Spanish Contribution to the WLCG

Gonzalo Merino

ICFA Cracow 10-10-2006

Spanish WLCG sites

- Eight Spanish sites currently contribute to the WLCG infrastructure
- Support 3 out of the 4 LHC experiments
  - ATLAS, CMS and LHCb
- One Tier-1 and three Federated Tier-2s
  - Tier-1: PIC *(ATLAS, CMS and LHCb)*
  - Spain-ATLAS Tier-2: IFAE, IFIC, UAM
  - Spain-CMS Tier-2: IFCA, CIEMAT
  - Spain-LHCb: UB, USC

WLCG MoU: Tier-2s

PIC
port d'informació
científica

Spain, ATLAS Federation	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	130	240	720	1100	1600
Disk (Tbytes)	21	91	270	400	610
Nominal WAN (Mbits/sec)					

Spain, CMS Federation	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	100	410	1000	1800	3300
Disk (Tbytes)	28	110	280	470	890
Nominal WAN (Mbits/sec)					

Spain, LHCb Federation	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	33	100	300	500	750
Disk (Tbytes)	0	0	1	1	2
Nominal WAN (Mbits/sec)					

Around 2000 ksi2k CPU and 0,5 PB disk integrated capacity at the Tier-2s foreseen in the reference year of 2008

WLCG MoU: Tier-1

PIC
port d'informació
científica

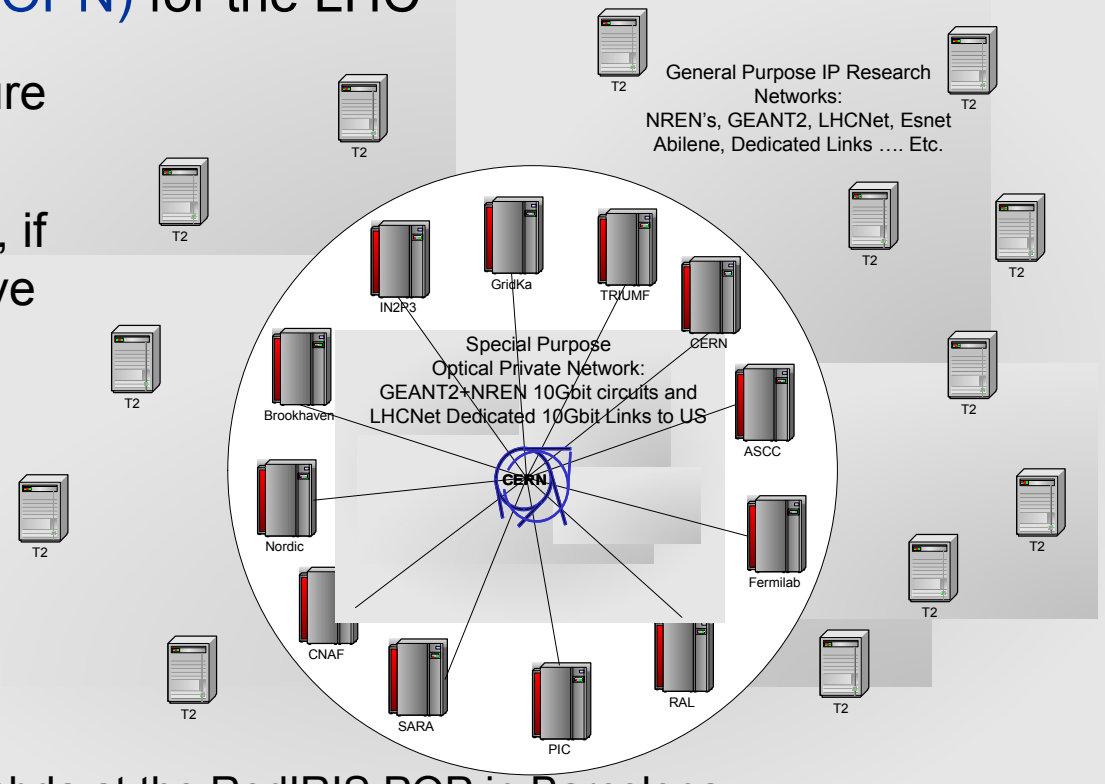
PIC, Spain	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	250	749	2250	3370	5050
Disk (Tbytes)	140	410	1200	1800	2800
Tape (Tbytes)	158	474	1420	2130	3200
Nominal WAN (Mbits/sec)	1000	2500	10000	10000	10000

- Targeting for a contribution
  - ATLAS ~ 5%
  - CMS ~ 5%
  - LHCB ~ 6.5%
- MoU being signed in the next few months (changes in the ministry) so these figures might slightly change

LHC Optical Private Network

PIC
port d'informació
científica

- Network architecture based on permanent 10G light paths forming an Optical Private Network (OPN) for the LHC
  - Main objective is to ensure QoS for T0→T1 traffic
  - Could carry T1-T1 traffic, if needed (T0-T1 flows have priority)
  - Will not carry T2-* traffic

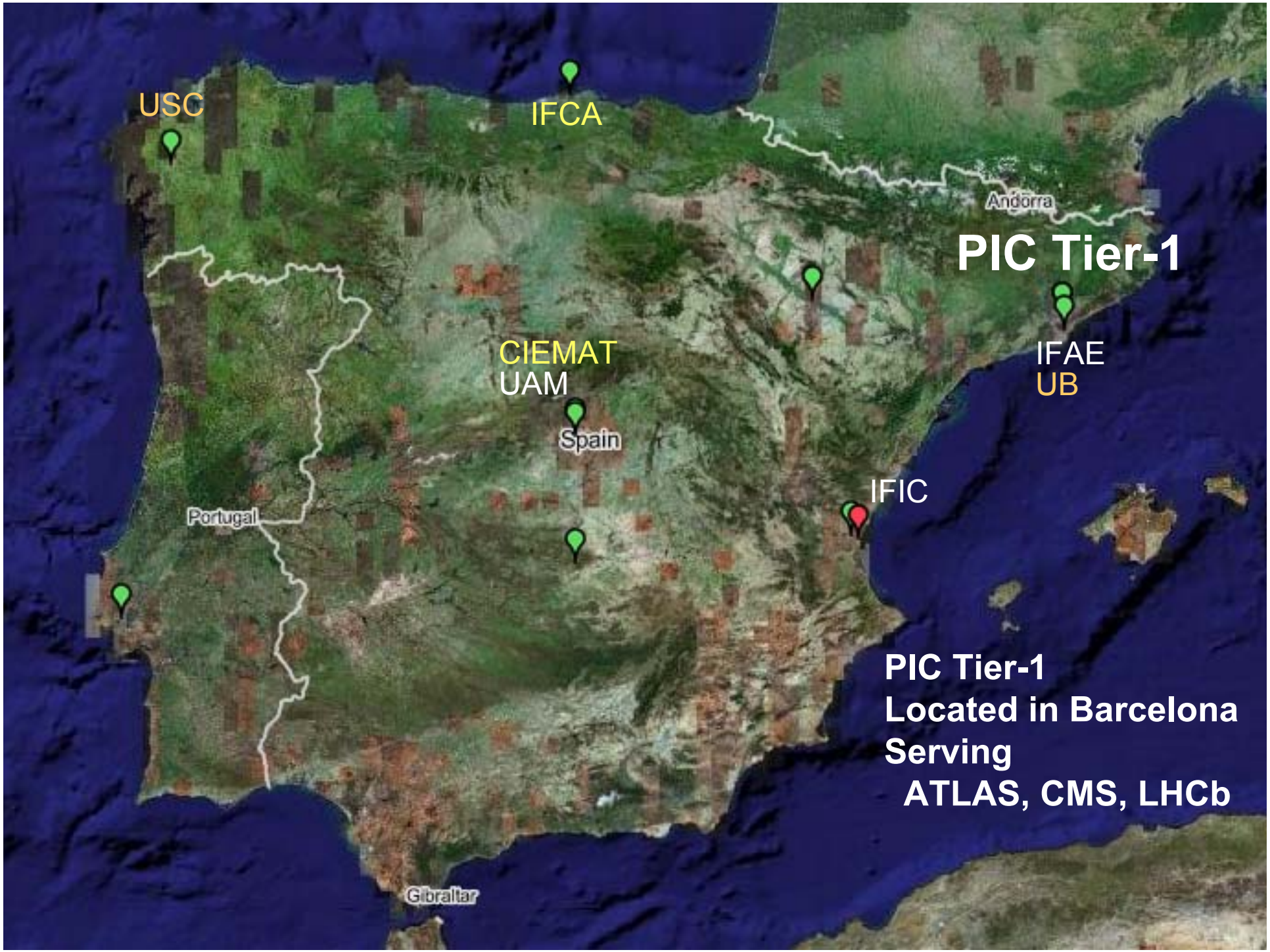


- Status at PIC
  - CERN-Barcelona:
    - mid-Oct 2006 10G lambda at the RedIRIS POP in Barcelona.
  - BCN-PIC:
    - Still not there (last mile problem!). Currently expected before end March 2007.


Andorra
UAM (Madrid)
IFAE (Barcelona
Spain
IFIC (Valencia)
Portugal
Gibraltar
Spain-ATLAS
Federated Tier-2


IFCA (Santander)
CIEMAT (Madrid)
Andorra
Spain
Portugal
Gibraltar
Spain-CMS
Federated Tier-2


USC (Santiago)
UB (Barcelona)
Andorra
Spain
Portugal
Gibraltar
Spain-LHCb
Federated Tier-2


USC
IFCA
Andorra
PIC Tier-1
CIEMAT
UAM
IFAE
UB
Spain
IFIC
Portugal
Gibraltar
PIC Tier-1
Located in Barcelona
Serving
ATLAS, CMS, LHCb

T1-T2 association

PIC
port d'informació
científica

- ATLAS
  - Spain-ATLAS federated Tier-2
  - Portugal
- CMS
  - Spain-CMS federated Tier-2
  - Portugal
  - Russia (RDIG)
  - Ukraine
- LHCb
  - Spain-LHCb federated Tier-2

Spanish Sites Capacity Today

PIC
port d'informació
científica

Site	CE (ksi2k)	SE-disk (TB)	SE-tape (TB)
IFAE	29	4	
IFIC	180	4	37
UAM	167	27	
IFCA	92 *(331 shared)*	7	
CIEMAT	300		20
UB	133		
USC	122		
Total Tier-2s	1023	42	57
PIC Tier-1	150 *(500 end 06)*	49	123

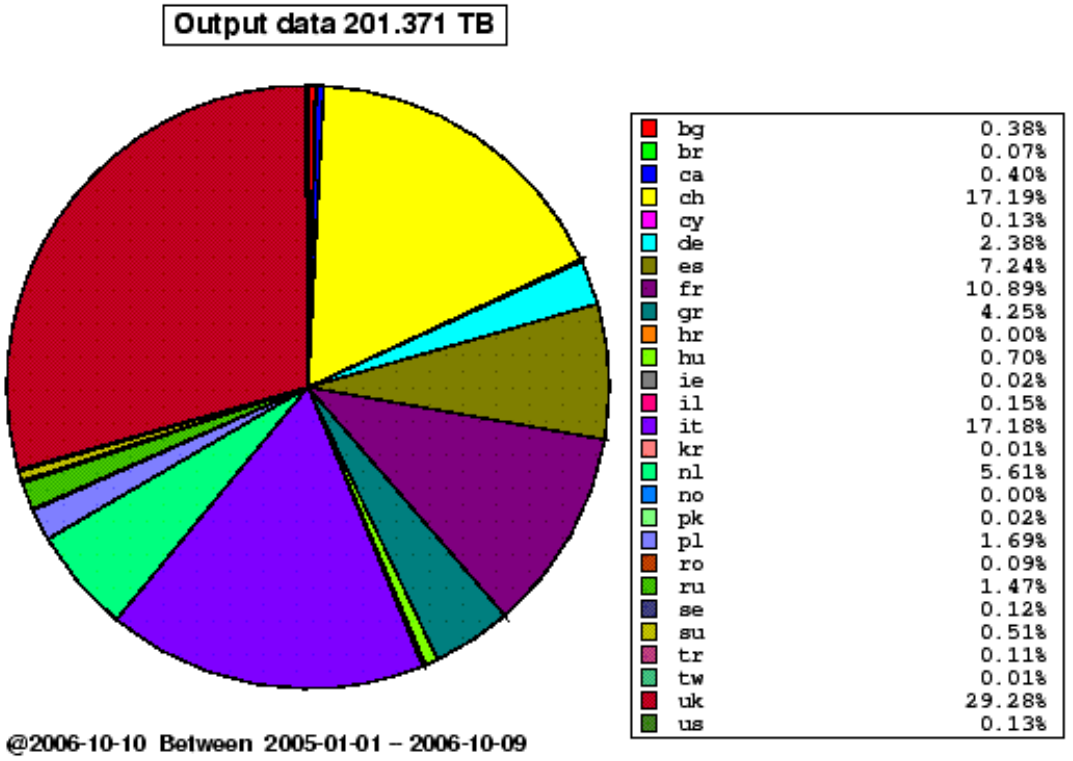
Contribution to LHCb MC prod

http://lhcb.pic.es

PIC
port d'informació
científica

- Total LHCb MC production 2005-2006
  - Around 300M events
  - More than 200 TB of output data
  - Almost 20M hours CPU time

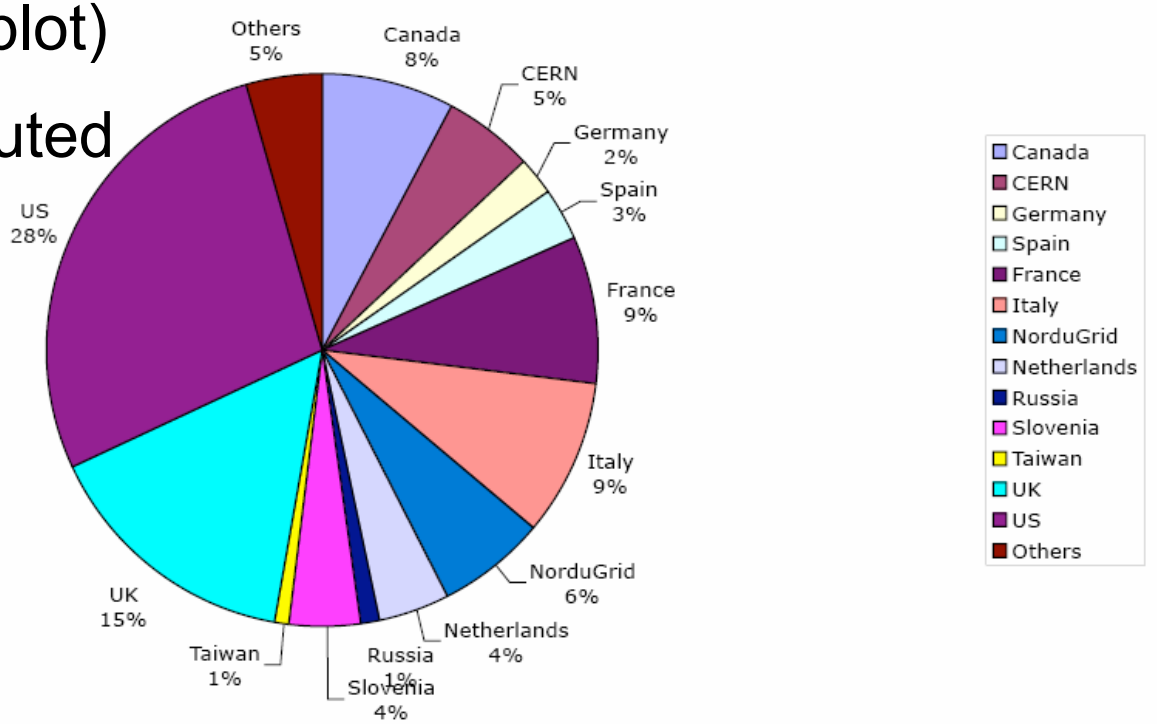
- Spanish contribution (USC,UB,PIC) amounts to about 7,24%



Spanish contribution to ATLAS & CMS MC prod

PIC
port d'informació
científica

- Wall Time of ATLAS MC prod Jan-Sep 2006 (plot)
- Spanish sites contributed with about 3%



- In the CMS recent production of 50M events for the CSA06 test, the Spanish sites contribution was of 7%

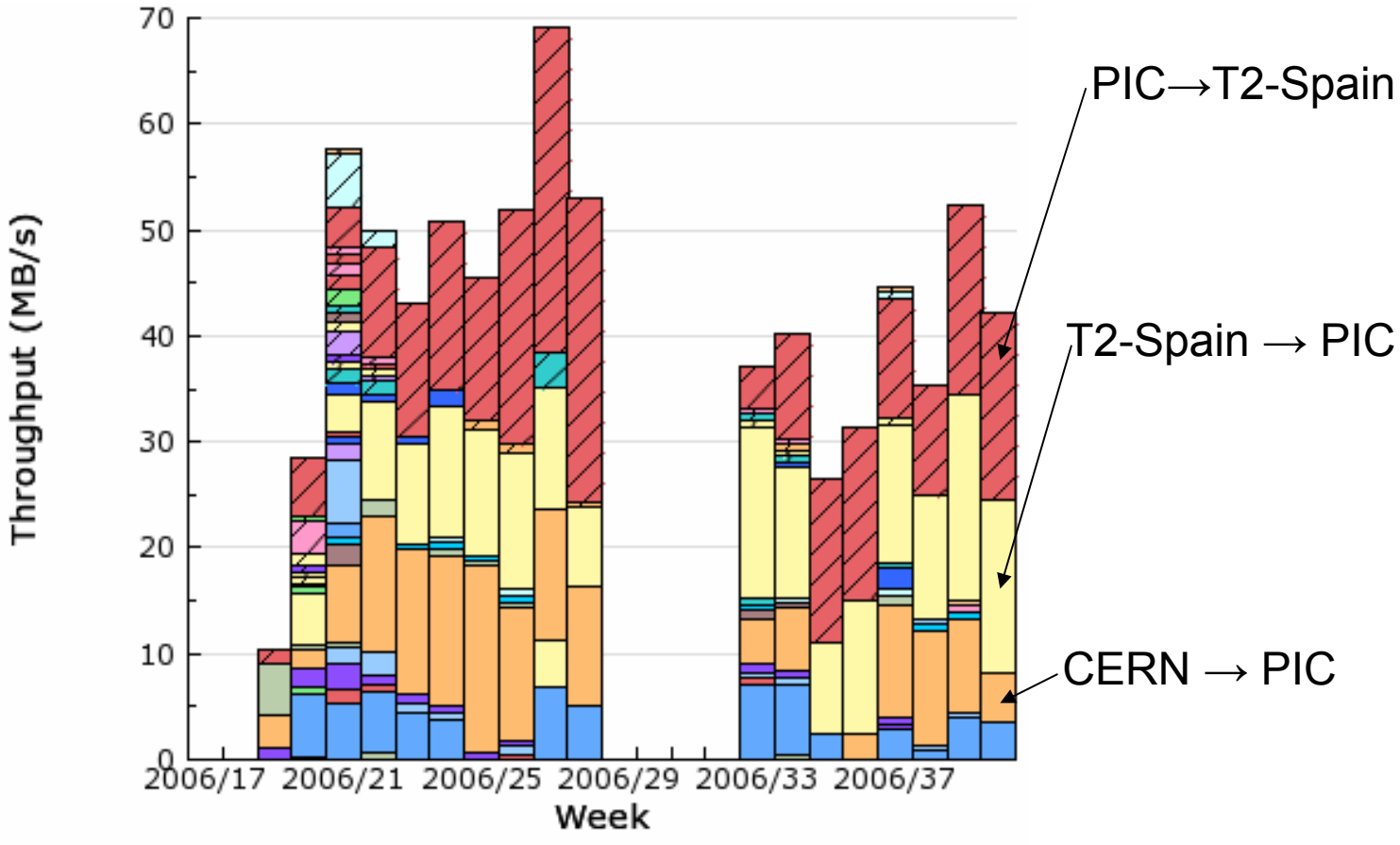
File Transfer Service

- The FTS is a point to point data movement service
  - Enables asynchronous transfers
  - Based on Globus GridFTP and SRM
  - Implements retry policies
- In WLCG, FTS servers deployed at the Tier-0 and Tier-1s
- Transfer channels are the logical unit of management
  - represent a mono-directional network pipe between 2 sites
- Channels configured at PIC:
  - T1s → PIC
    - Around 10 channels defined, one for each Tier-1
    - To steer T1-T1 transfers where PIC is the destination
  - ANY → PIC
    - To steer data reception from any T2 (MC production)
  - ANY → T2s
    - To steer data sending to the T2s

CMS FTS Tests
SC4 Transfers

PIC
port d'informació
científica

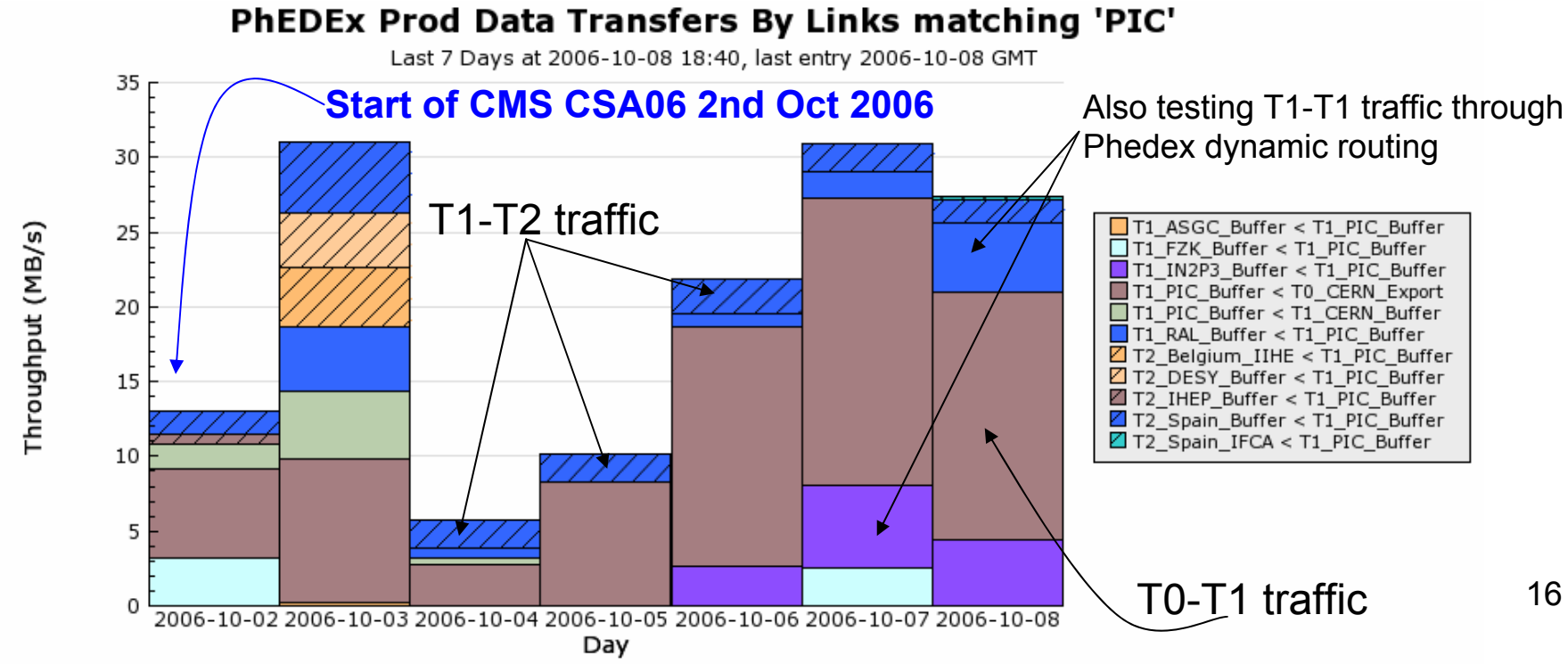
Hundreds of TB of data transferred by the CMS Phedex system testing the T0-T1-T2 data flow chain since May 2006



CMS FTS tests
CSA06

PIC
port d'informació
científica

- CMS CSA06 test just started last week. Will run till mid-Nov
- CSA06: A 50 million event exercise to test the workflow and dataflow associated with the data handling and data access model of CMS
- Making use of the FTS service to realistically distribute the data



Other WLCG Services

PIC
port d'informació
científica

- Replica Catalogue
  - One LFC deployed at PIC
  - Used by ATLAS as **local** replica catalogue
- VO-box
  - Used by LHC experiments to deploy VO-specific services that run on top of the Grid Services
  - Three deployed at PIC: ATLAS, CMS and LHCb
- Resource Brokers
  - lcg-RBs: deployed at IFCA, IFIC and PIC
  - glite-WMS: deployed at PIC
- Computing Element *(alternative flavour to lcg-CE)*
  - glite-CE: deployed at PIC
- MyProxy Servers
  - Two instances deployed: IFCA, IFIC

Tier-1 Reliability and Availability

- SAM monitoring framework since mid-2006
  - https://lcg-sam.cern.ch:8443/sam/sam.py
- Evolving into a complete Grid Services monitoring tool (CE, SE, BDII, FTS, LFC, RB …)
- Site Availability metric is computed every hour
  - Watching at Tier-1 most critical services
    - Computing Element
    - SRM servers
    - Site-BDII
  - If any of the critical services is not OK, the site is considered as unavailable
- Site Reliability metric also computed, taking into account Scheduled Downtime periods

Tier-1 Availability

PIC
port d'informació
científica

Availability of WLCG Tier-1 Sites + CERN August 2006

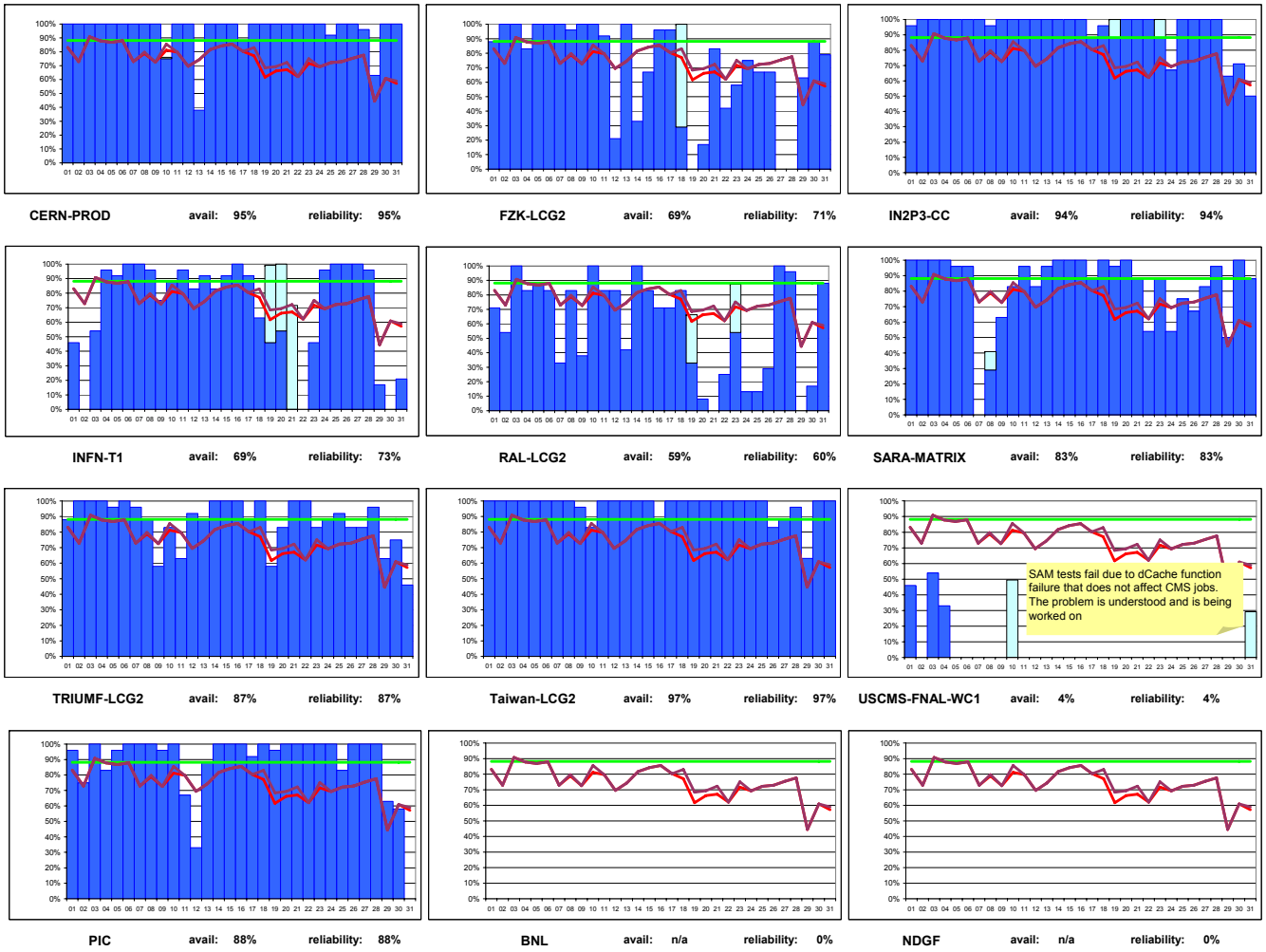
All sites assumed up while SAM had problems on 1, 3, 4 August

Data from SAM monitoring. Site availability and reliability as agreed in WLCG MB on 11 July 2006 (scheduled interruptions are excluded when calculating reliability)

legend: tests passed / scheduled down

	availability	reliability	target	88%
average (all sites):	74%	75%		
average (8 best sites):	85%	86%		

site average colour coding: < 90% of target ≥ 90% of target ≥ target



3 sites exceed SC4 reliability target of 88% (CERN, IN2P3, ASGC)
3 sites within 90% of the SC4 target (SARA, TRIUMF, PIC)

Contribution to ATLAS

- Production System
  - MC prod increasing factor 10 in the next year
  - New structure for the ATLAS MC prod system was recently deployed
  - Spain-ATLAS Tier-2 in charge of shifts coordination and weekly meetings chairing
- Distributed Data Management system
  - Involved in the DDM deployment and coordination teams
  - Testing the DDM infrastructure for T1-T2 dataset transfers within Spain
- Distributed Analysis
  - Participating in the DA prototype system
  - Testing implementation of job prioritisation based on VOMS role/group attributes

Contribution to CMS

- Active contribution to the SC3 activities in 2005
  - Disk2disk CERN-PIC transfers sustaining 4TB/day during 2 weeks
  - Aggregated throughput read data from WNs
    - 175MB/s (75MB/s) demonstrated at the T1 (T2)
  - 10K jobs run at the Spanish sites (~20% of the CMS SC3 jobs run in LCG)

Contribution to LHCb

- UB/USC actively contributed to the development of parts of DIRAC (LHCb meta-Grid):
  - WMS and Transfers Accounting
  - Configuration Service
  - Monitoring
  - Secure communication framework for DIRAC
- Some of the servers for this LHCb infrastructure running at PIC:
  - Monitoring and Accounting master server
  - Configuration Service slave server

Summary

- Spain contributes to the WLCG infrastructure with
  - One Tier-1 serving ATLAS, CMS LHCb
  - Three Federated Tier-2s (ATLAS, CMS and LHCb) spanning seven physical sites
- WLCG MoU to be signed in the next few months *(changes in the minstry)*
  - Pledges being refined now in the light of the more accurate LHC schedule
  - Need to match the National HEP funding cycle
- Spanish sites are doing well in the LHC preparation Service Challenge exercises up to now, but
  - Facing very big resource ramp-ups in the next months/years
  - MoU Service Availability levels are very high (specially for Tier-1). It has been proven to be a tough business to get there. Focus in stability/resilience in the next 9 months
- Grid infrastructure in Spain
  - Spanish EGEE partners co-funding their activity from internal budgets or national research programs (specially HEP)
  - At this time, there is no funded Spanish Grid initiative