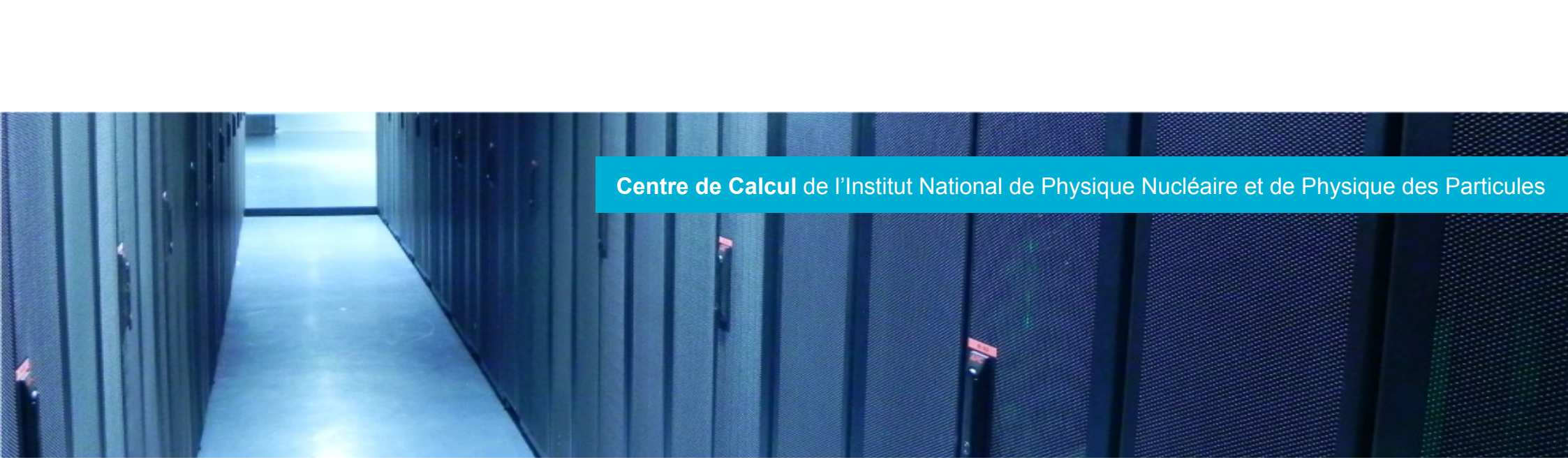




Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules

IN2P3 Computing Center

Visit of NCSA representatives





Institut National de Physique Nucléaire et de Physique des Particules

Dedicated computing center (HTC)



Resources mutualisation

CC-IN2P3 federates the main computing resources

For :

High energy physics

Nuclear physics

Astroparticle physics

Some openings to other sciences

Manpower : 84 people – 63 IT engineers – 2 researchers

2015 budget : ~7.5 M€ (without salaries)



Partnership with CEA/DSM/IRFU

~ 70 groups are using CC-IN2P3 resources



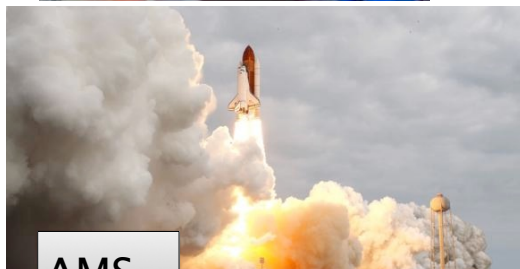
LHC



HESS



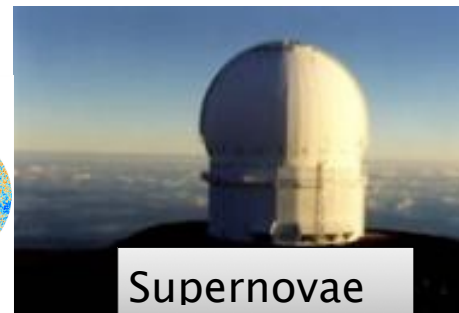
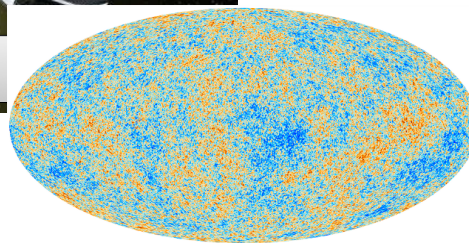
Auger



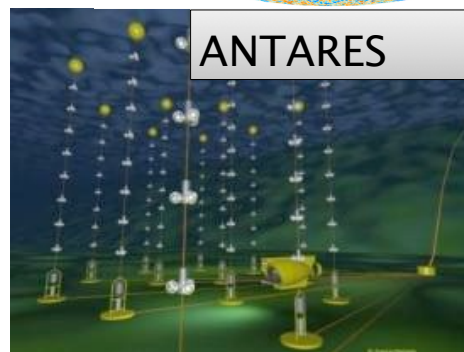
AMS



Planck



Supernovae



ANTARES



VIRGO

CPU

~26 000 vcores
~250 kHEPSpec06
~ 240 TFlops

Disk storage

Standard performance
disk = **14 PB**
High performance disk
(for GPFS) = **1.7 PB**

Tapes

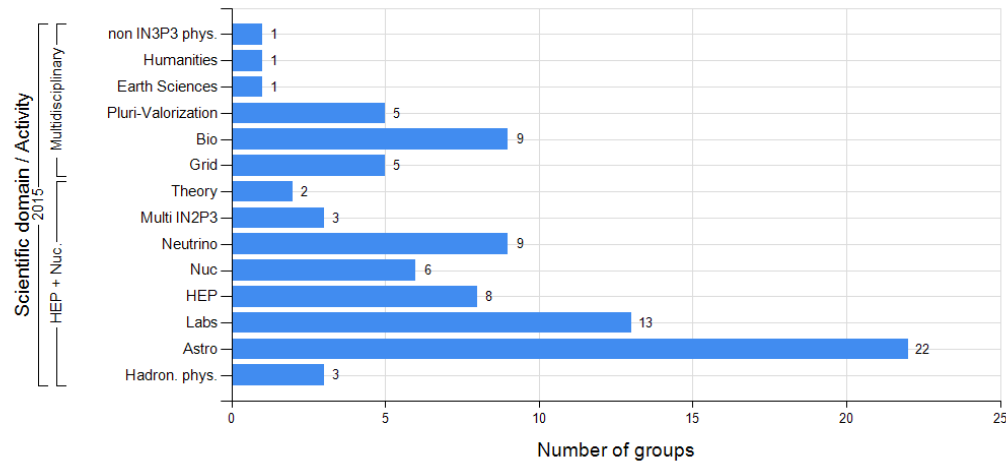
Storage used on
magnetic tape : **25 PB**
out of **340 PB** nominal
capacity

Backup (TSM)

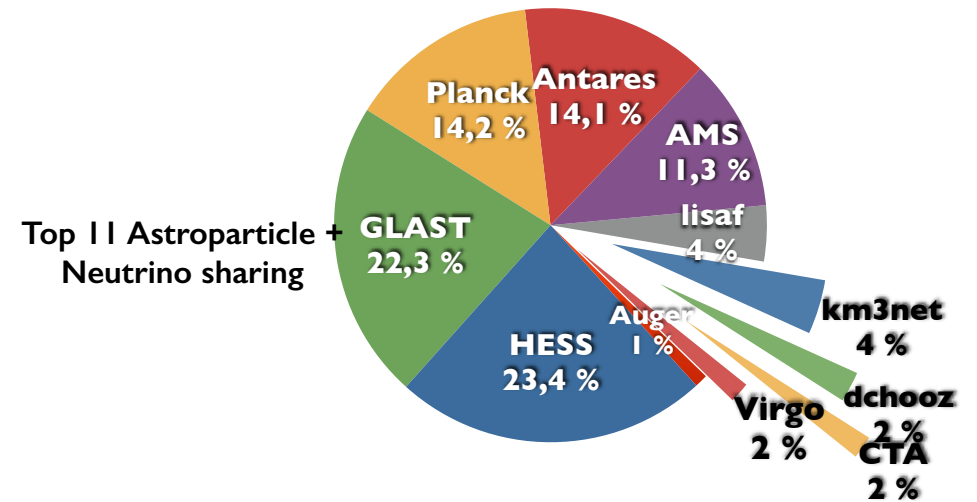
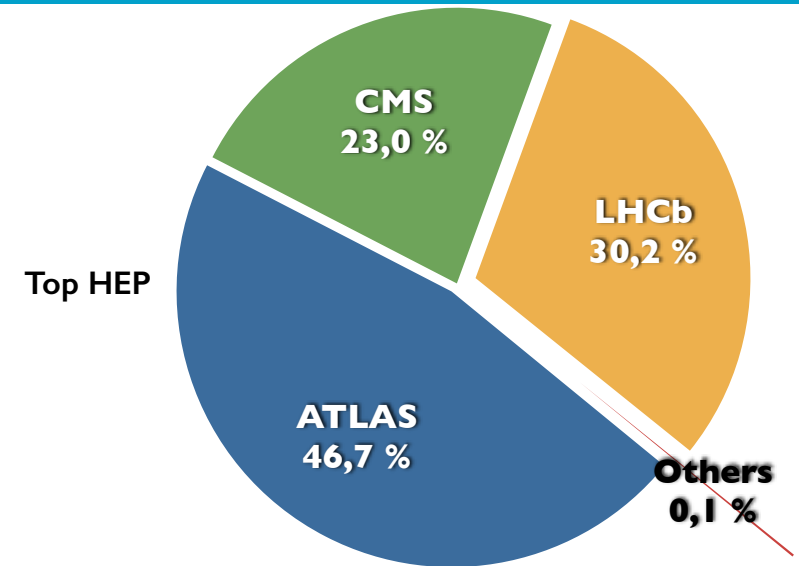
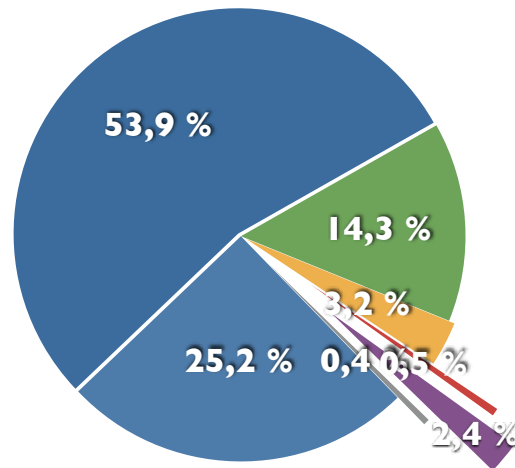
Stored volume : about
5,5 Po

Users : distribution and CPU consumption (May 2015)

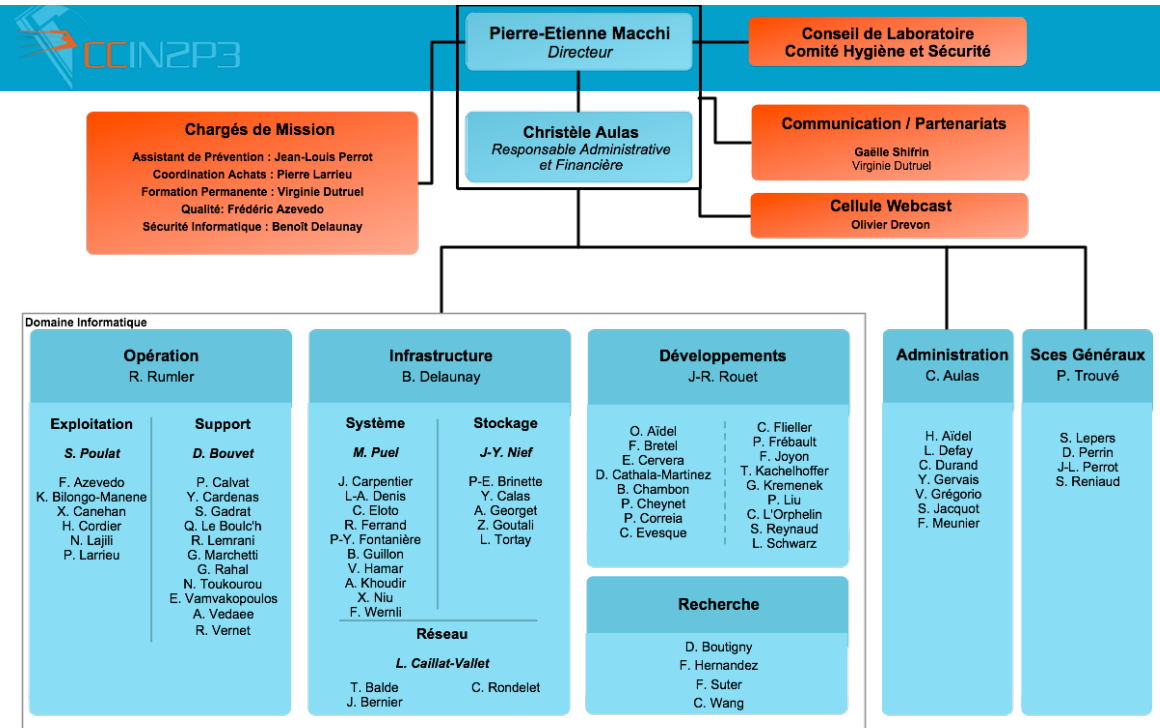
Number of groups by scientific domain and activity in 2015



- Particle Physics
- Hadron Physics
- Theory
- Labs
- IN2P3 Multidisciplinary & openings
- Nuclear Physics
- Astroparticles + Neutrino



Organization



Centre de Calcul de l'IN2P3/CNRS - Domaine Scientifique de la Doua - 43 Bd du 11 Novembre 1918 - 69622 Villeurbanne CEDEX 11 mai 2015



4 IT teams

Development :

tools, services, software, reporting & BI, databases

Infrastructure :

servers installation, set up, based software (OS, grid components, middleware, cloud...)
 storage systems (dCache, GPFS, HPSS...)
 network (WAN & LAN)

Operation :

QoS
 day to day operation
 user support :

- > dedicated (LHC, Euclid, LSST) to give the « best services », to test solutions, to adapt the CC offer and vice versa
- > generic : for experiments without specific needs

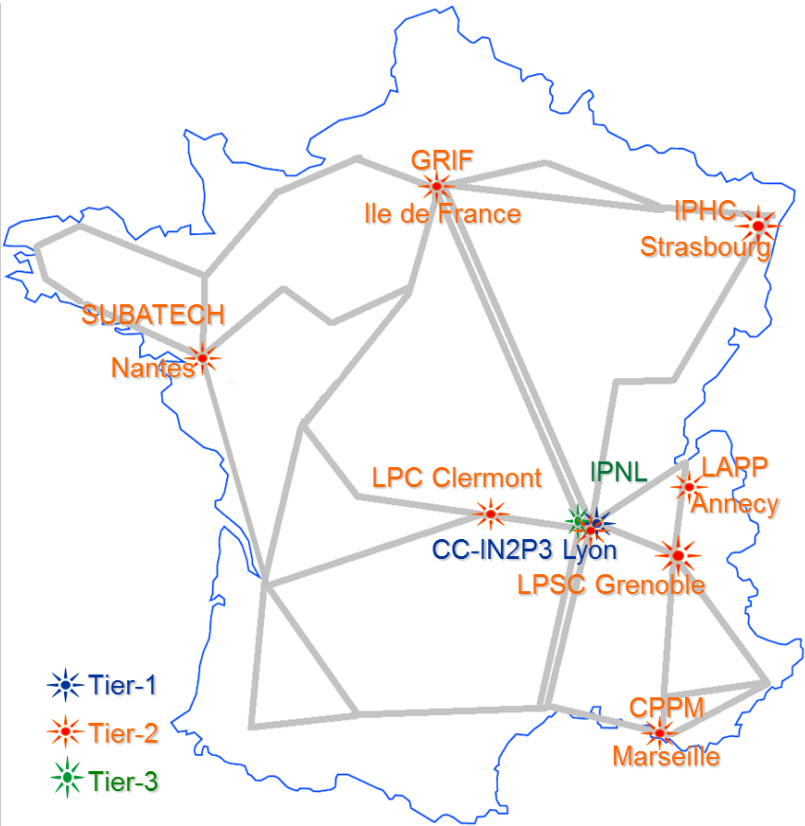
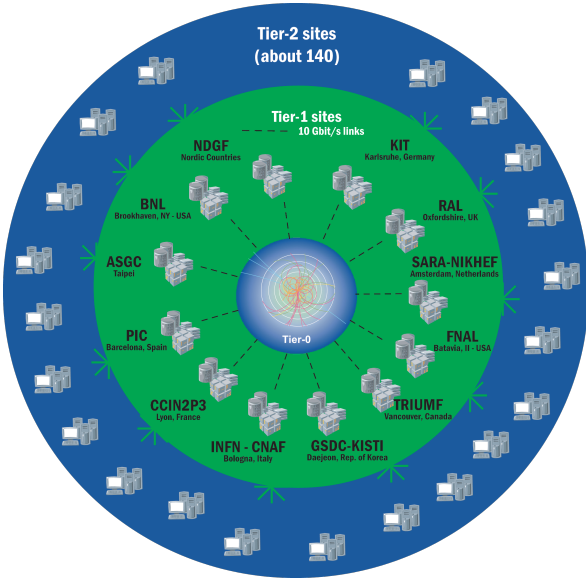
Research team :

- strengthen links between Computer Scientists and users of large-scale DCIs in production
- bring expertise on HPC to physics collaborations

-> Flexibility - adaptability :

- may (re-)affect hardware to specific needs
- (most) money is fungible
- « Task force » set up for LSST : Fabio (lead) , Yan (dep.), plus Rachid (UserSupport) and Infra, Ops & Dev...

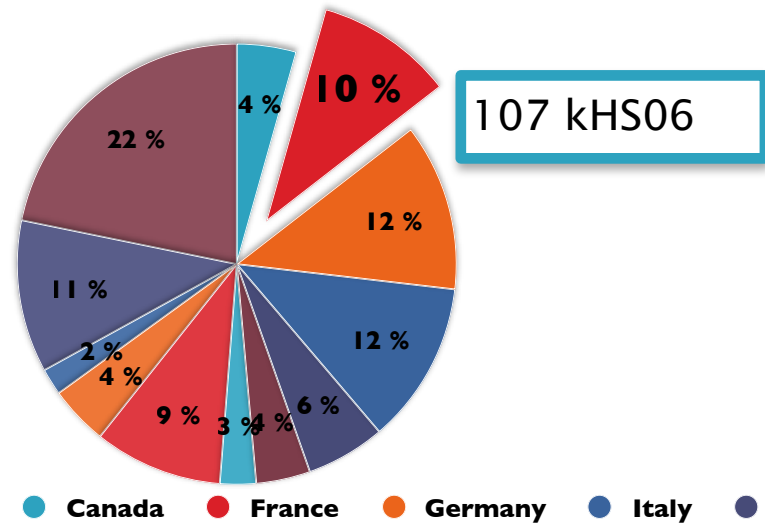
WLCG and LCG-France : a french cloud



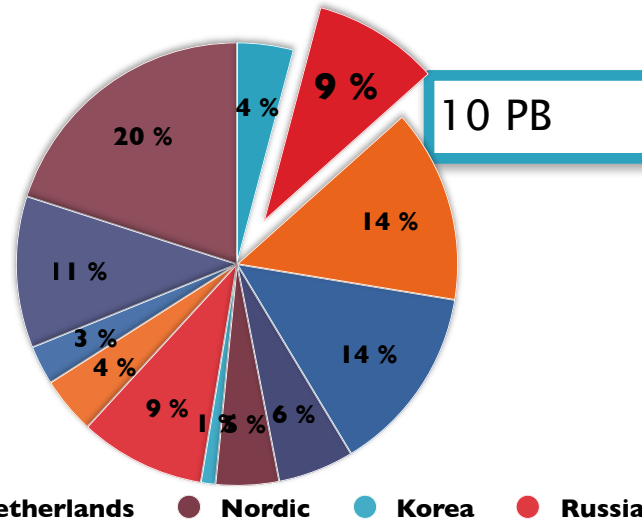
Role	Site	ALICE	ATLAS	CMS	LHCb
Tier-1	IN2P3-CC	✓	✓	✓	✓
Tier-2	IN2P3-CC-T2 (AF)		✓		✓
	IN2P3-CPPM		✓		✓
	GRIF	✓	✓	✓	✓
	IN2P3-LPC	✓	✓		✓
	IN2P3-IPHC	✓		✓	
	IN2P3-LAPP		✓		✓
	IN2P3-LPSC	✓	✓		
	IN2P3-SUBATECH	✓			
Tier-3	IN2P3-IPNL	✓		✓	

LCG-France share into W-LCG

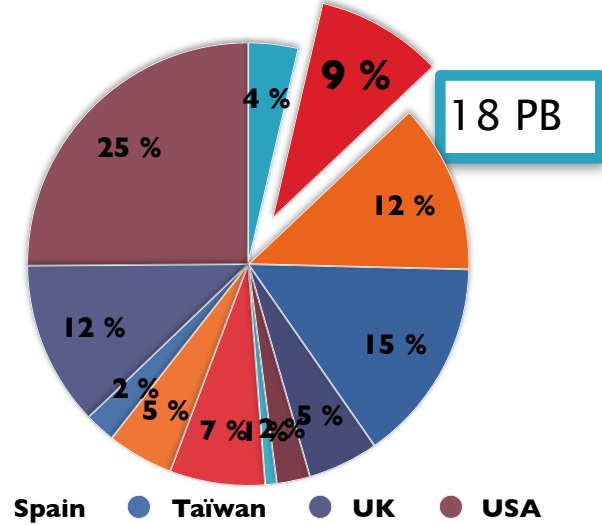
2015 T1 Pledged CPU Capacity



2015 T1 Pledged Disk Capacity

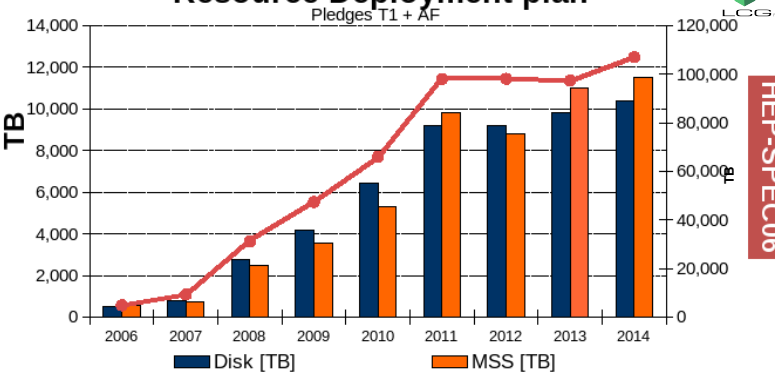


2015 T1 Pledged Tape Capacity



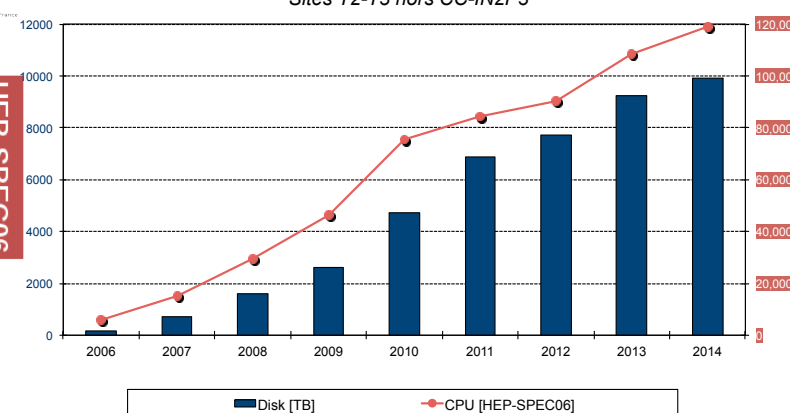
Canada France Germany Italy Netherlands Nordic Korea Russia Spain Taiwan UK USA

Resource Deployment plan



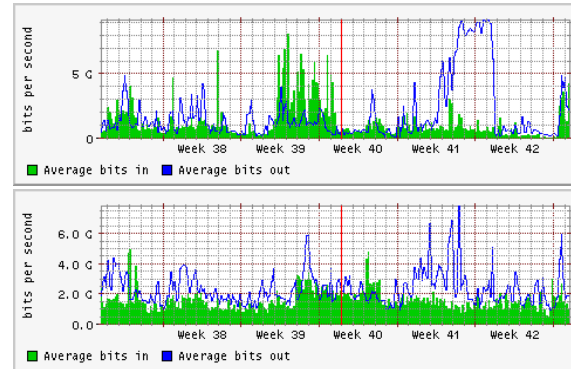
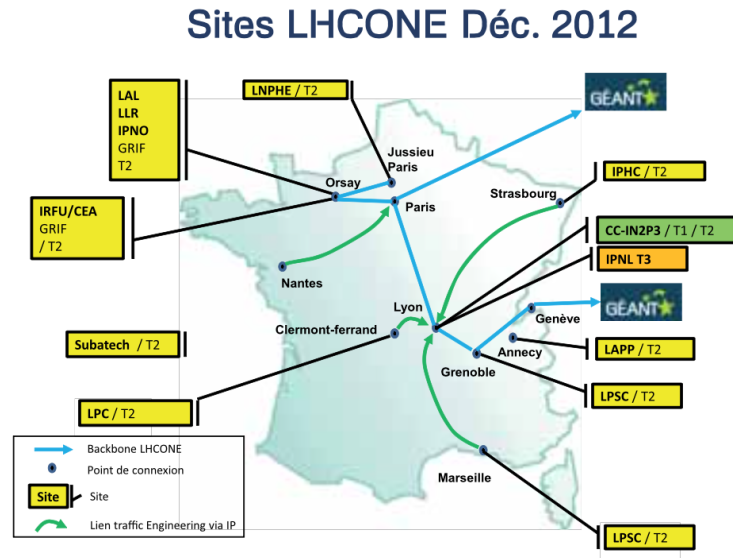
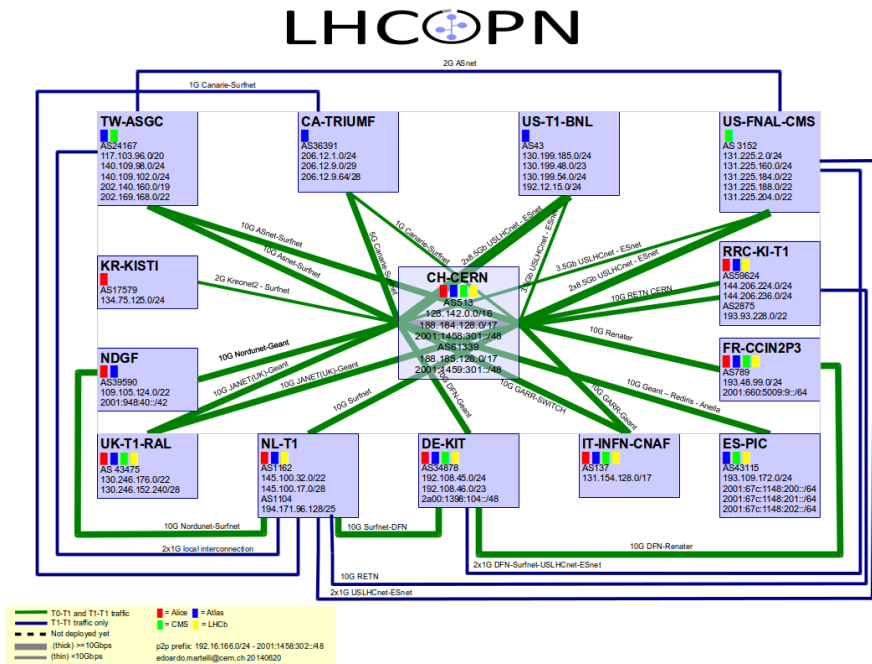
Evolution Ressources LCG-France

Sites T2-T3 hors CC-IN2P3



% of 2015 pledges	CPU	Disk	Tapes
French T1 / $\sum T1$	10.15	10.29	10.11
French T1+T2s / $\sum T1+T2s$	9.57	10.00	10.11

Network connectivity for WLCG and LCG-France



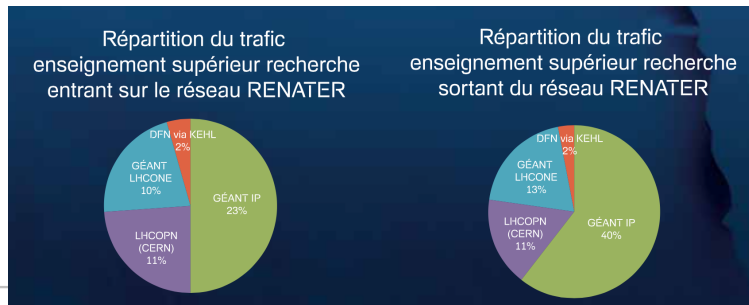
Traffic Lyon $\longleftrightarrow$ CERN

Trafic Lyon-general Internet

~ 50 PB of data per year (in + out)

2013 Renater report status:

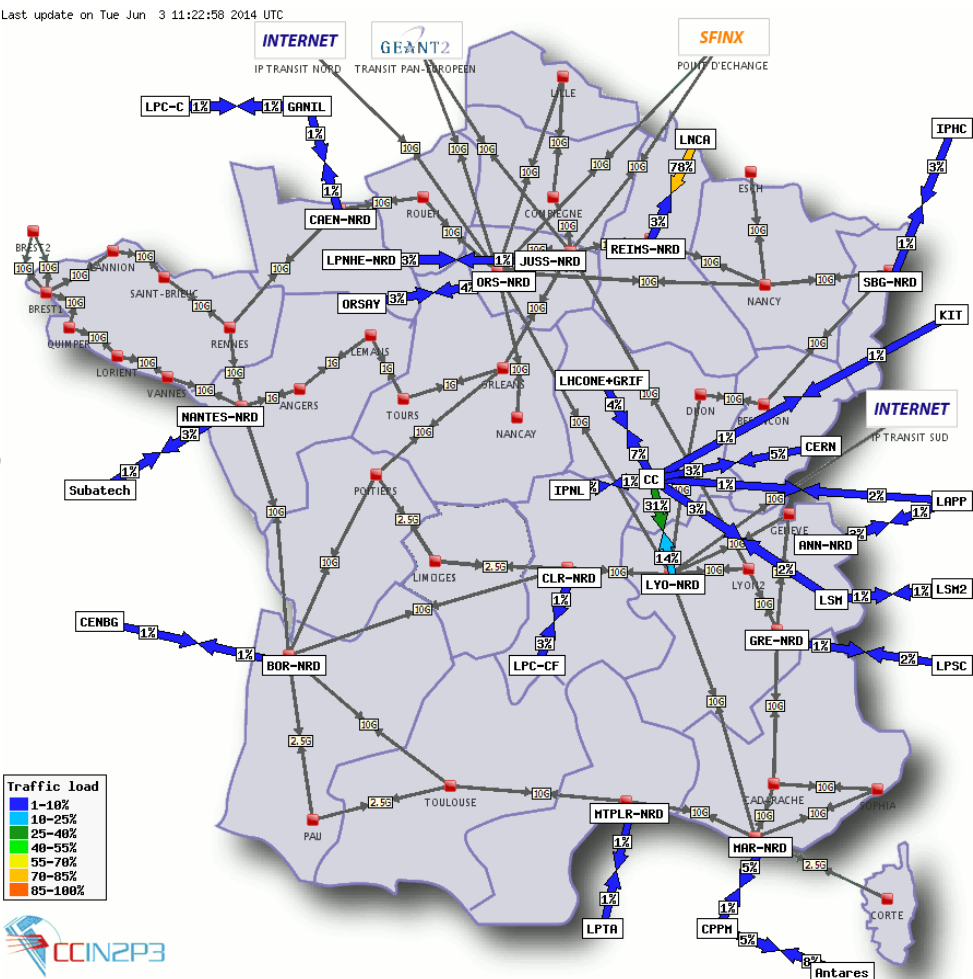
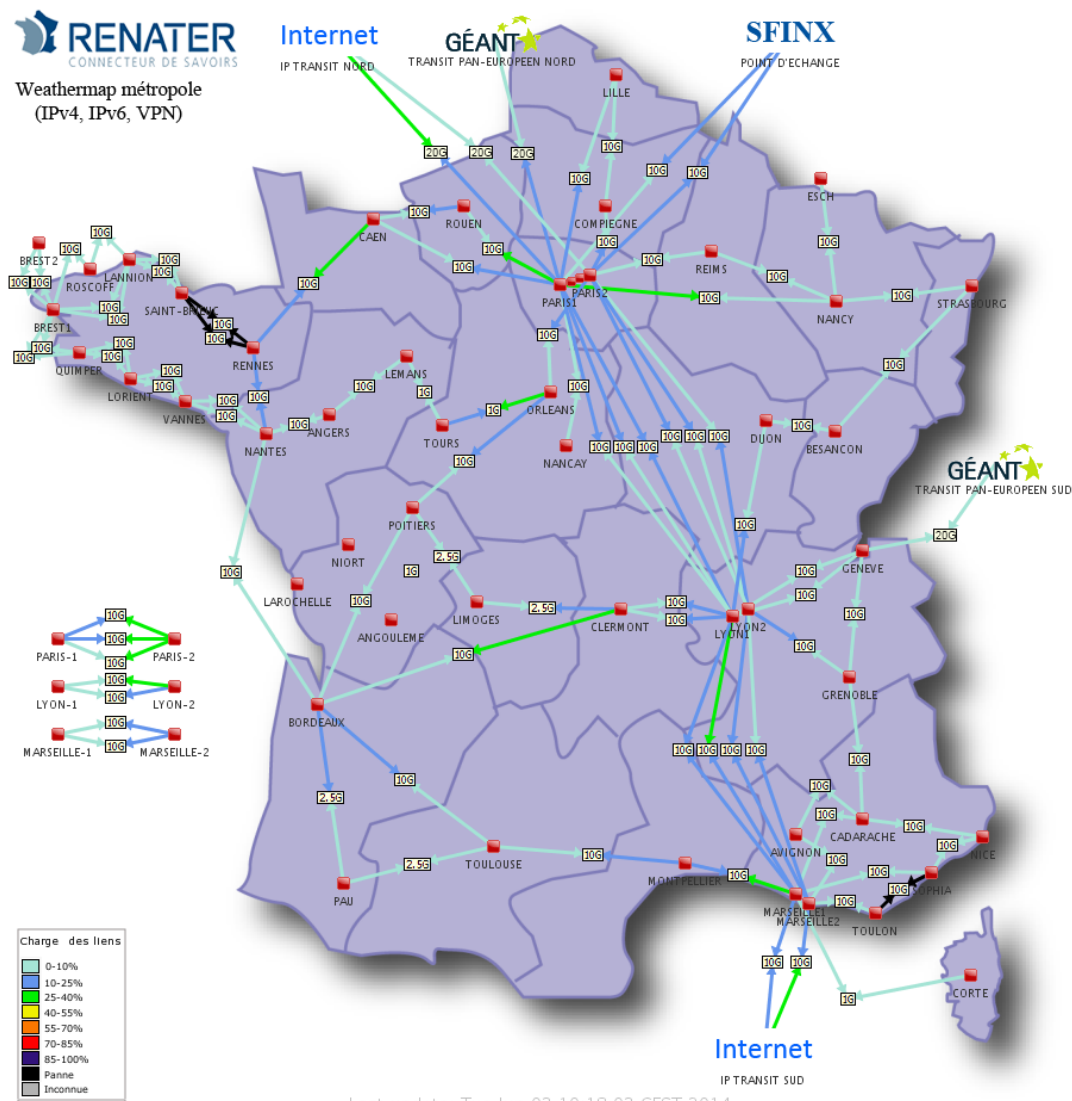
LCG is 46 % of total french academic trafic



Visit of NCSA representatives

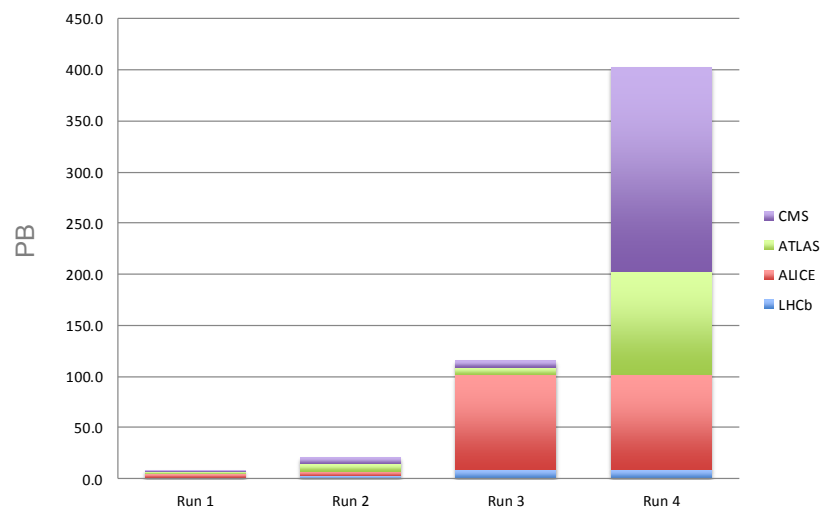
2015-05-27 CCIN2P3

French academic network and IN2P3 usage





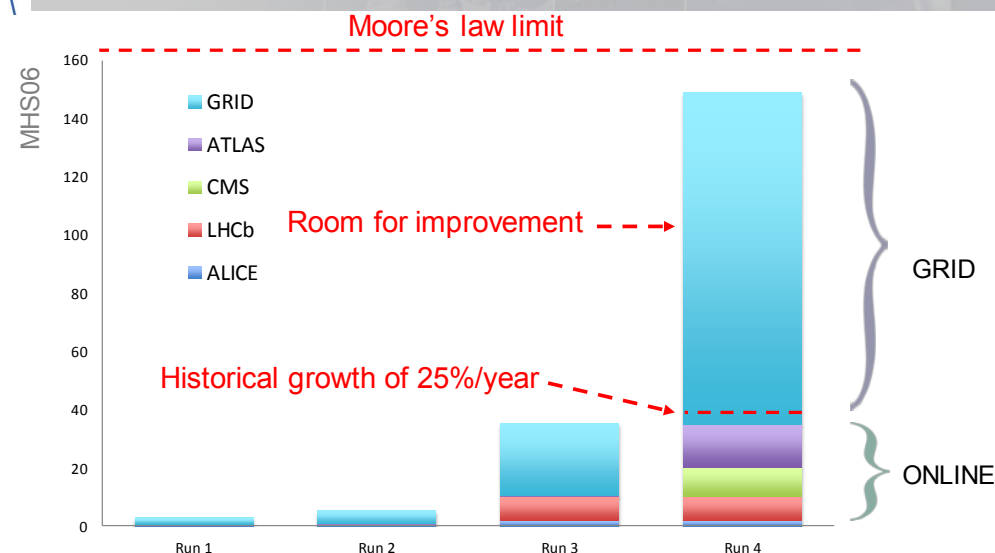
Data: Outlook for HL-LHC



- Very rough estimate of a new RAW data per year of running using a simple extrapolation of current data volume scaled by the output rates
 - To be added: derived data (ESD, AOD), simulation, user data...



CPU: Online + Offline



- Very rough estimate of new CPU requirements for online and offline processing per year of data taking using a simple extrapolation of current requirements scaled by the number of events.
- Little headroom left, we must work on improving the **performance**.

Run 2 : 2015-18 — Run 3 : 2020-22 — Run 4 : 2025-28

> Run 2 : huge effort to be done on software, switch to and/or complement with other technologies

Estimated needs of future (and on-going) experiments

LSST (Large Synoptic Survey Telescope) :

- reprocessing of half of the data
- CC will host all the processed data

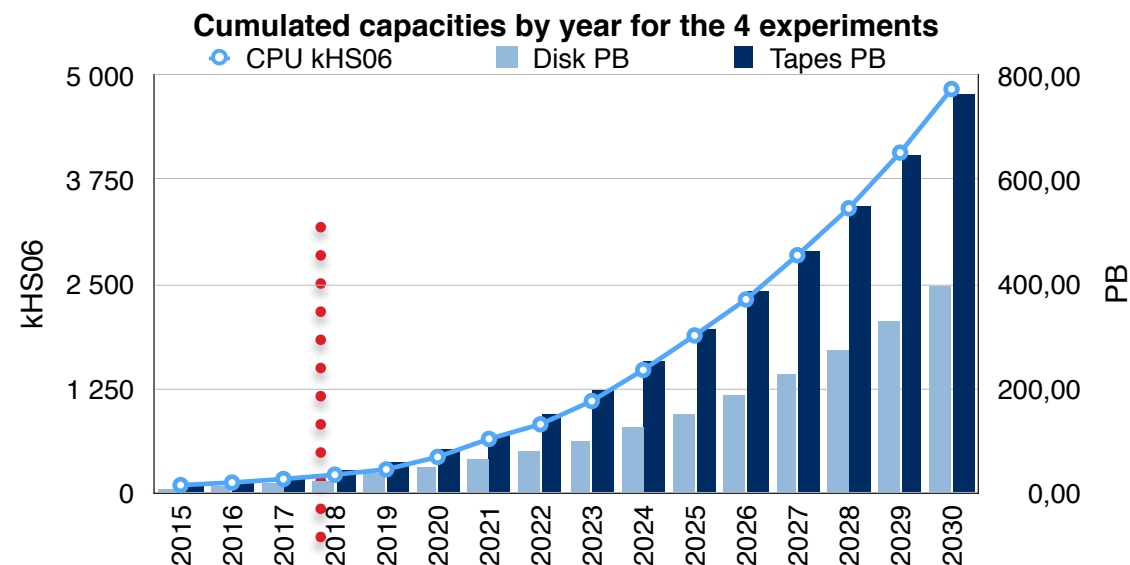
EUCLID : CC-IN2P3 will be one of the 8 “Sciences Data Centers” of this European space mission and should provide 30% of the resources (CPU and storage)

CTA : CC-IN2P3 may be led to operate for it, also by 2030, at least a 25% of 88 kHS06 for CPU, 207 PB for disk and 507 PB for tapes.

LHC : ~+25% per year indicates that at the end of the LHC Run 3 a TI capacity of

En 2024	CPU kHS06	Disque Po	MSS Po
LHC	1 000	80	150
x2014	5	6	6

In 2030	CPU kHS06	Disk PB	MSS PB
LSST	2 400	100	266
EUCLID	67	150	52
CTA	22	52	127
Σ	2 489	302	445
x2014	12	22	18



Computing rooms : VIL2



Base infrastructure designed to fit the final configuration (wires, pipes...)

Everything else is modular (transformers, UPS, chillers, etc.) and can be installed later as a function of the needs



Best PUE : ~ 1.47

Capacity : 80 racks

28 installed - 52 left

1 rack = 730 TB or 20,5 kHS06 (2014)

2*250 m2 to use

- ▶ The french central point for storage and compute large datasets
 - ▶ main backbone of the french NGI
- ▶ the main user of the french NREN
 - ▶ behaves like a leader in driving the network increase bandwidth
 - ▶ good connections
- ▶ accustomed to work in international collaborations
 - ▶ WLCG , EU projects, Consortium of similar HEP (EU-T0), LIA (China,Japan)
 - ▶ and with other communities (Humanities, Bio-medical...)

Thank you