson da Colaboração CMS no CERN a partir de Janeiro 2012 2012-01-01

Grupos do LIP em ATLAS e CMS participam na pesquisa do bóson de Higgs 2011-12-21

Gazeta da Física 2011-11-14

Ciência na República - Jorge Dias de Deus 2011-10-04

**BOLEIM**  
Edição n.4

COLABORAÇÕES



## Bem-vindo

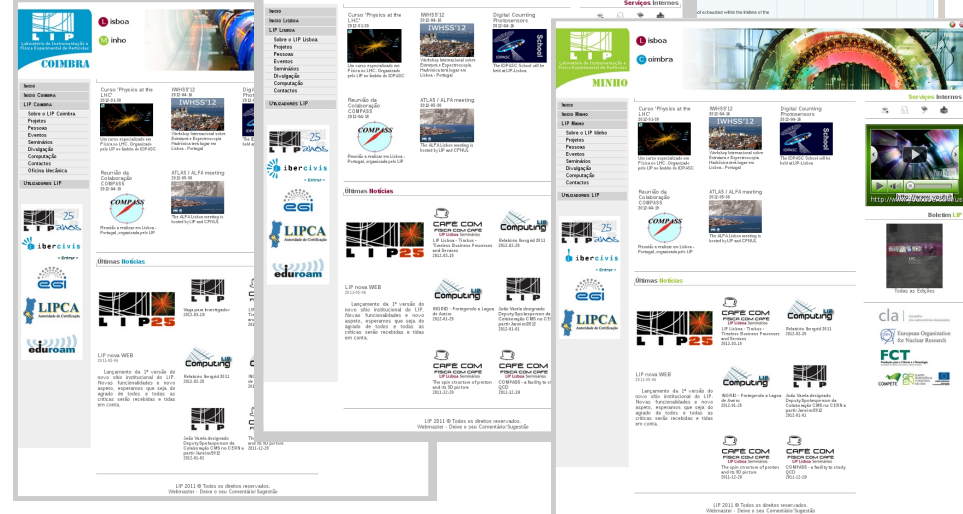
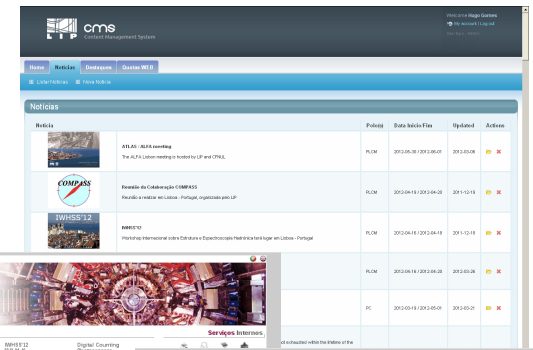
O LIP dá-lhe as boas vindas e convida-o a conhecer o trabalho que tem desenvolvido desde 1986 no campo da Física Experimental de Partículas e da Instrumentação Associada. O LIP tem desempenhado um papel fundamental em grandes colaborações internacionais, e na altura em que comemora 25 anos sobre o seu início, reforça o lugar de Portugal na comunidade científica internacional.

Através do Portal do LIP poderá conhecer as equipas de investigação e os seus projetos, as notícias mais relevantes da área, e as atividades levadas a cabo nas 3 delegações do LIP: Lisboa, Coimbra e Minho.

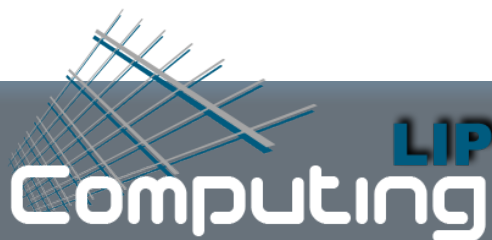
## Seminários



Lisboa



- ✓ LIP web pages were consolidated
- ✓ New public image on the 25th anniversary of LIP
- ✓ LIP Computing fully administrate all the web pages (Coimbra, Lisboa and Minho).
- ✓ Visual identity for the web
- ✓ Content management system



"LIP computing activities"

IT INFRASTRUCTURE

By Nuno Dias



# World Wide Web @ LIP (cont.)

The first screenshot shows the LIP web interface for scholarship management, titled 'Laboratório de Instrumentação e Física Experimental de Partículas'. It features a navigation menu with options like 'Bolsas', 'Correspondência', and 'Imobilizado'. A table lists scholarships with columns for 'Bolsa', 'Nome', 'Projecto', 'Inicio', 'Fim', 'Valor', and 'Actions'.

The second screenshot is the 'CMS PHYSICS WEEK 2012' portal, featuring a large banner image and a sidebar with links to various sections like 'Home', 'Program', 'Registration', and 'Participate'.

The third screenshot is the 'IDPASC' portal, titled 'The International Doctorate Network in Particle Physics, Astrophysics and Cosmology'. It includes a navigation menu, a central content area with a large image, and a sidebar with links to 'Courses', 'Seminars', 'Workshops', and 'Public Sessions'.

## LIP Web team develops and supports a wide range of web services

- ✓ Secretariat Portal
- ✓ Material / Missions Request
- ✓ Events platform with Secretariat Admin panel
- ✓ Conference Room Booking
- ✓ Users Wiki
- ✓ Bulletin (LIP News)
- ✓ Indico (to be updated)
- ✓ Masterclasses
- ✓ CERN Portuguese Teachers School program
- ✓ IDPASC network
- ✓ Ibercivis
- ✓ Portuguese for health Summer School website
- ✓ Education Portal (under development)
- ✓ Publications Portal (under development)

# Other Services @ LIP

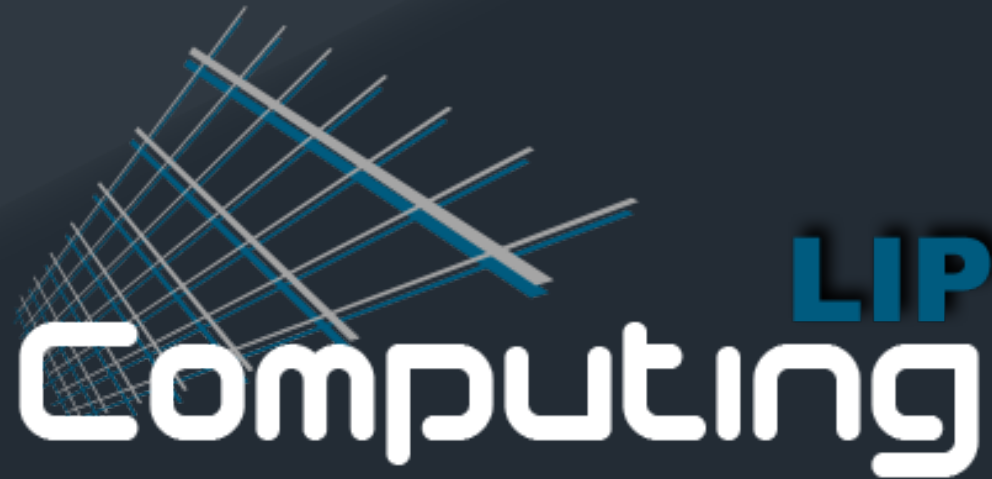
- ✓ LIPCA (Certificates)
- ✓ E-Mail/Webmail
- ✓ Mailing Lists
- ✓ Users webpages
- ✓ NFS Servers (homes, soft)
- ✓ DHCP (connectivity)
- ✓ DNS
- ✓ Desktops/Laptops (support)
- ✓ Login cluster
- ✓ Interactive cluster (Fermi)
- ✓ Printers
- ✓ Video-conference systems

- ✓ Graphic design  
(cards, flyers, brochures and posters)
- ✓ Security
- ✓ Intranet
- ✓ MySQL DB Cluster
- ✓ DB replication of Coimbra "Projects DB" to LIP-Lisbon
- ✓ Migration of some of the websites databases to the new cluster

## Under development

- ✓ Cloud
- ✓ LDAP
- ✓ Single Sign-on

**Questions?**



LIP Computing Activities

# Worldwide LHC Computing Grid

Portuguese Tier2  
Atlas and CMS



# Portuguese federated Tier2

- Portuguese federated distributed computing facility:
  - LIP-Lisbon – supporting ATLAS and CMS
  - LIP-Coimbra– supporting ATLAS
  - NCG-INGRID-PT– National Grid Centre:
    - Supporting ATLAS, CMS and many other User Communities.
- Integrated into the WLCG through the Ibergrid and EGI grid infrastructures.
  - Fraction of computing power delivered per site

Site	LIP-Lisbon	LIP-Coimbra	NCG
Fraction % (Nov 09 – Mar 12)	29	13	58

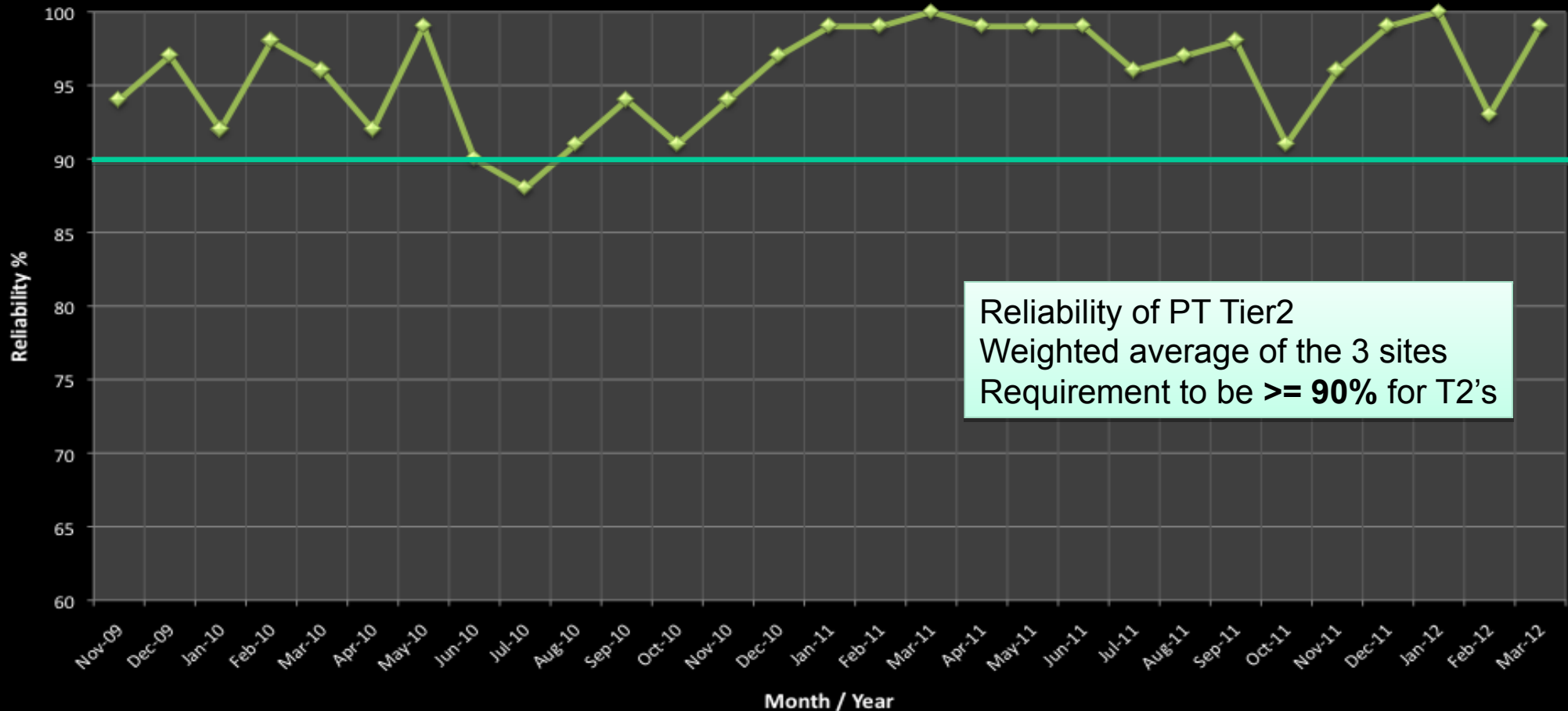
# Portuguese federated Tier2

- Portuguese funding agency (FCT) signed in 2006, an MoU with CERN to deploy and operate a Tier 2 for ATLAS and CMS.
- WLCG pledges (2011-2013):
  - Storage:
    - 220 TB for ATLAS + 200 TB for CMS
  - Computing:
    - 3200 HEP-SPEC06 ATLAS + 3200 HEP-SPEC06 for CMS
    - HEPSPEC06 (HS06) – benchmark agreed upon to measure the CPU power. 1 Intel Xeon 54 or 55 family - 9 to 14 HS06.
  - Local ATLAS and CMS users have additional Tier-3 capacity for local analysis not in Tier-2 pledges.

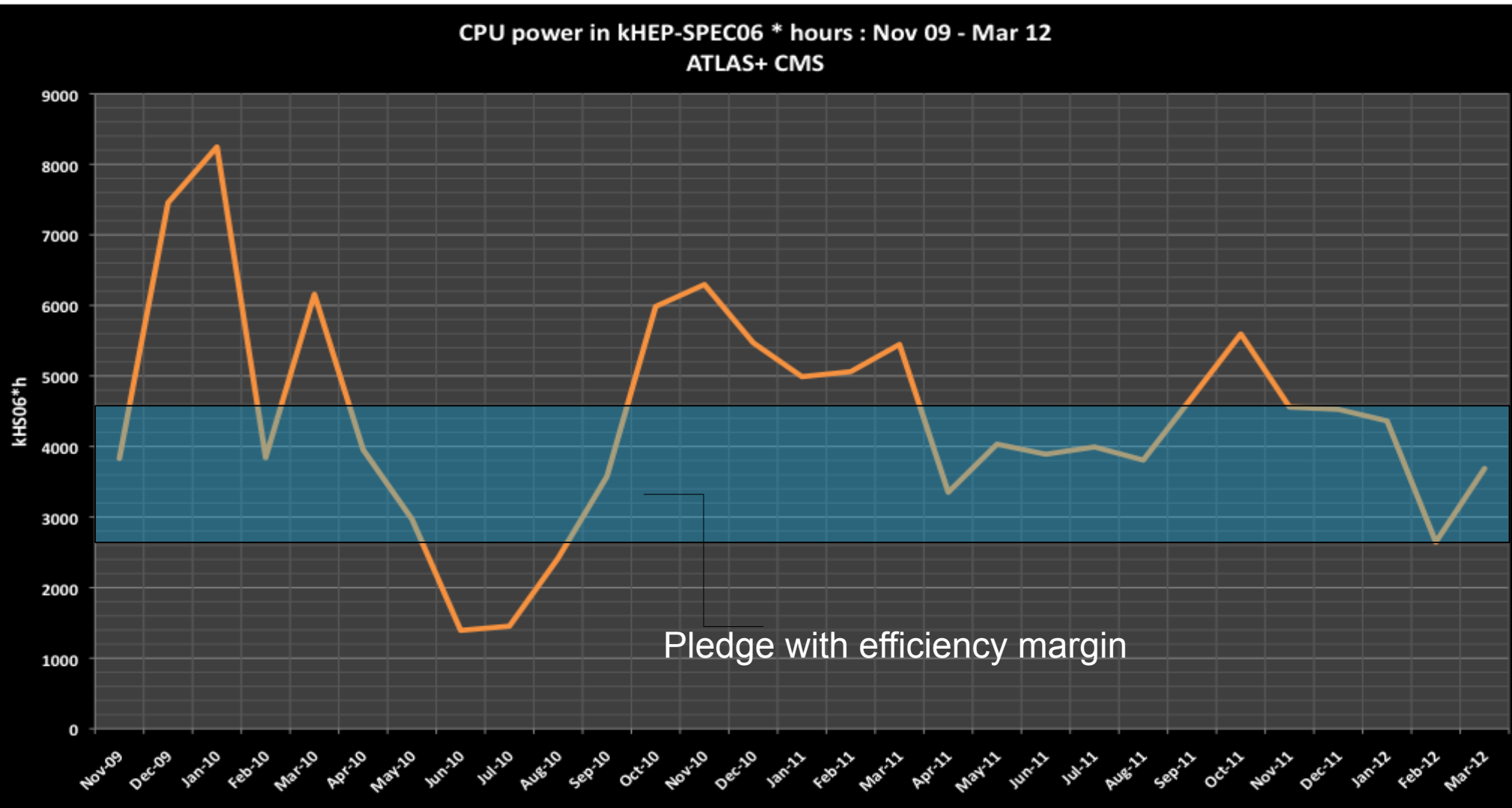


# Performance - overall

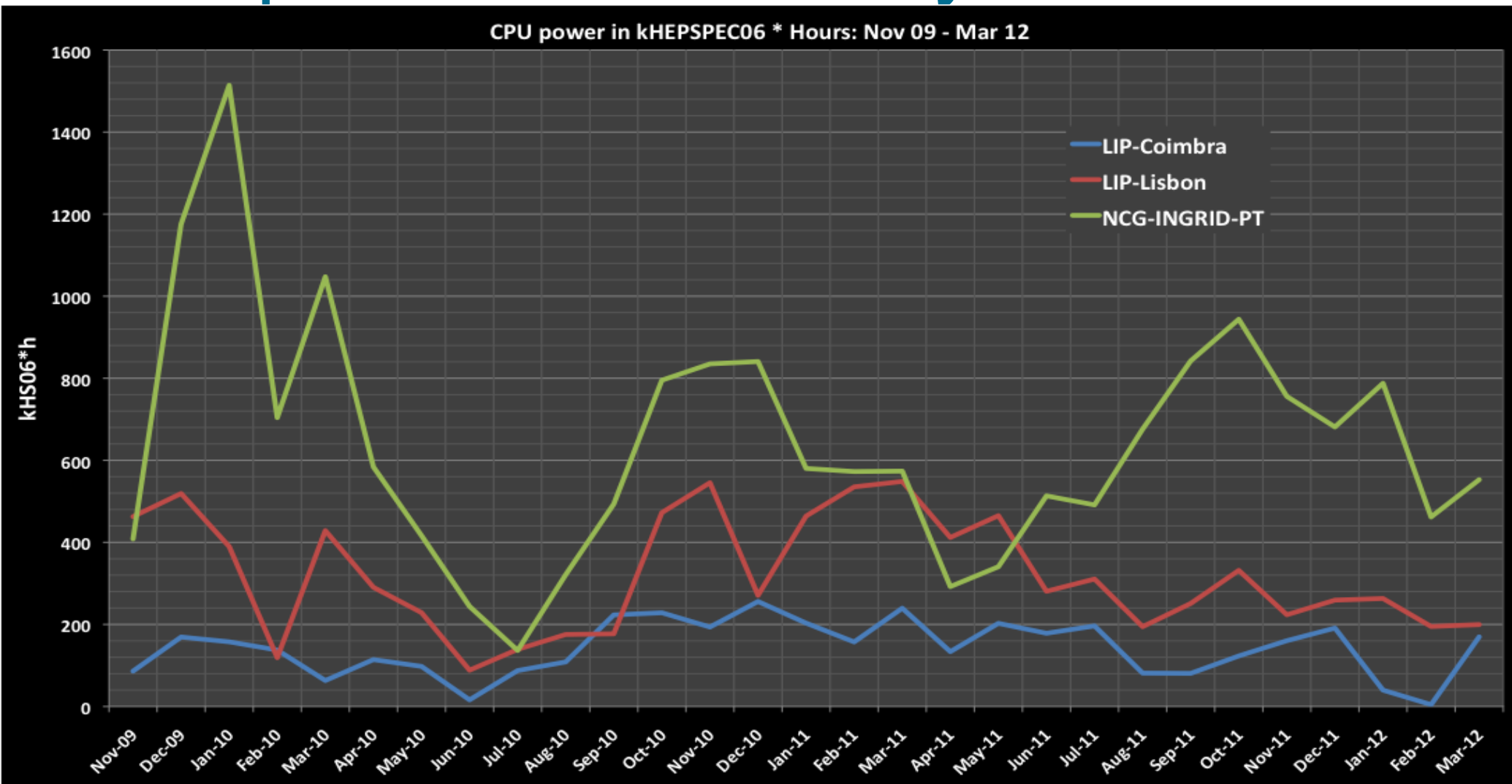
Average PT Tier 2 reliability per month: Nov 09 - Mar 12



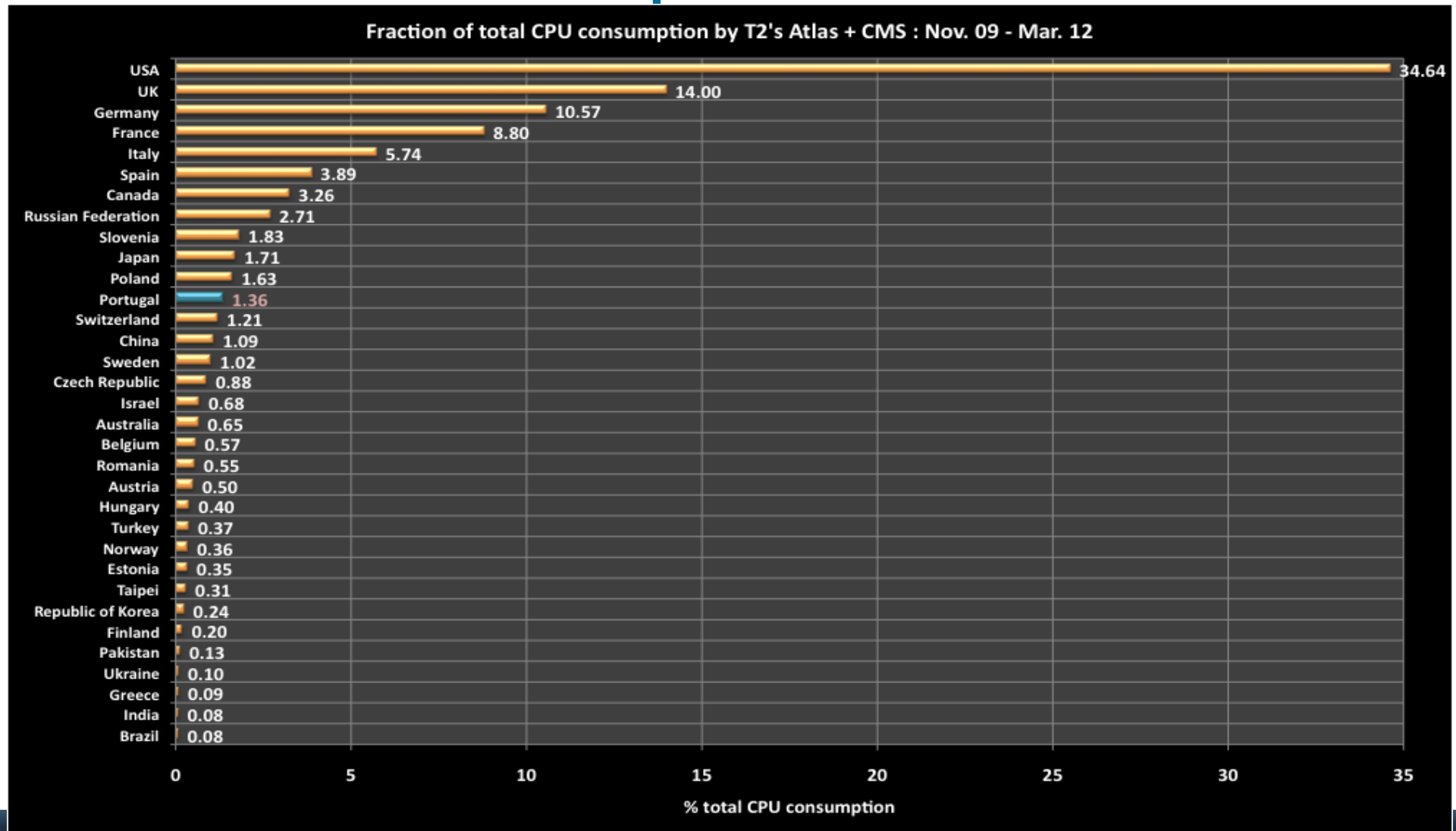
# CPU power delivered by PT T2



# CPU power delivered by each site



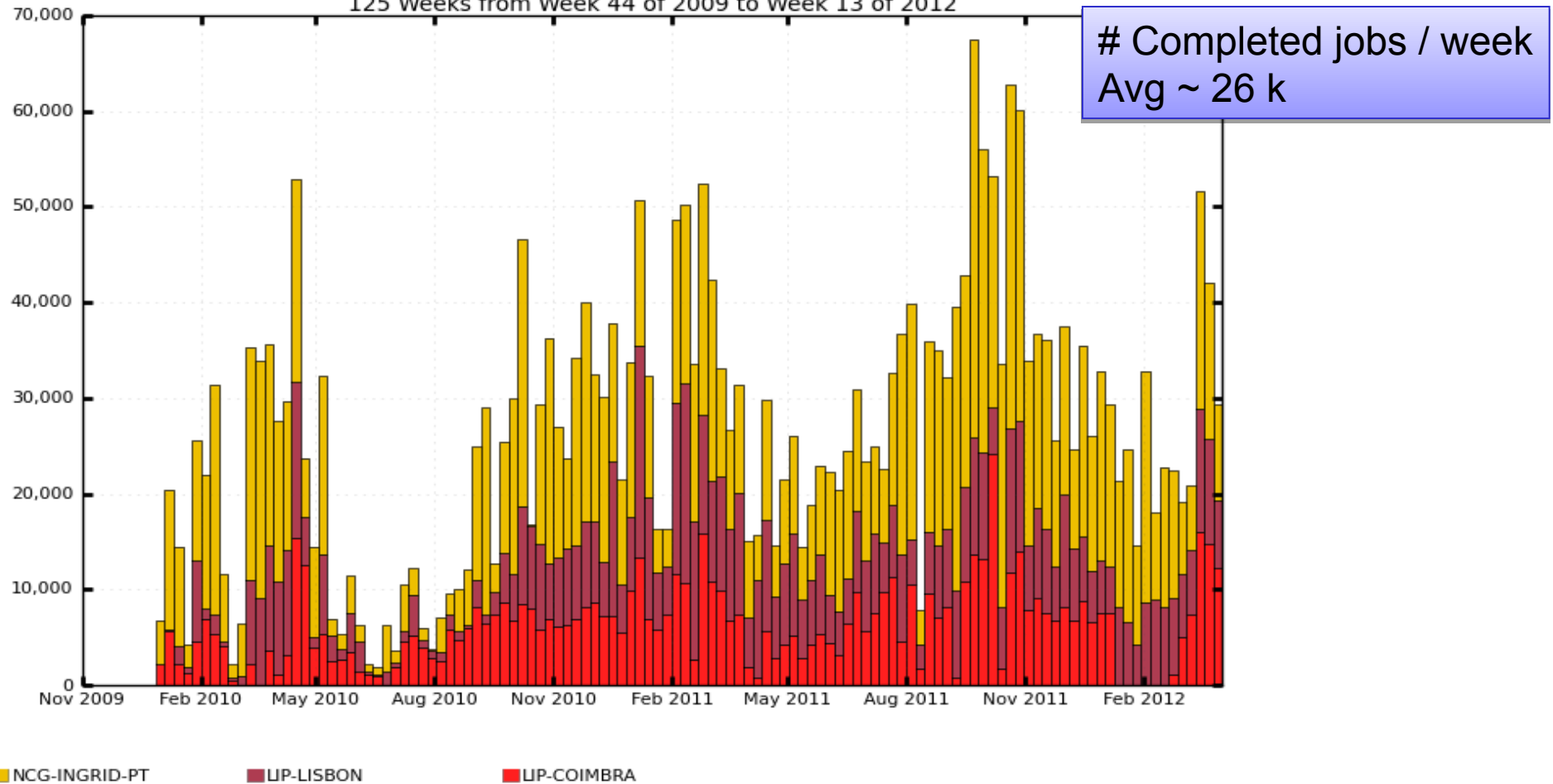
# % of Total CPU power – Tier2's



# ATLAS (Nov 09 – Mar 12)

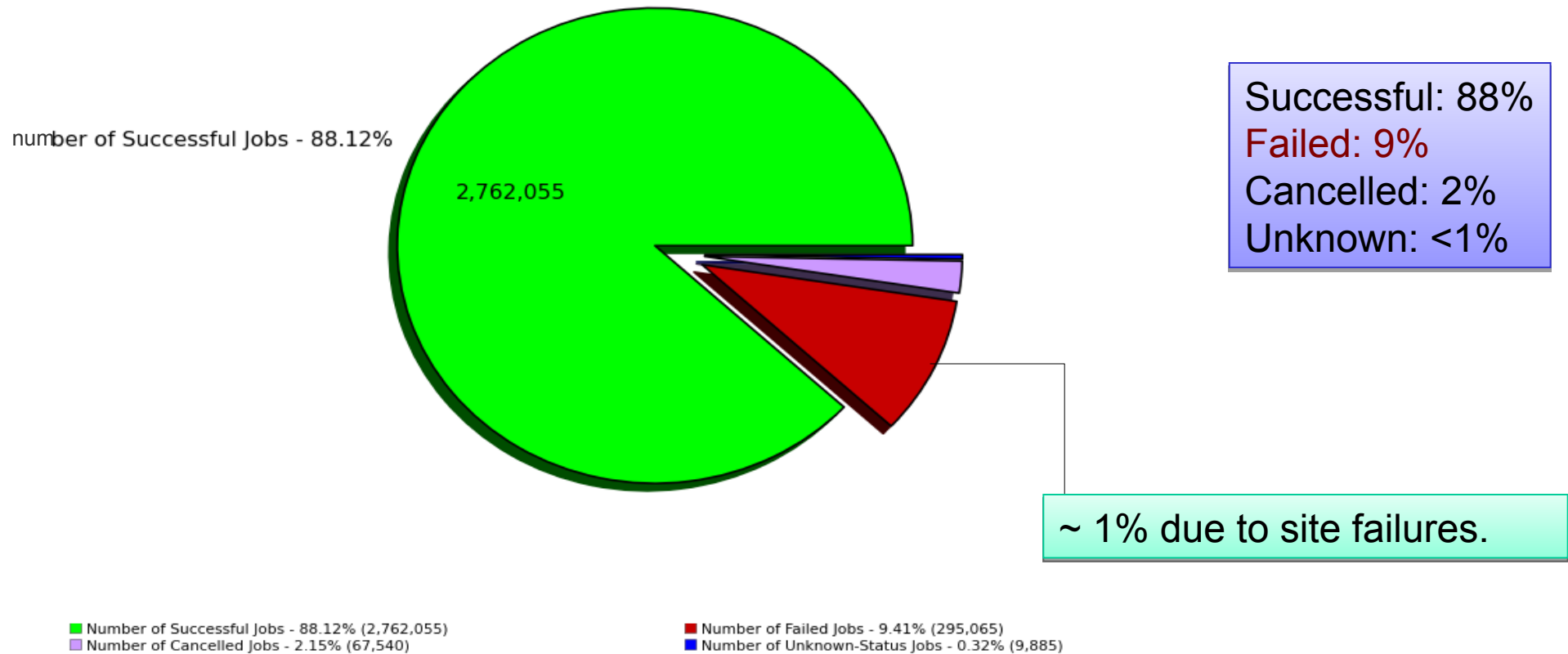
## Completed jobs

125 Weeks from Week 44 of 2009 to Week 13 of 2012



# ATLAS (Nov 09 – Mar 12)

Number of Successful and Failed Jobs (Pie Graph) (Sum: 3,134,545)

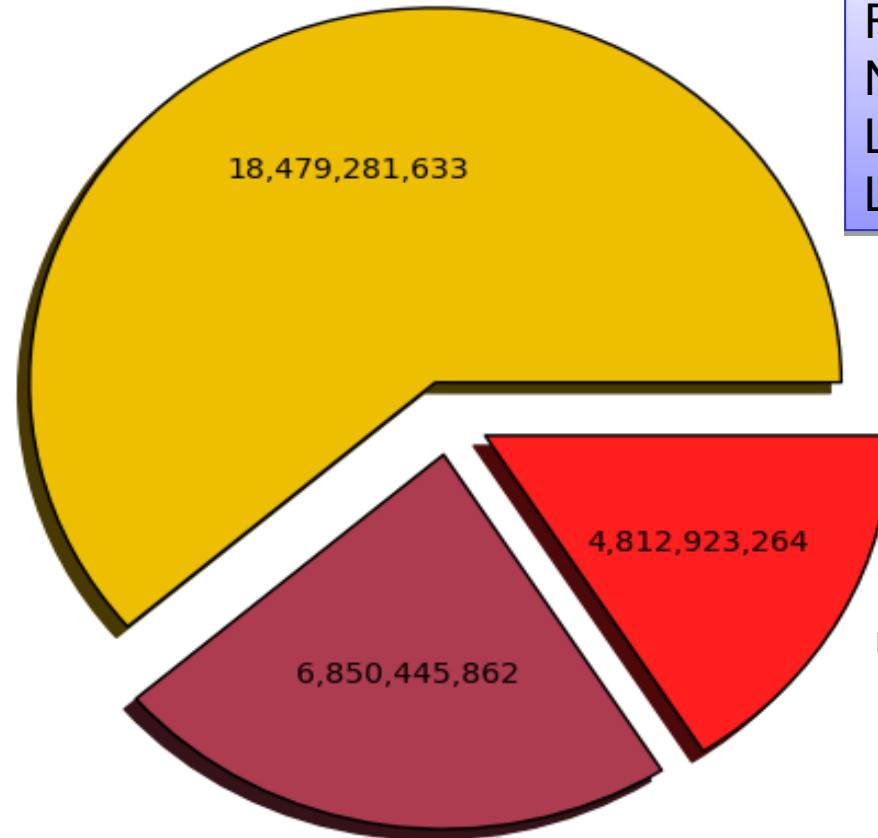




# ATLAS (Nov 09 – Mar 12)

CPU consumption Good Jobs in seconds (Pie Chart) (Sum: 30,142,650,759)

NCG-INGRID-PT - 61.31%



Fraction of CPU consumption:  
NCG: 61%  
LIP-Lisbon: 23%  
LIP-Coimbra: 16%

LIP-LISBON - 22.73%

LIP-COIMBRA - 15.97%

■ NCG-INGRID-PT - 61.31% (18,479,281,633)  
■ LIP-COIMBRA - 15.97% (4,812,923,264)

■ LIP-LISBON - 22.73% (6,850,445,862)

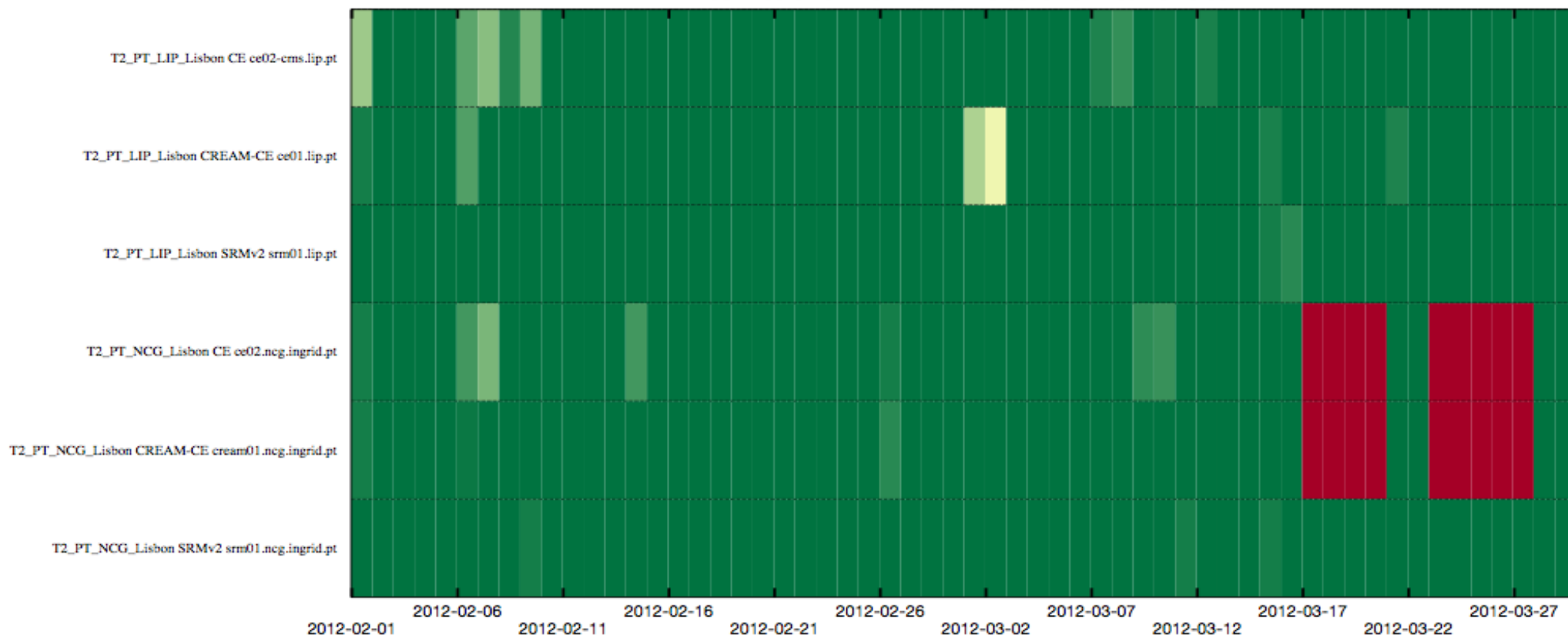
WLCG

By Mário David

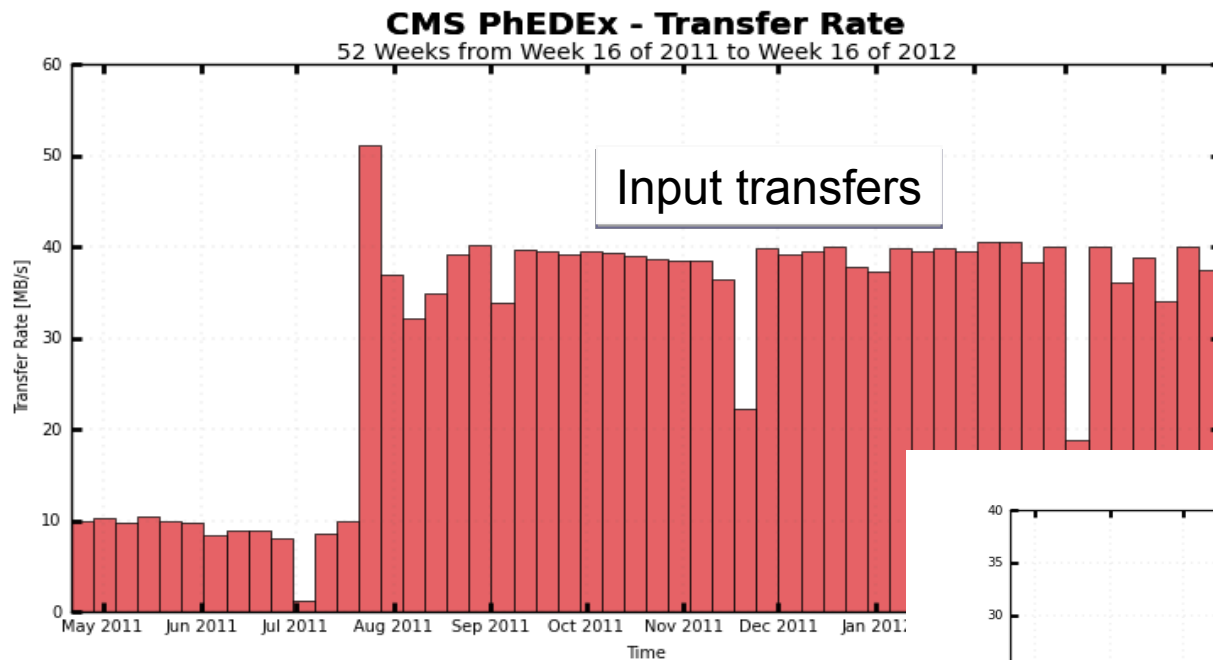
# CMS: NCG and LIP services reliability: Feb 12 – Mar 12

## Service reliability using CMS\_CRITICAL\_FULL

1391 hours from 2012-01-31 23:00 to 2012-03-29 23:00

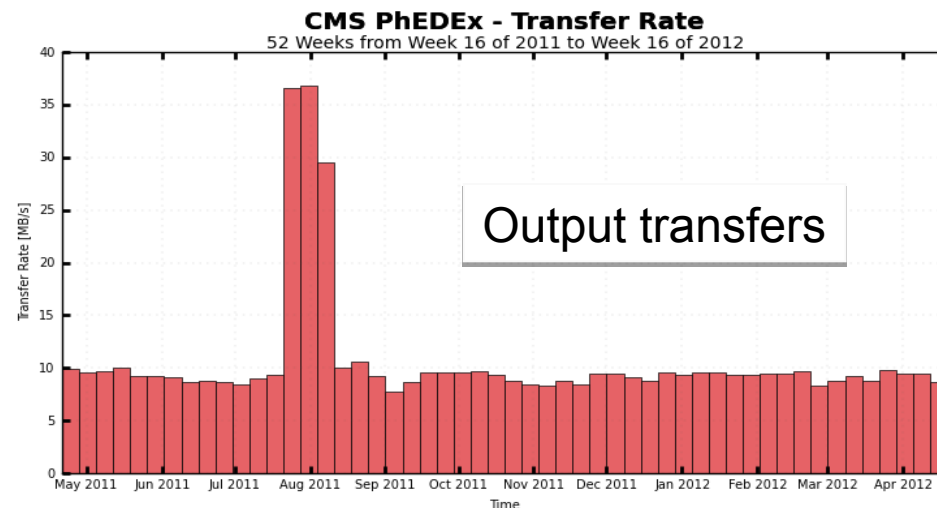


# CMS: Phedex Debug instance



Sustained transfers during long period of time.

NCG: May 11 – Apr 12

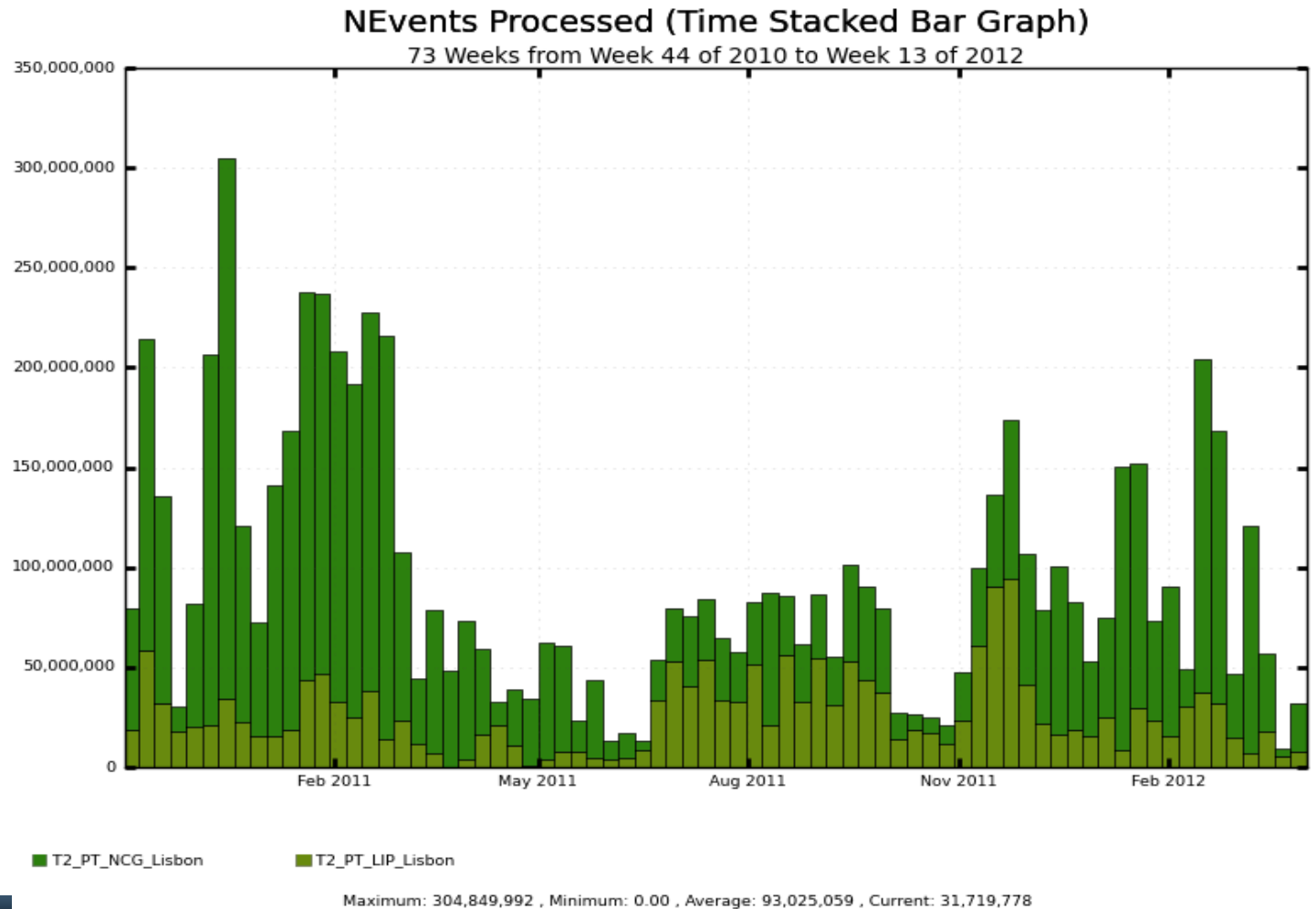


T2\_PT\_NCG\_Lisbon

Maximum: 36.76 MB/s, Minimum: 7.72 MB/s, Average: 10.65 MB/s, Current: 8.62 MB/s

# CMS (Nov 10 – Mar 12)

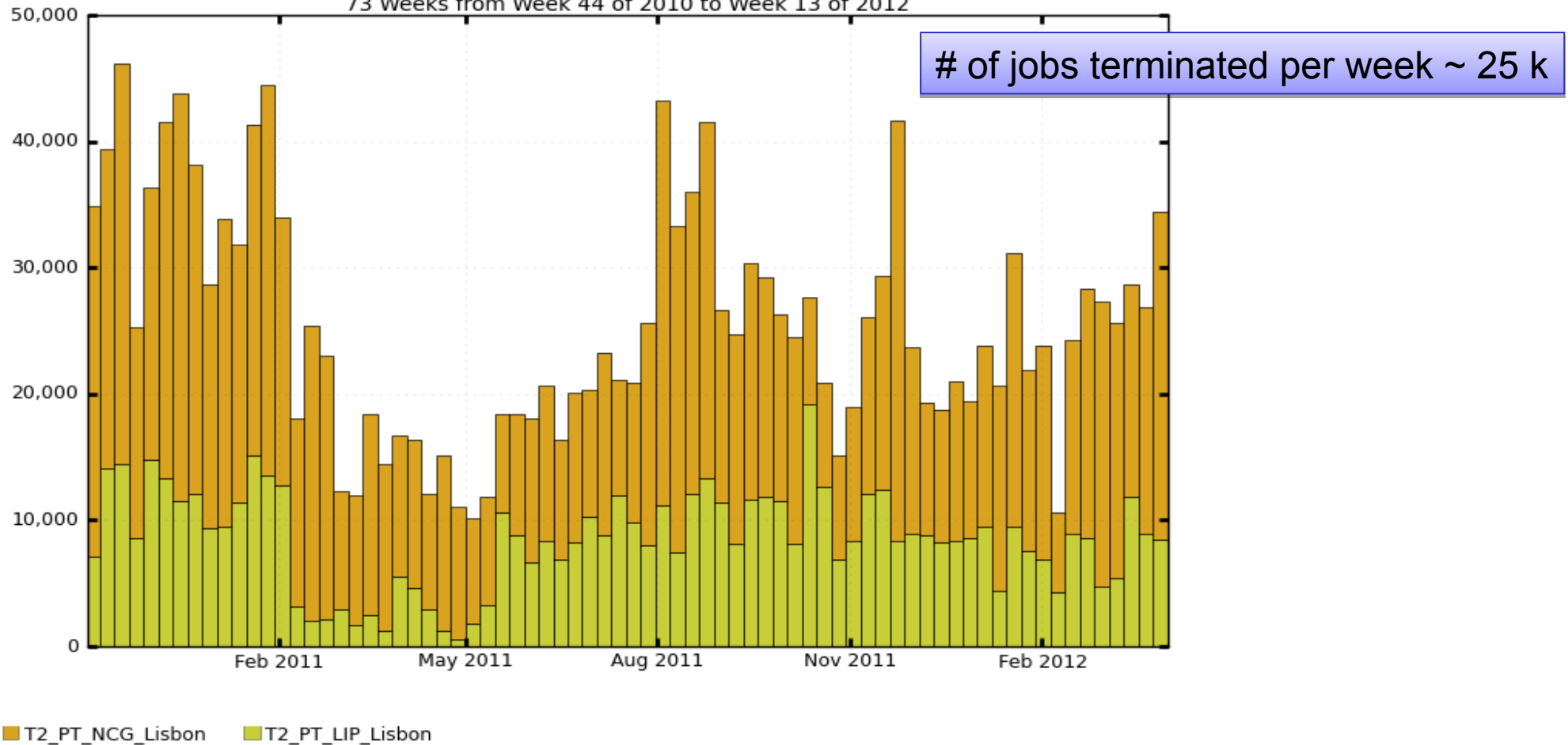
# of events processed  
per week ~ 93 M



# CMS (Nov 10 – Mar 12)

## Terminated jobs

73 Weeks from Week 44 of 2010 to Week 13 of 2012



Maximum: 46,158 , Minimum: 0.00 , Average: 25,141 , Current: 34,459

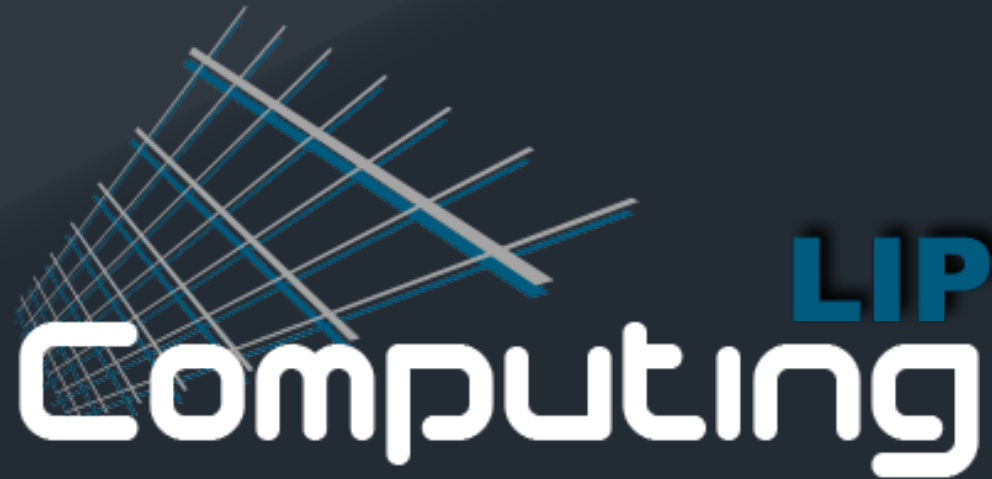
# Thoughts - Conclusions

- Sites running well in the last years.
- Grid MW has become sufficiently stable – reflected in previous point.
- Local services:
  - Grid Engine as batch system and Lustre for storage have proven to be good choices:
  - Stable, scalable and robust.
- HW also OK (LIP), at NCG a bit more problematic from time to time.

# Thoughts - Future

- Resources may become problematic:
  - Human resources – due to the “Ciência 2007 / 2008” FCT contracts ending in 2013 and 2014.
  - Electrical power cost growing:
    - Increase of TVA.
    - Increase of fixed costs (ERSE).
  - HW: support contracts ending this year – failures of components will be hard/expensive to replace.
    - Setting some currently active/production HW aside for spares.
- We have applied to FCT call for projects:
  - Partially replace Grid storage systems at LIP.
  - Partially cover operational costs.





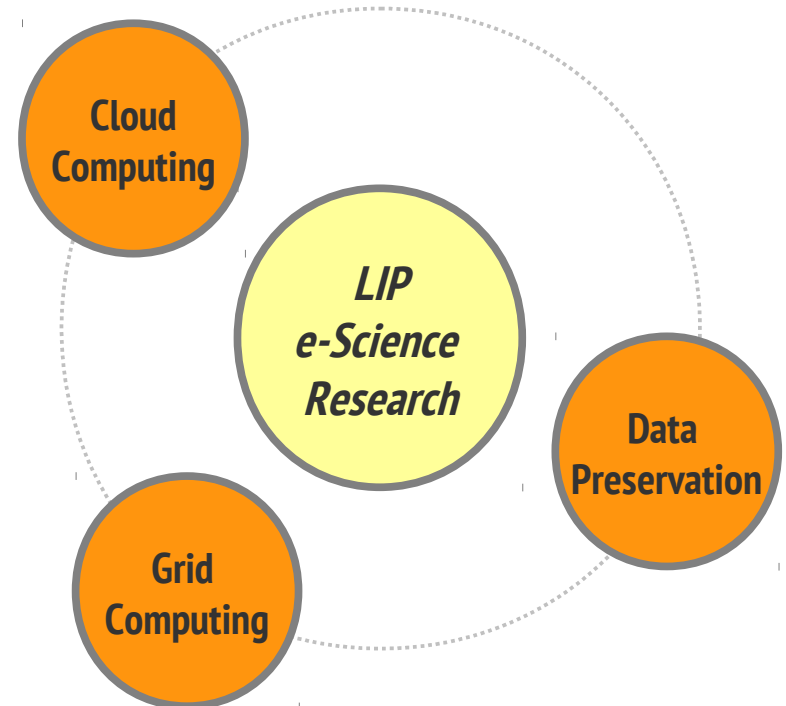
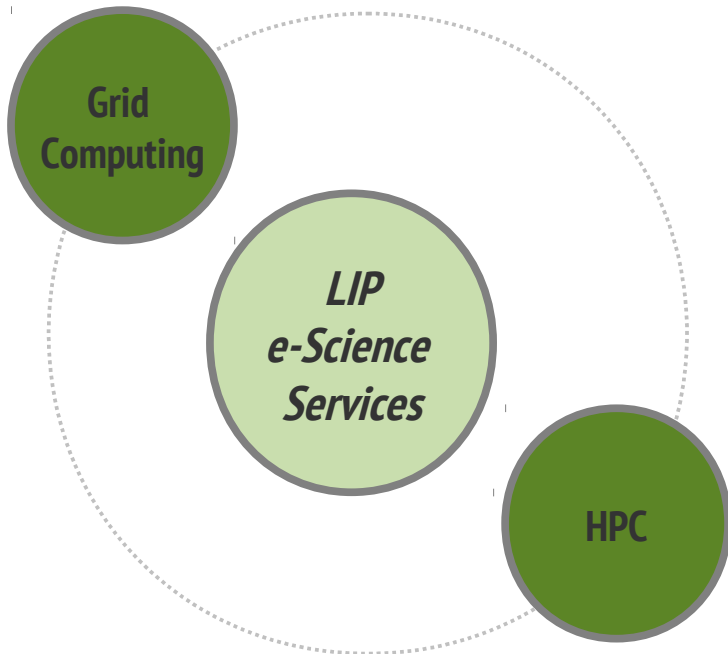
LIP Computing Activities

# e-Science Activities

Research and Services for enhancing  
science



# e-Science activities Overview

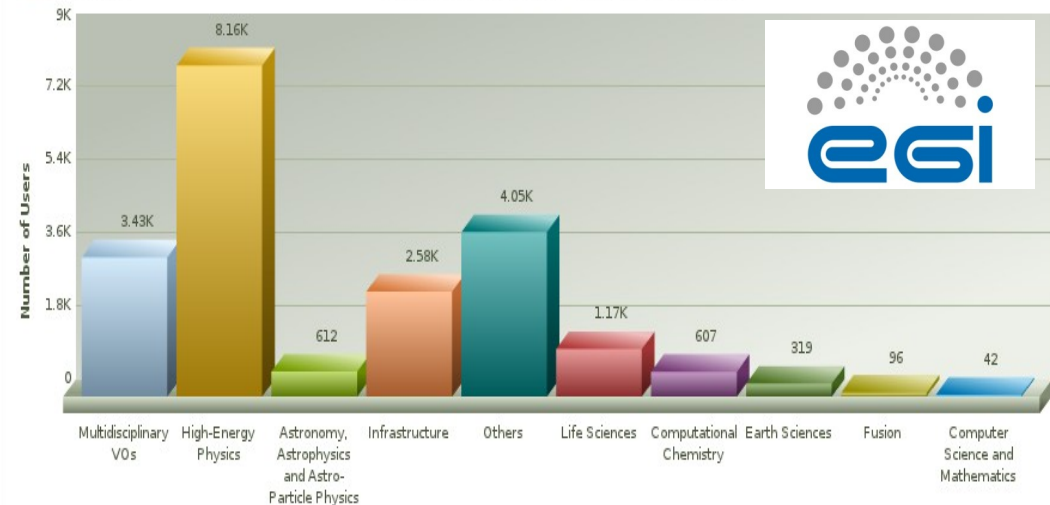


# Grid Computing, <sub>EGI</sub>



User Distribution per Discipline - Click on the column for more details

Generation Date : 2012-04-16T12:48:46+02:00



- **42 Countries**
- **Resource Centres**
  - 323 EGI
  - 108 supporting MPI (+12.5%)
- **271,000 Logical CPUs (cores)**
  - +13% since April 2011
- **122 PB disk and 128 PB tape**

- **232 Virtual Organisations**
- **21,126 VO members**
  - +13.5% since April 2011
- **1,264,922 jobs/day**
  - +32% since April 2011
- **3.6M non-HEP jobs/month**
  - +17.35% since April 2011

“Federation of Computer resources from multiple administrative domains to reach a common goal”

# Grid Computing, IBERGRID



## Portugal:

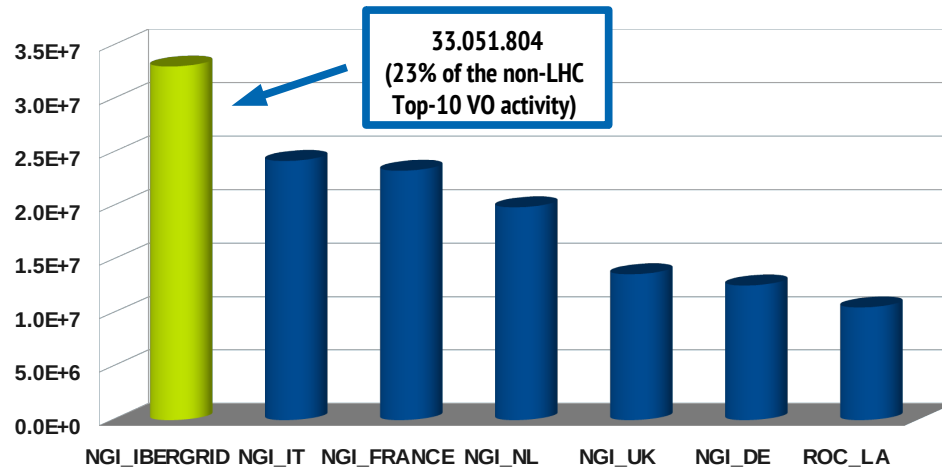
- Logical CPUs (cores)
  - 2,126
  - 17,514 HS06
- 638 TB of Storage



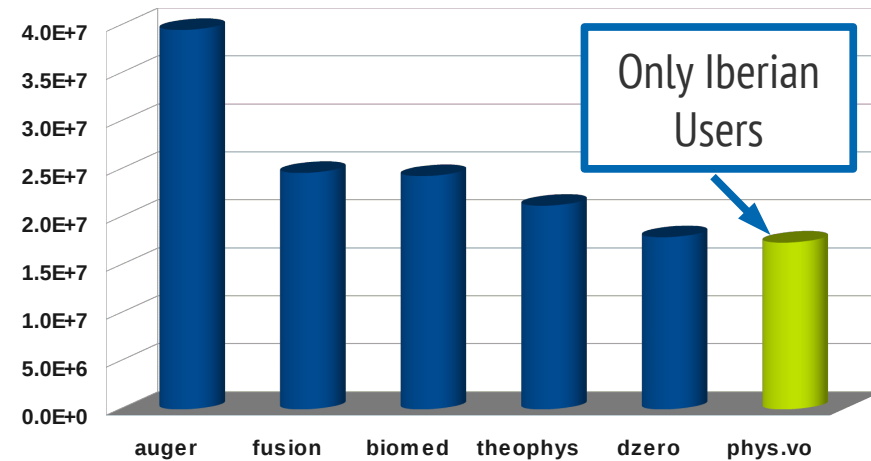
## Spain:

- Logical CPUs (cores)
  - 15,696
  - 16,0647 HS06
- 11,460 TB of Storage
- 5,922 TB of Storage Tape

Normalized CPU time for top 10 non-LHC VOs  
(HS06 hours since Jan 2012)



Normalized CPU Time for Top 10 non-LHC VOs  
(HS06 hours since Jan 2012)

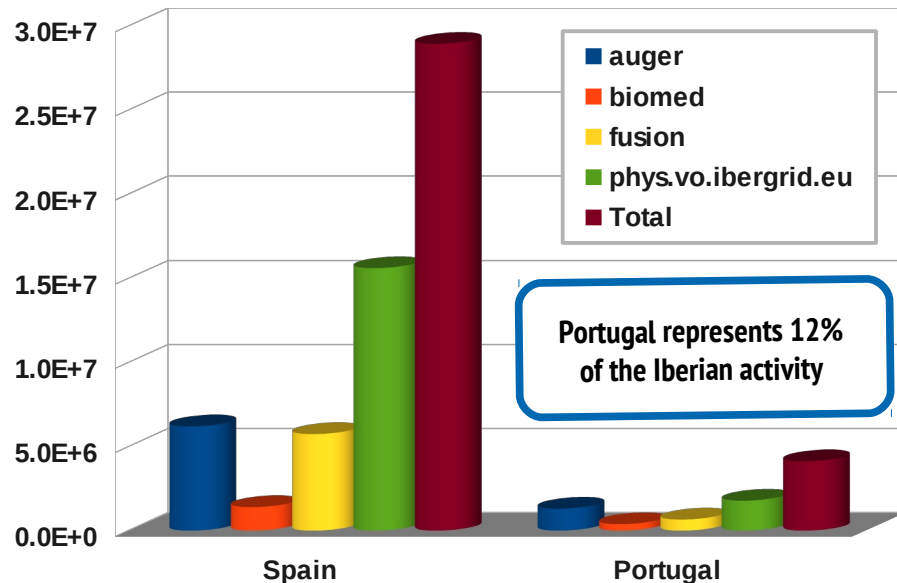


# Grid Computing, INGRID

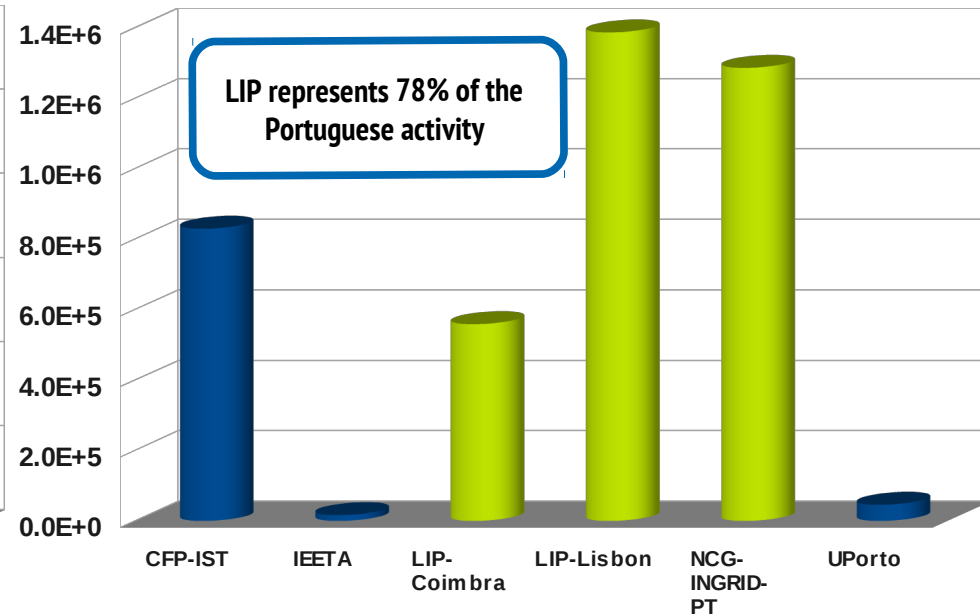
- 7 Resource Centres
- LIP (Lisbon, Coimbra and NCG)
- 78% of the PT activity excluding LHC VOs



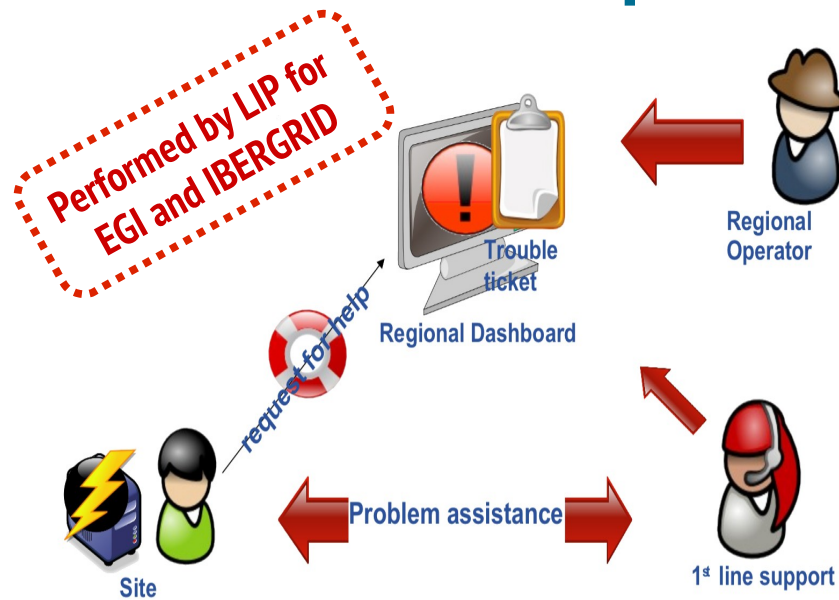
Normalized CPU Time for Top-10 non LHC VOs  
(HS06 hours since Jan 2012 - NGI\_IBERGRID)



Normalized CPU Time for Top 10 non-LHC VOs  
(HS06 hours since Jan 2012 - PORTUGAL)



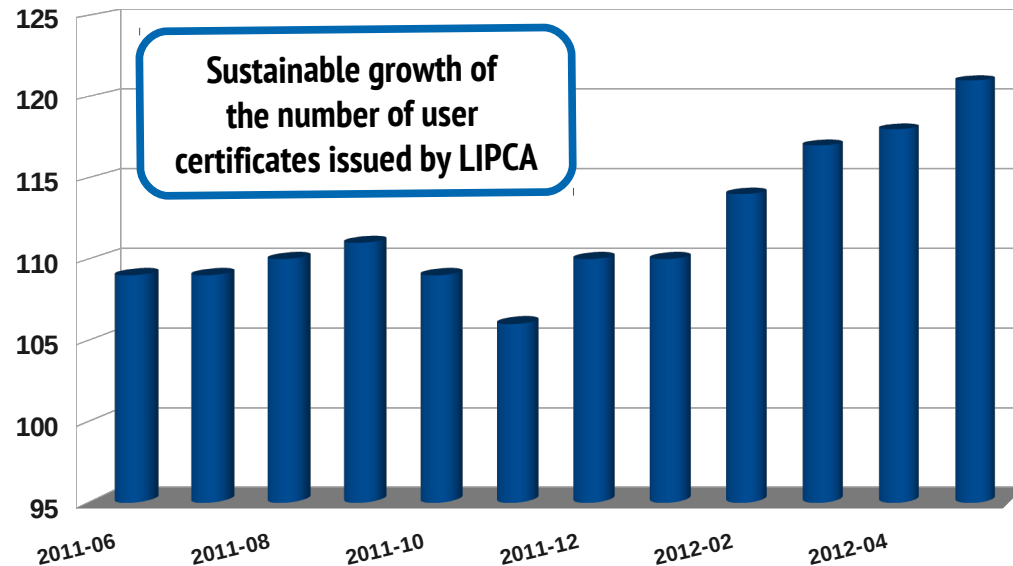
# Grid Computing, National Services



## ○ Coordination of operations

- Operation of central grid services and tools for EGI and IBERGRID
- Support users and administrators

Portuguese CA Users



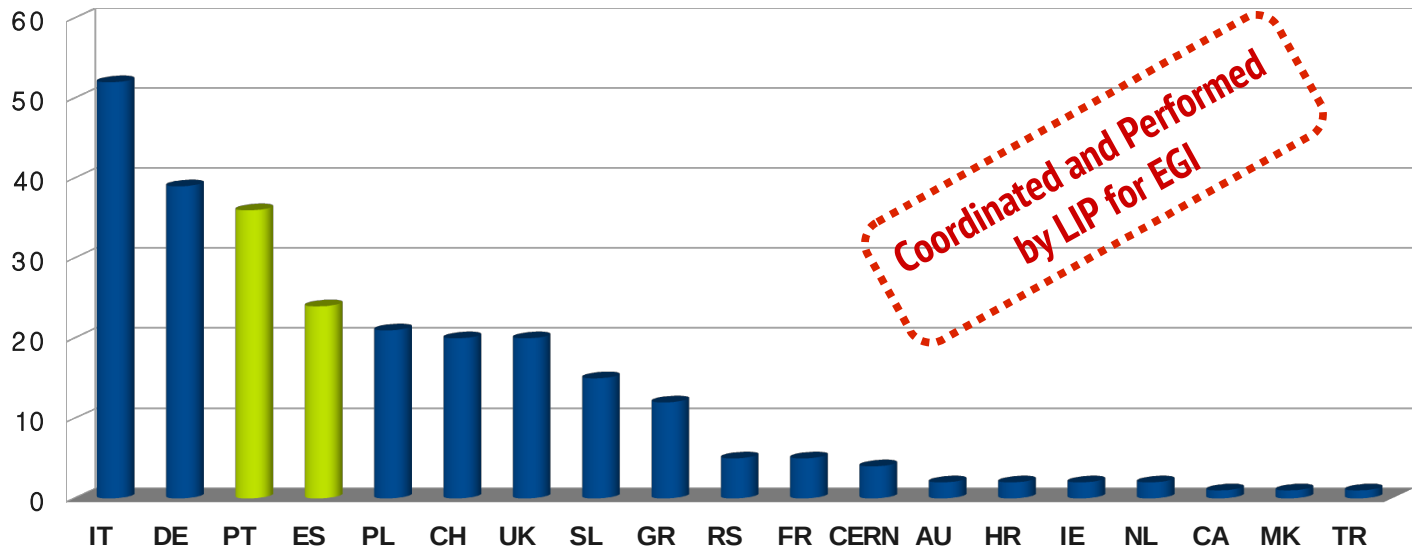
- LIPCA: Management of X509 certificates



# Grid Computing, Global Services

- Coordination of Stage Rollout (SR) in EGI infrastructure
  - SR is a process whereby Early Adopter sites are the first ones to deploy new middleware services into production
  - 6 UMD Releases with more than 70 updates tested by Early Adopters

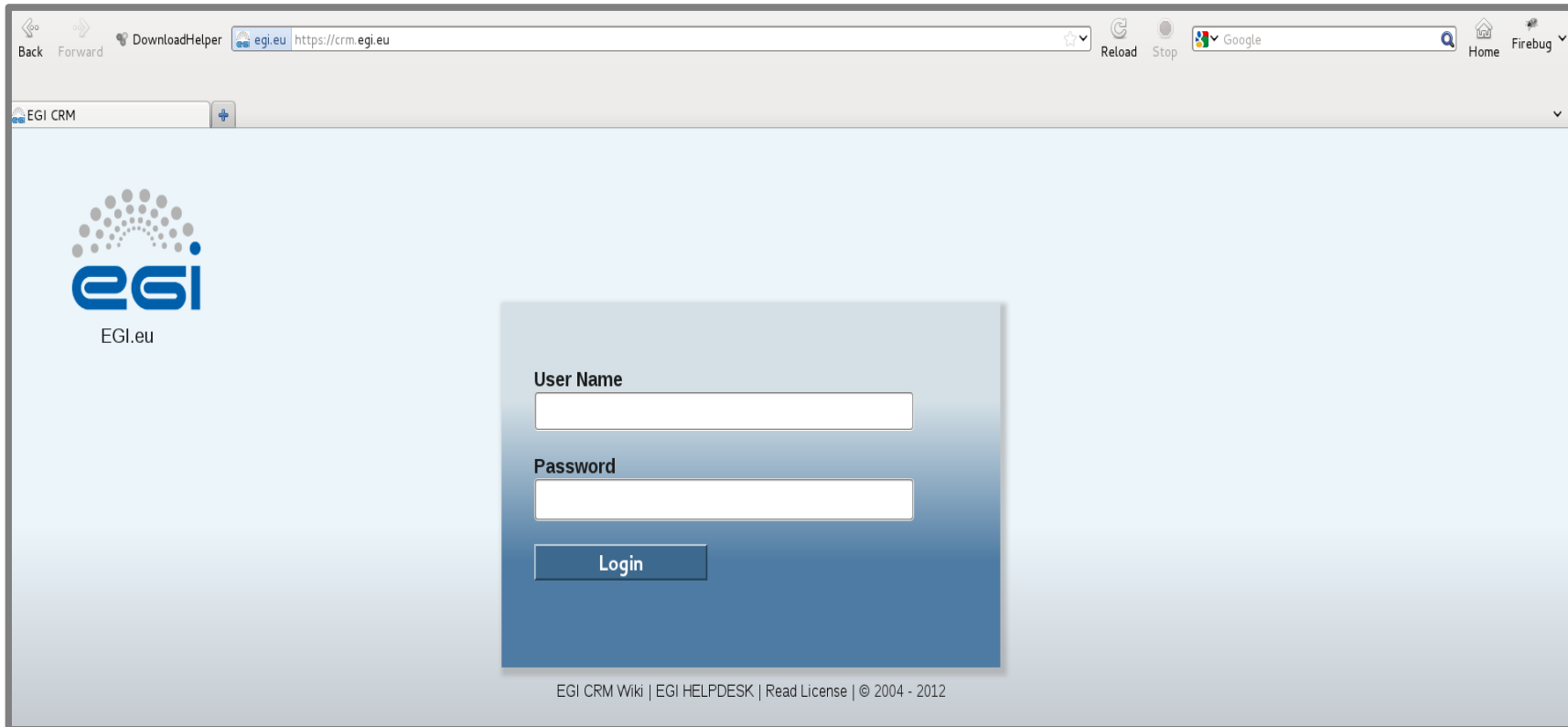
Number of SR products per NGI





# Grid Computing, Global Services

- Operation of the EGI Client Relationship Management Tool
  - Manage EGI user community information and register possible leads



“Federation of Computer resources from multiple administrative domains to reach a common goal”

# Grid Computing, Global Services

- Operation of the EGI Client Relationship Management Tool
  - Manage EGI client information and register possible leads

**EGI CRM**  
Operated and Customized by LIP for EGI

Search for  in

Showing Records 1 - 25 of 651

<input type="checkbox"/>	Account Name	Account Type	Project List	Scientific Discipline	Status	Assigned To
<input type="checkbox"/>	European Extremely Large Telescope	ESFRI Project	ESFRI:E-ELT	Physical Sciences and Engineering	Active	EGI Group Management
<input type="checkbox"/>	Neutron Scattering and Muon Spectroscopy...	ESFRI Project	ESFRI:NMI3-II	Analytical Facilities and Material Scien...	Active	EGI Group Management
<input type="checkbox"/>	Collaborative European Digital/Archival ...	ESFRI Project	ESFRI:CENDARI	Social Sciences & Humanities	Active	EGI Group Management
<input type="checkbox"/>	Infrastructure for Systems Biology-Europ...	ESFRI Project	ESFRI:ErasyBio/ISBE	Biological and Medical Sciences	Active	EGI Group Management
<input type="checkbox"/>	European Plant Phenotyping Network	ESFRI Project	ESFRI:EPPN	Life Sciences	Active	EGI Group Management
<input type="checkbox"/>	Building data bridges between biological...	ESFRI Project	ESFRI:BioMedBridges	Life Sciences	Active	EGI Group Management

“Federation of Computer resources from multiple administrative domains to reach a common goal”

# Grid Computing, Other Services

**Regional Operations Portal Dashboard**  
(operated and customized  
at LIP for EGI and IBERGRID)

Actions	Node status	Node name	Last status	Exec date	Alarm age	Details
	●	wms02.pic.es	critical	Tue Apr 17 16:02:38 WEST 2012	6	
	●	wms01.pic.es	critical	Tue Apr 17 16:27:25 WEST 2012	6	

Close selected alarms

“Federation of Computer resources from multiple administrative domains to reach a common goal”

# Grid Computing, Other Services

The screenshot shows the VO Admin Dashboard interface. At the top, there's a header with "NCG-INGRID-PT" and "NO CENTRAL GRID - LIP/FCCN/LN". Below this, a red dashed box highlights the "VO Dashboard" title and the text "(developed by LIP and operated for EGI and IBERGRID)". The interface includes a "Choose VO" dropdown menu, a "Last release: Release 3.1 - 2011-10-10" section, and a list of updates. A user profile for "Goncalo Borges" is visible in the top right corner. The bottom right corner of the dashboard shows links for "APP DB", "my EGI", "voms admin", and "RT".

**VO Dashboard**  
(developed by LIP and operated for EGI and IBERGRID)

VO: Choose VO ....

**VO Admin Dashboard**

**Last release:** Release 3.1 - 2011-10-10

- Bug fixed for VO sources. When a application disappeared from the Admin panel. Administrators could not insert new links to it or even delete it.
- Updated form to insert VO sources links. The user must now write the full link with the protocol type included (<http://> or <https://>).

For further details, please consult the VO Admin Dashboard user guide: [https://wiki.egi.eu/wiki/VO\\_Services/VO\\_Admin\\_Dashboard](https://wiki.egi.eu/wiki/VO_Services/VO_Admin_Dashboard)

“Federation of Computer resources from multiple administrative domains to reach a common goal”

# Grid Computing, Other Services

The image shows a screenshot of the Ibergrid Wiki dashboard and its administrative interface. The top part of the dashboard features the 'IBERGRID wiki' logo and a world map. Below this, there are navigation links for 'RecentChanges', 'FindPage', and 'HelpContents'. The main content area is titled 'USP' and lists various resources under 'Contents', including 'User Support Homepage', 'User VO Registration', 'VO Resources', and 'VO Activity'. A sidebar on the left contains a 'VO Admin Dashboard' with a 'Last release: Release 3.1 - 20...' and a list of updates. The top of the dashboard shows a 'Choose VO' dropdown and a search bar. The bottom of the dashboard has a 'New NAG' section with a 'Close s' button. The overall interface is designed for managing virtual organizations and providing user support.

Dashboard

ashboard  
Virtual Organizations  
admin

VO: Choose VO ....

IBERGRID wiki

RecentChanges FindPage HelpContents

USP

OPS/FAQs FrontPage OPS USP

Contents

1. User Support Homepage
  1. Ibergrid Macro VOs
2. User VO Registration
  1. User questionnaire
  2. Request VO Membership
  3. Accept VO Acceptable User Policy
3. VO Resources
4. VO Activity
  1. Summarized View

Operations

- ▶ FAQs
- ▶ Technical Documents
- ▶ Deliverables
- ▶ Presentations
- ▶ Project reports
- ▶ Meetings
- ▶ Agendas
- ▶ Minutes
- ▶ Publications
- ▶ Other

User Support

- ▶ FAQs

VO Admin Dashboard

Last release: Release 3.1 - 20...

- Bug fixed for VO sc...
- Updated form to ins...

For further details, please c...

Search: [ ] Titles Text

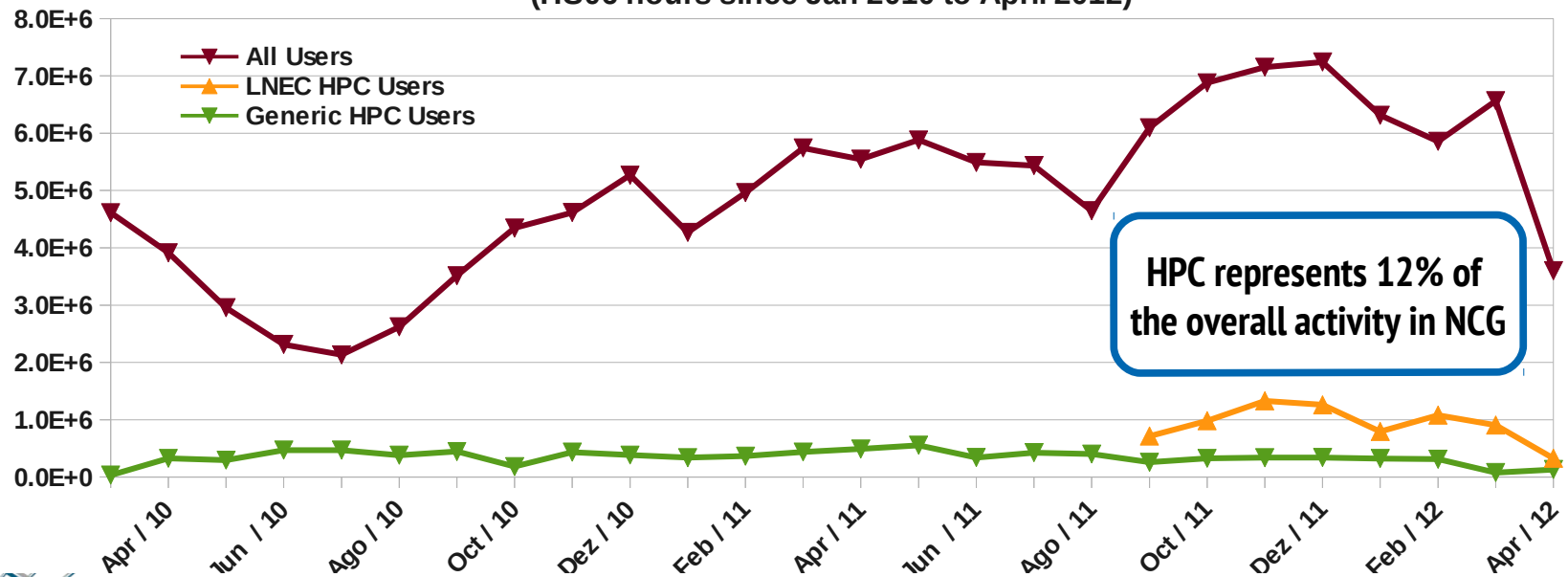
goncalo Settings Logout

IBERGRID WIKI  
(customized and operated for IBERGRID)

# HPC Service, INGRID

- For researchers with low latency requirements for parallel jobs:
  - NCG resources with infiniband (8 Gbps) interconnect
  - NCG resources with Gigabit Ethernet (1Gbps) interconnect
  - LNEC resources with Gigabit Ethernet (4Gbps) interconnect

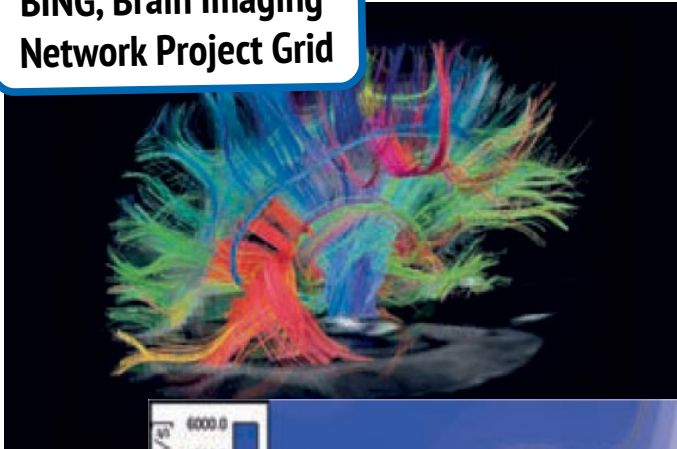
Normalized CPU Time for HPC activities at NCG  
(HS06 hours since Jan 2010 to April 2012)



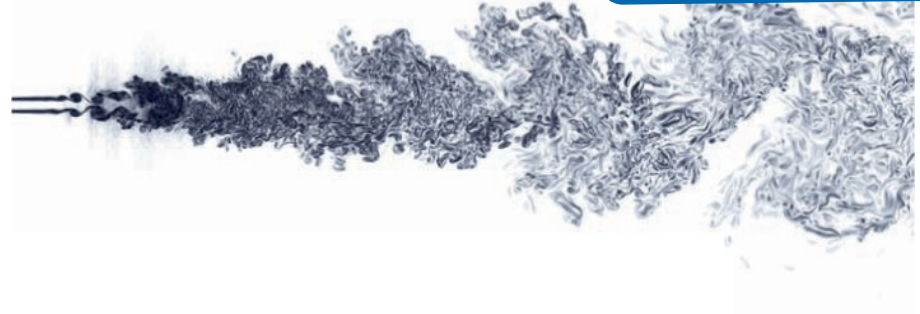


# Grid Computing & HPC, Applications

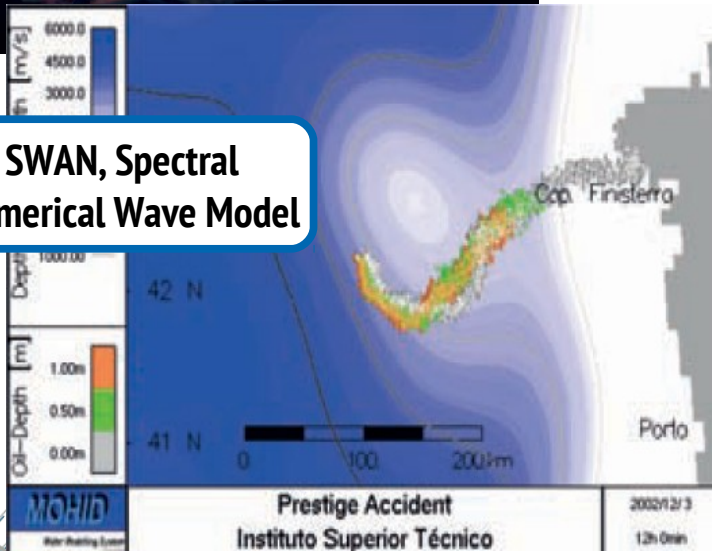
**BING, Brain Imaging  
Network Project Grid**



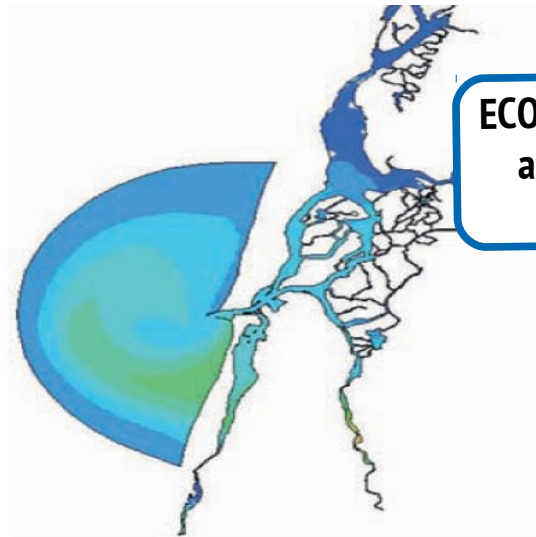
**PJET, Simulation of  
turbulent plane jet**



**SWAN, Spectral  
Numerical Wave Model**

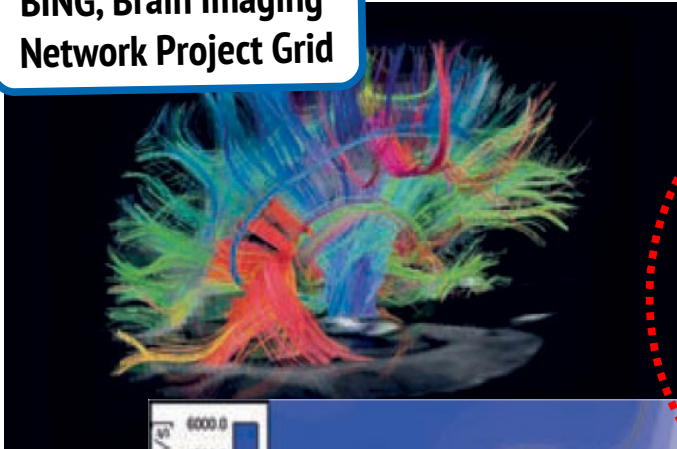


**ECO-SELF, hydrodinamical  
and ecological model  
for Aveiro Lagoon**



# Grid Computing & HPC, Applications

BING, Brain Imaging  
Network Project Grid

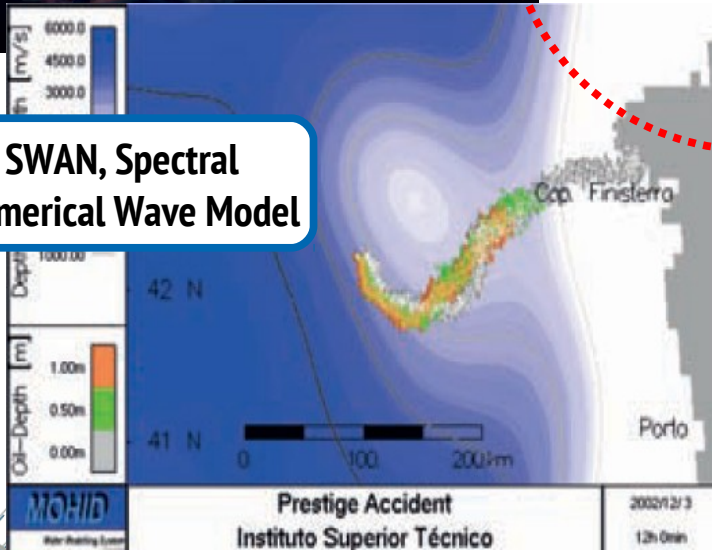


PJET, Simulation of  
turbulent plane jet

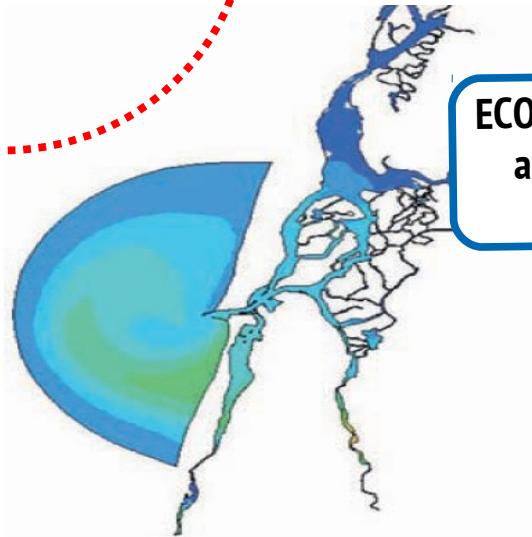


Ported by LIP

SWAN, Spectral  
Numerical Wave Model



ECO-SELF, hydrodinamical  
and ecological model  
for Aveiro Lagoon





# Cloud Computing, IBERCLOUD

## ○ Iberian federated infrastructure

- Federated resources: LIP, IFCA, UPV, CESGA
- Integrating different virtualization engines
- Amazon (EC2 and S3) compatibility
- LIP responsible for the authentication mechanisms




R&D at LIP

## ○ A user centred infrastructure

- Define the properties of the machine
- Define for how long it will need it
- Have interactive access



# Cloud Computing, IBERCLOUD

**IBERCLOUD**

[IBERCLOUD  
what is ?](#)

[IBERGRID  
what is ?](#)

[SUPPORT  
contact us](#)

[LOGIN](#)

## IBERCLOUD

A SCIENTIFIC CLOUD INFRASTRUCTURE  
FOR IBERGRID RESEARCHERS



**OVERVIEW**

IberCloud is oriented to provide a research community IBERGRID with a cloud infrastructure. To qualify for this service you must be a member of the IBERGRID community.



**STEPS TO FOLLOW**

**openstack**

DASHBOARD

[Project](#)[Admin](#)

[System Panel](#)

[Overview](#)

[Instances](#)

[Services](#)

### All Instances

Logged in as [Settings](#) [Sign Out](#)

#### Instances

[Terminate Instances](#)

<input type="checkbox"/>	Tenant	Host	Instance Name	IP Address	Size	Status	Task	Power State	Actions
<input type="checkbox"/>	admin	opstack02	<a href="#">dummy2</a>	10.0.0.3	512MB RAM   1 VCPU   0 Disk	Active	None	Running	<a href="#">Edit Instance</a> ▼
<input type="checkbox"/>	admin	opstack02	<a href="#">dummy</a>	10.0.0.2	512MB RAM   1 VCPU   0 Disk	Active	None	Running	<a href="#">Edit Instance</a> ▼

Displaying 2 items

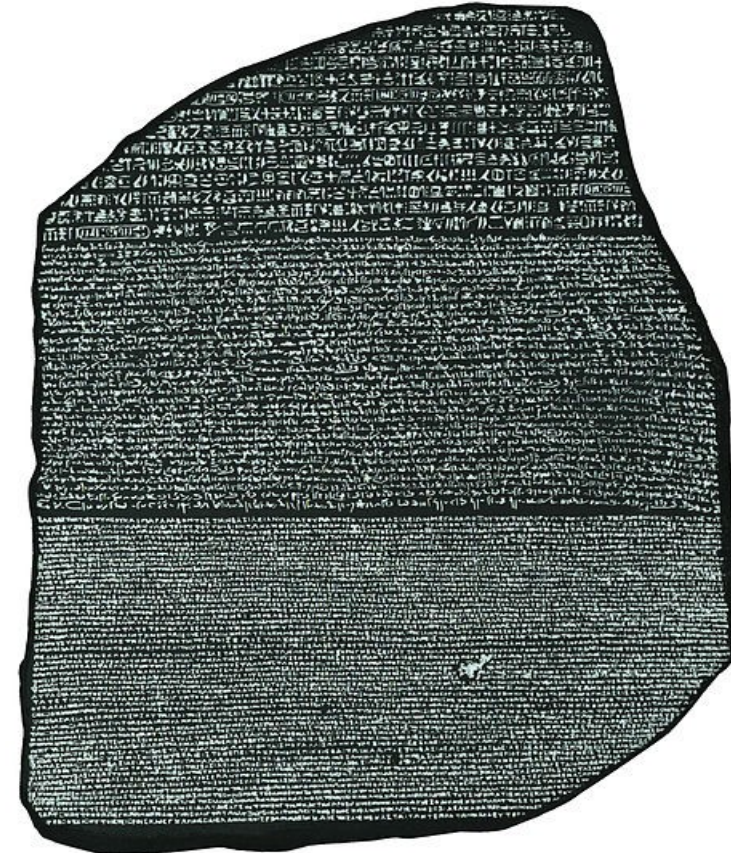
R&D at LIP

# Data Preservation, Timbus



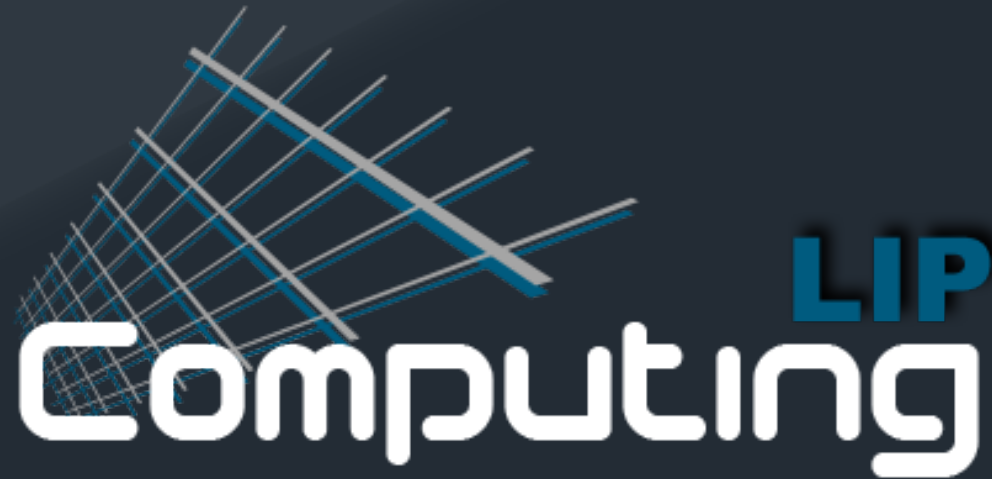
R&D at LIP

- LIP participation aiming long term preservation of HEP analysis performed by local researchers
- Enable systematic archival of all the analysis steps
- Replay analysis actions by re-running the same programs as the researcher did in the past
- Running adapted/modified versions of this same programs, and/or by using different data sets.



# Summary and Future

- Effort will continue on delivering high quality services
  - In the context of the Initiatives where LIP is involved and where its work has been acknowledged
- Research & Development
  - Investment on Cloud Computing
  - Implementation of Data Preservation principles
  - Best practices towards better infrastructure management
- Critical issues
  - Sustainability of the e-Science infrastructures in Portugal (Political will / Human Resources)



LIP Computing Activities