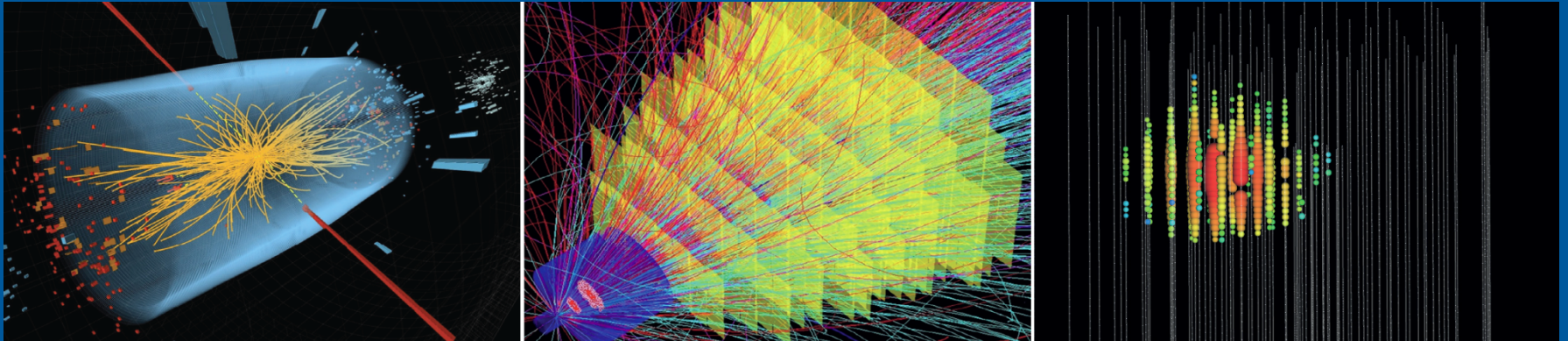


# LK I — IT developments for HEP



Paul Millar – DESY

# Introduction

This talk introduces **IT developments\* from LK I:**

- Big Data solutions with dCache,
- Network connections,
- High Performance Computing (HPC),
- Complete data life-cycle.

\* IT developments reported here are from DESY; KIT IT developments are presented in the Research Field: *Key Technologies*.

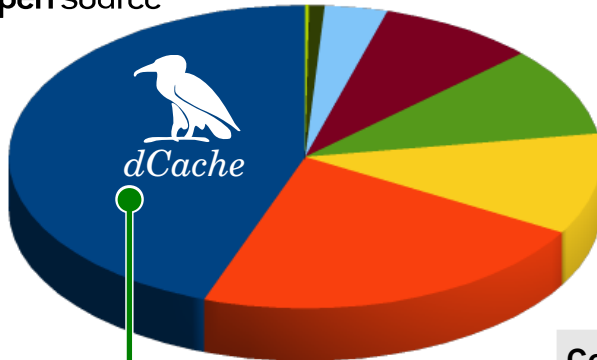
The LK II developments are covered in a plenary talk.

# dCache: managed storage software for Big Data



LHC data stored on each storage system

Source: BDI published data (2014-01-30)



- dCache (92 PB)
- DPM (46 PB)
- EOS (22 PB)
- StoRM (20 PB)
- CASTOR (18 PB)
- BeStMan (7.1 PB)
- Globus FTP (1.7 PB)
- ARC (0.5 PB)



**Core team**

- 5 FTEs
- 2 FTEs
- 1.5 FTEs

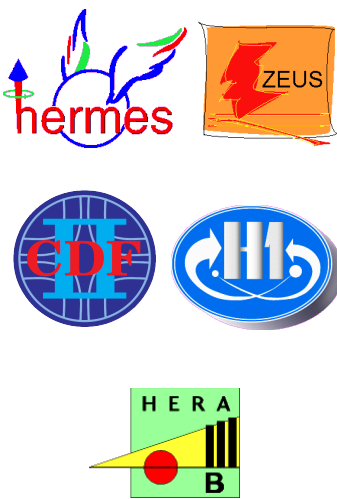



*dCache*

**Student mentor programme**

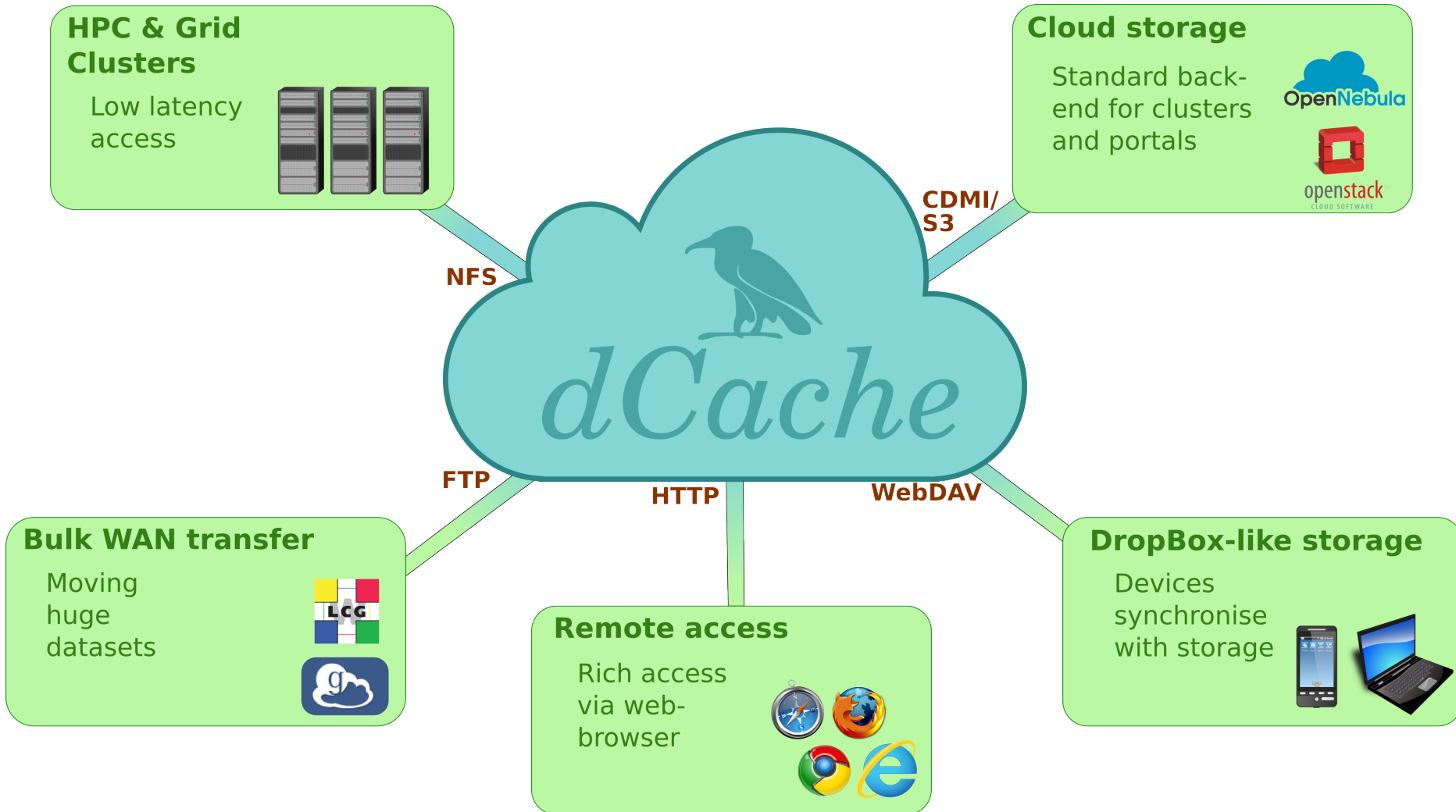
Hochschule für Technik und Wirtschaft Berlin  
3 students

**Collaborations**

# dCache evolution for Big Data and Cloud

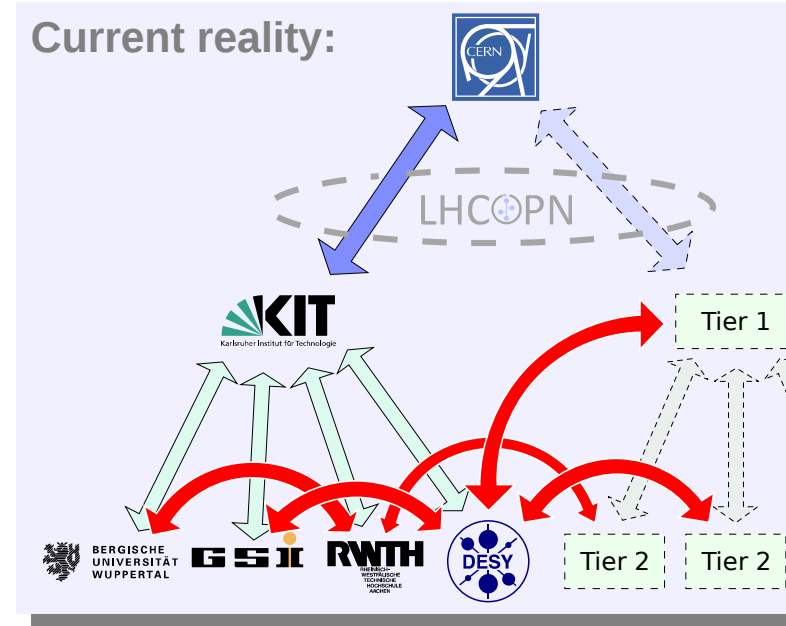
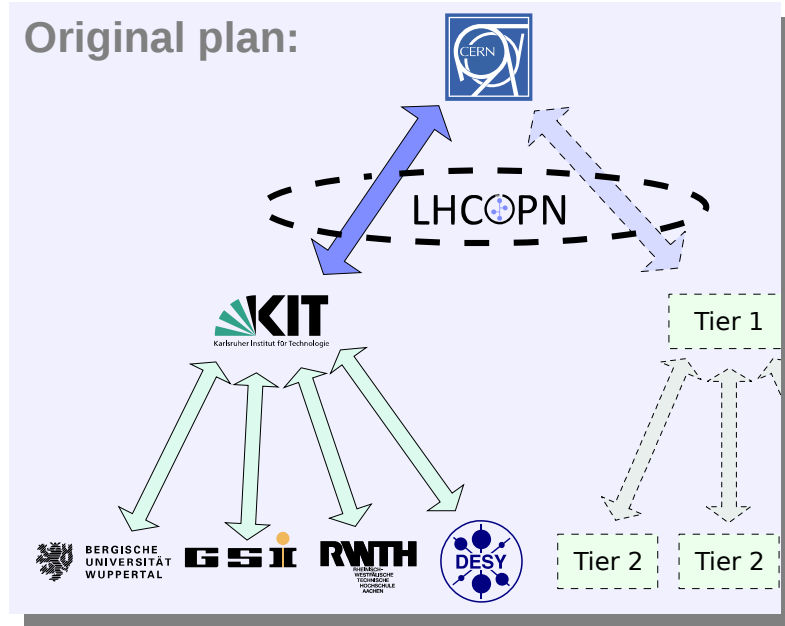
Era	Disk cache	Grid Storage	Generic Storage	Cloud Storage
Additional Communities				
Additional Authentication	Trusted host	X.509, Kerberos	Username+PW	SAML, OpenID, OAuth, Token, ...

# Big Data Strategy

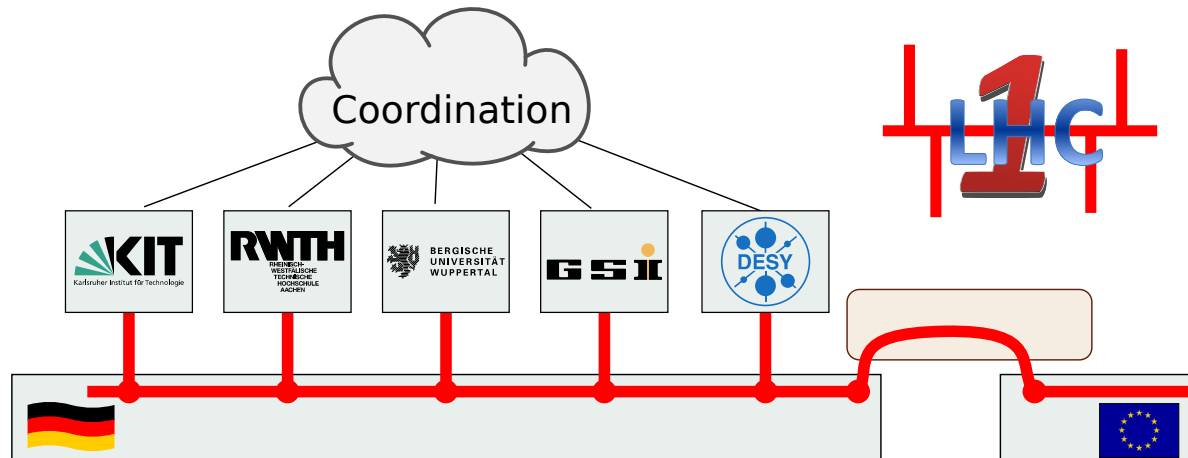


# LHCone: advances in networking

The Problem

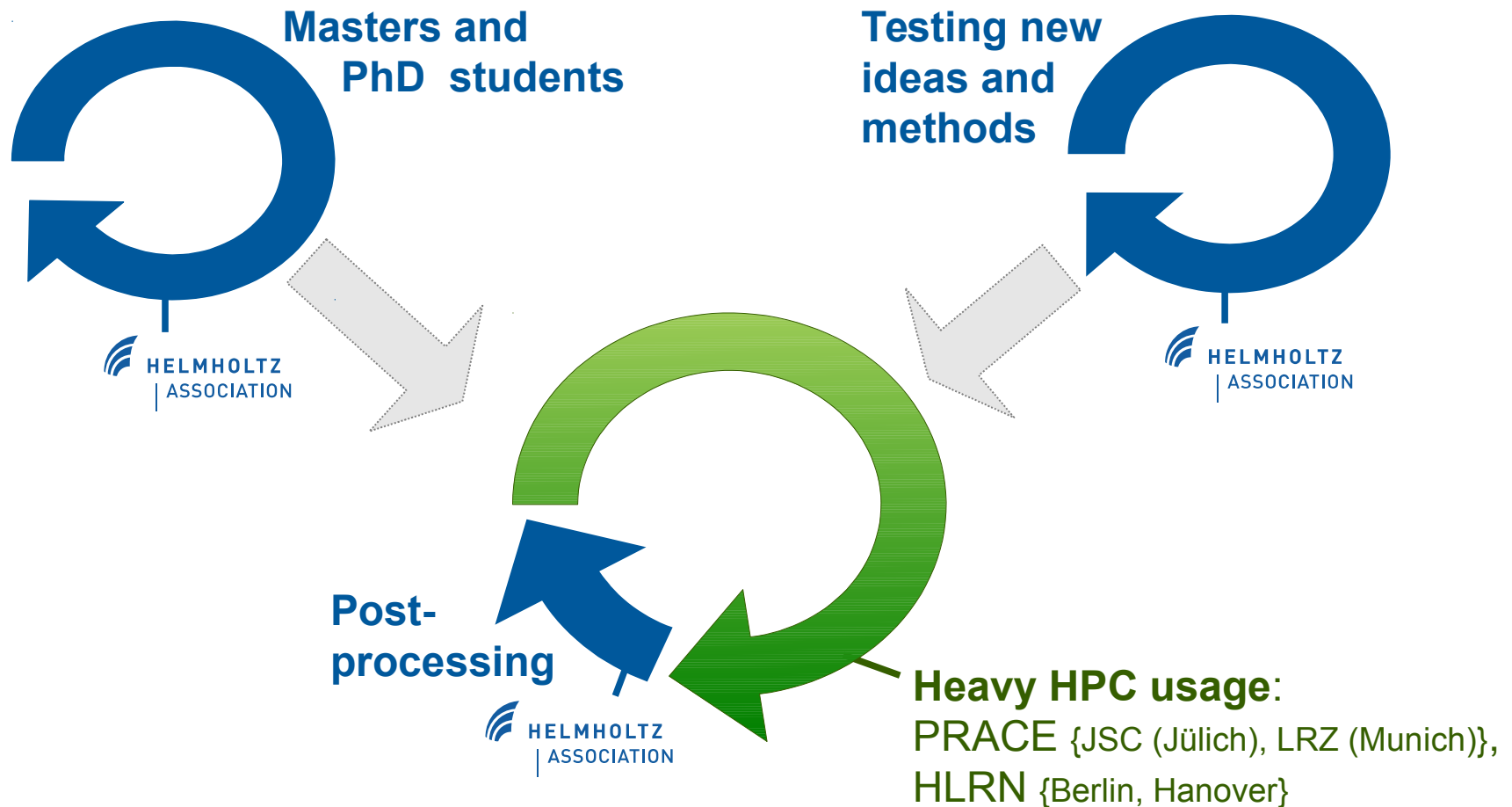


The Solution

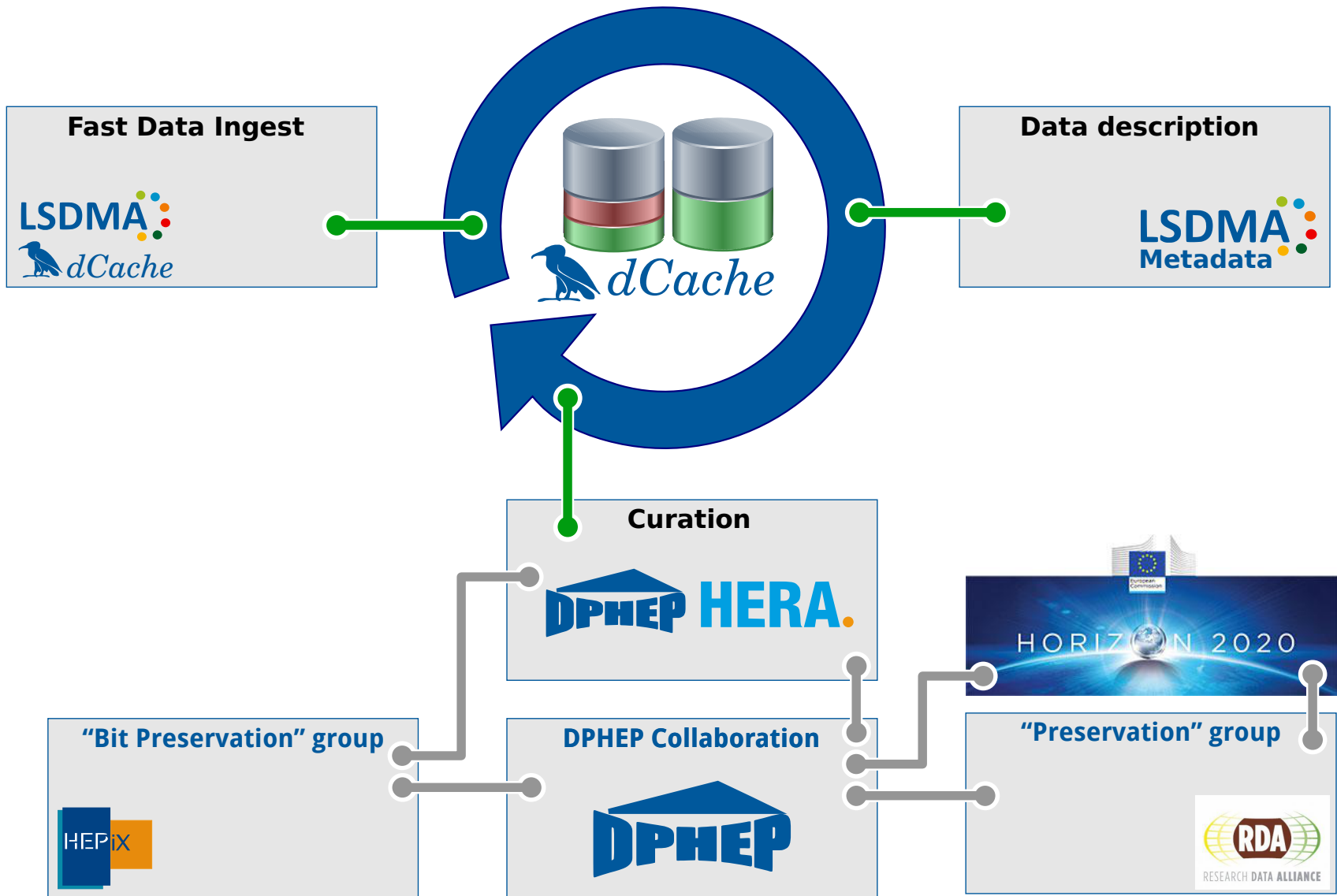


# High Performance Computing (HPC):

Lattice QCD, Simulation for Photon Science, Plasma acceleration, ...



# Handling the complete data life-cycle





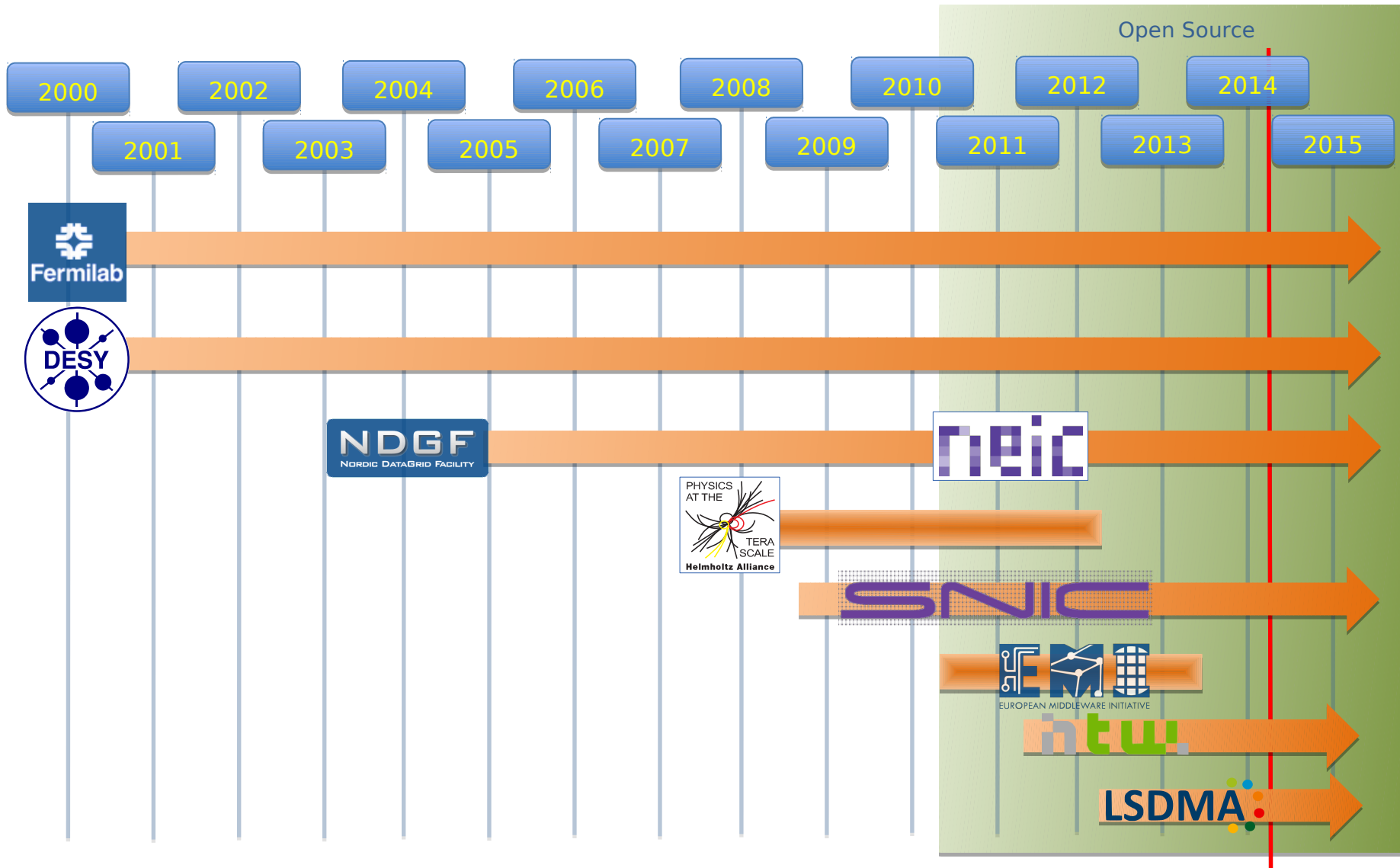
# Strategic outlook

We are advancing IT by

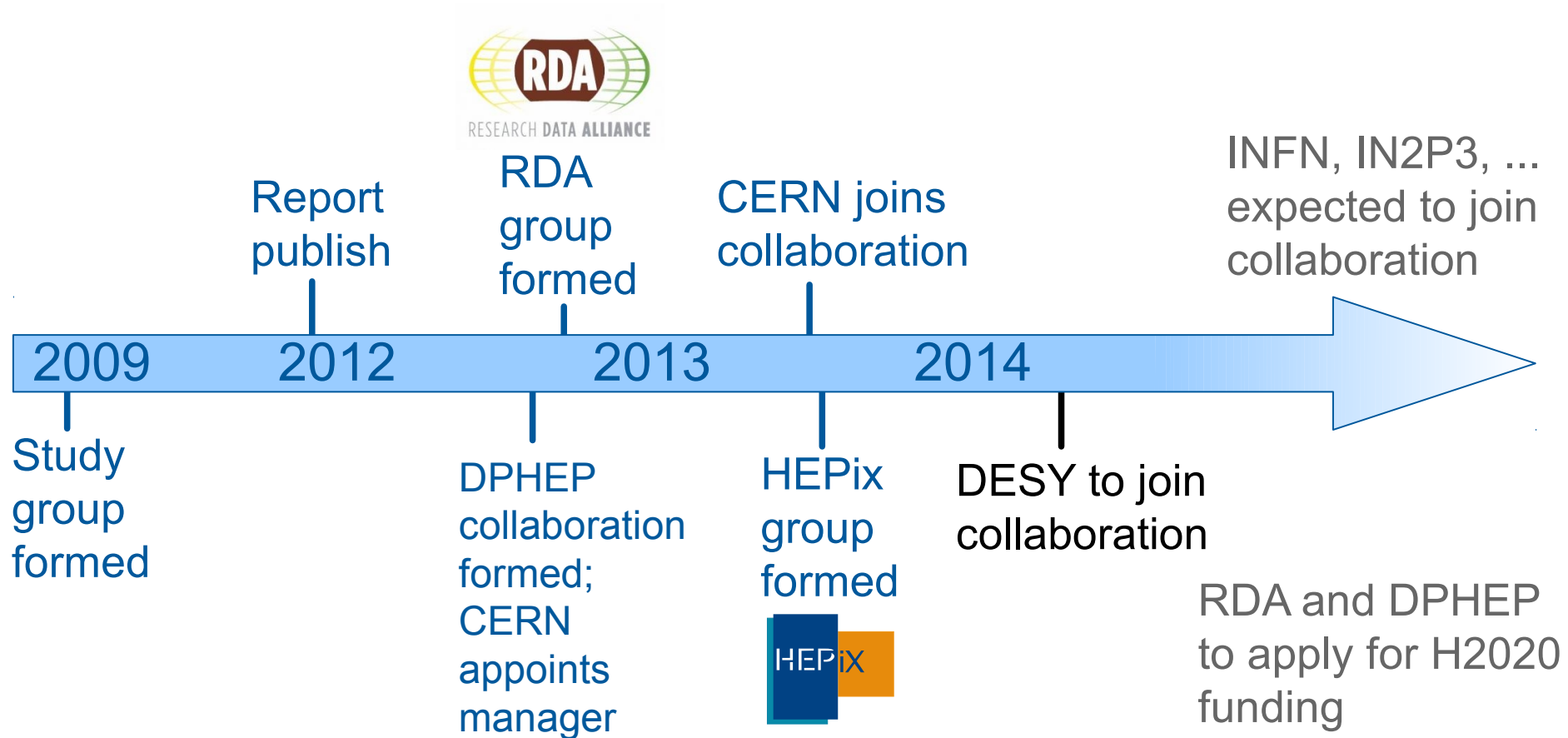
- Solving many community's **Big Data** challenges,
- Advancing **network** connectivity,
- Developing solutions for **High Performance Computing**,
- Enhancing the complete **data life-cycle**:
  - Improving data ingest performance,
  - Managing data archive metadata,
  - Exploring data preservation.

# Supplementary slides

# Collaboration and funding for dCache



# DPHEP: curation of unique data



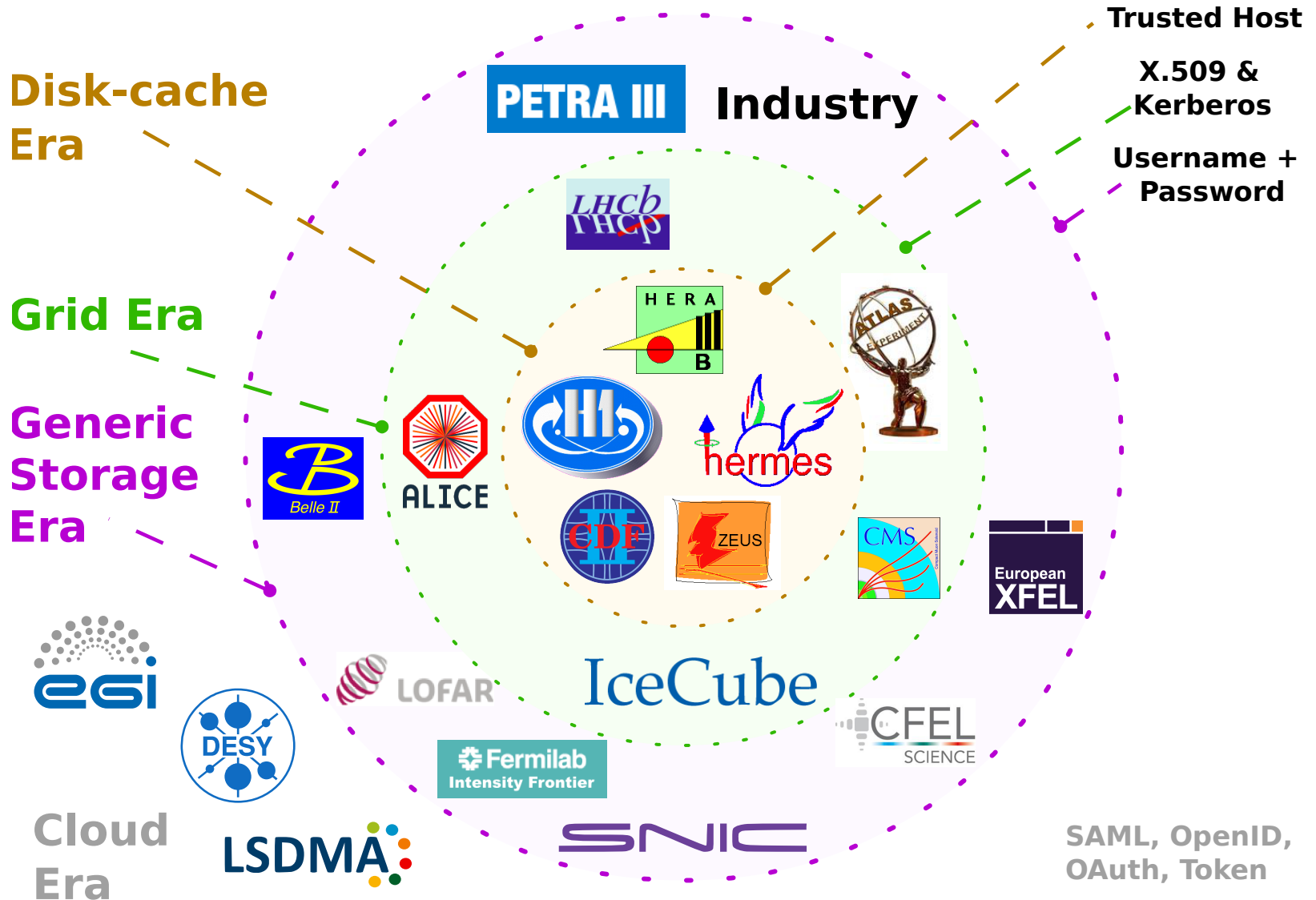
See [www.dphep.org](http://www.dphep.org).

# Backup slides

# dCache resources

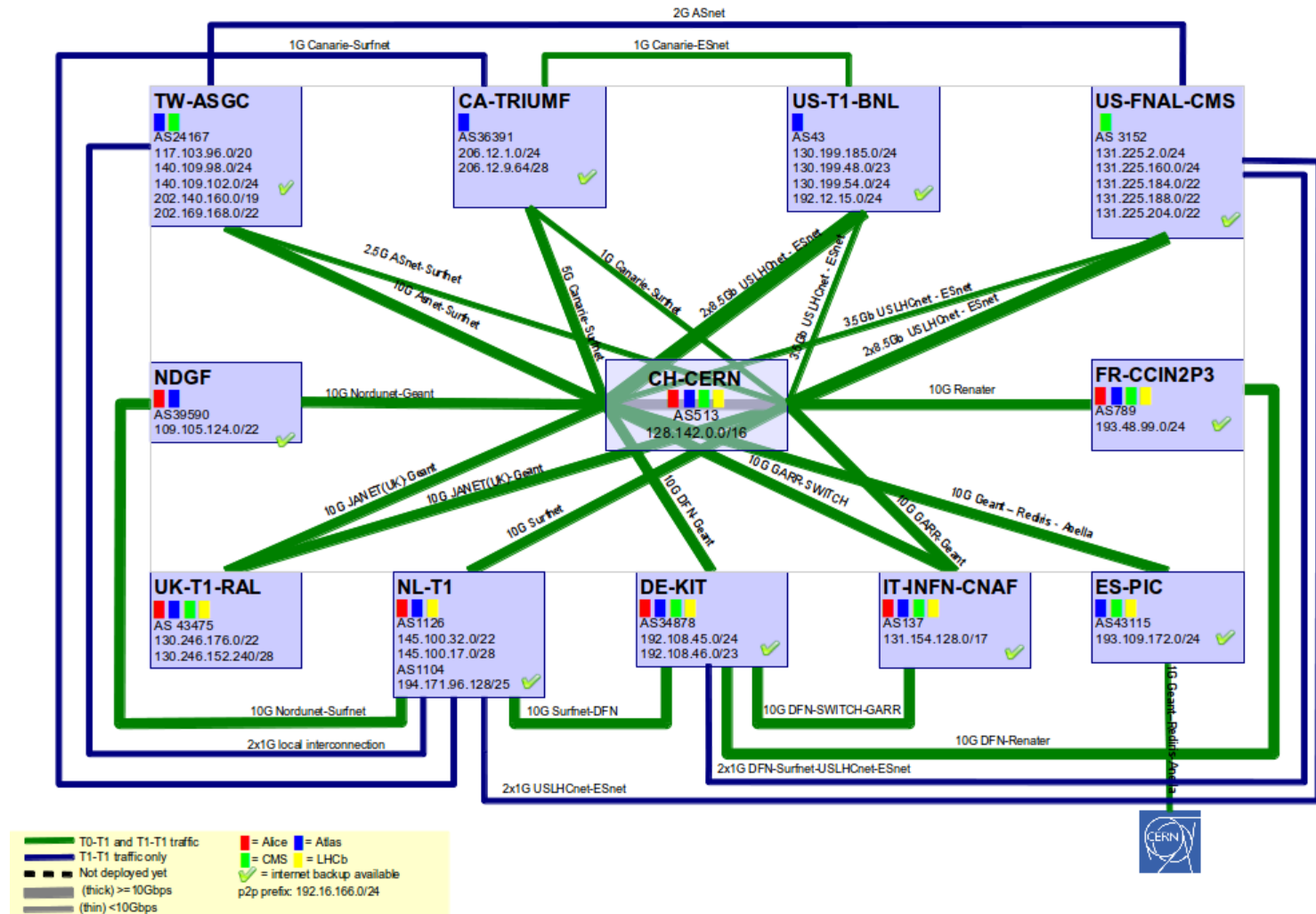
- DESY
  - **PoF / Base funding:** 2 FTEs
  - **LSDMA:** 3 FTEs
- Fermilab
  - 2 FTEs
- NEIC
  - 1.5 FTEs
- HTW
  - 3 Students

# dCache supported communities



# Advances in networking

## LHCOPN





# Advances in networking

LHCONE: A global infrastructure for the LHC Tier1 Data Center – Tier 2 Analysis Center Connectivity



Bill Johnston ESnet

