Data Preservation

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Definition

Digital Data are affected by digital obsolescence

- Medium
- Access
- Semantic

Preservation means

- bit preservation
- access preservation
- knowledge preservation

Why DP

Observations are unique:

Astrophysics, Earth Science pioneered DP:

FITS, Open Access Policies, OAIS

Experiments are reproducible:

but LEP, Tevatron, LHC, etc. will not

data exploitation by a larger community exists

Existing FP7 projects

SCIDIP-ES

(SCIence Data Infrastructure for Preservation - Earth Science)

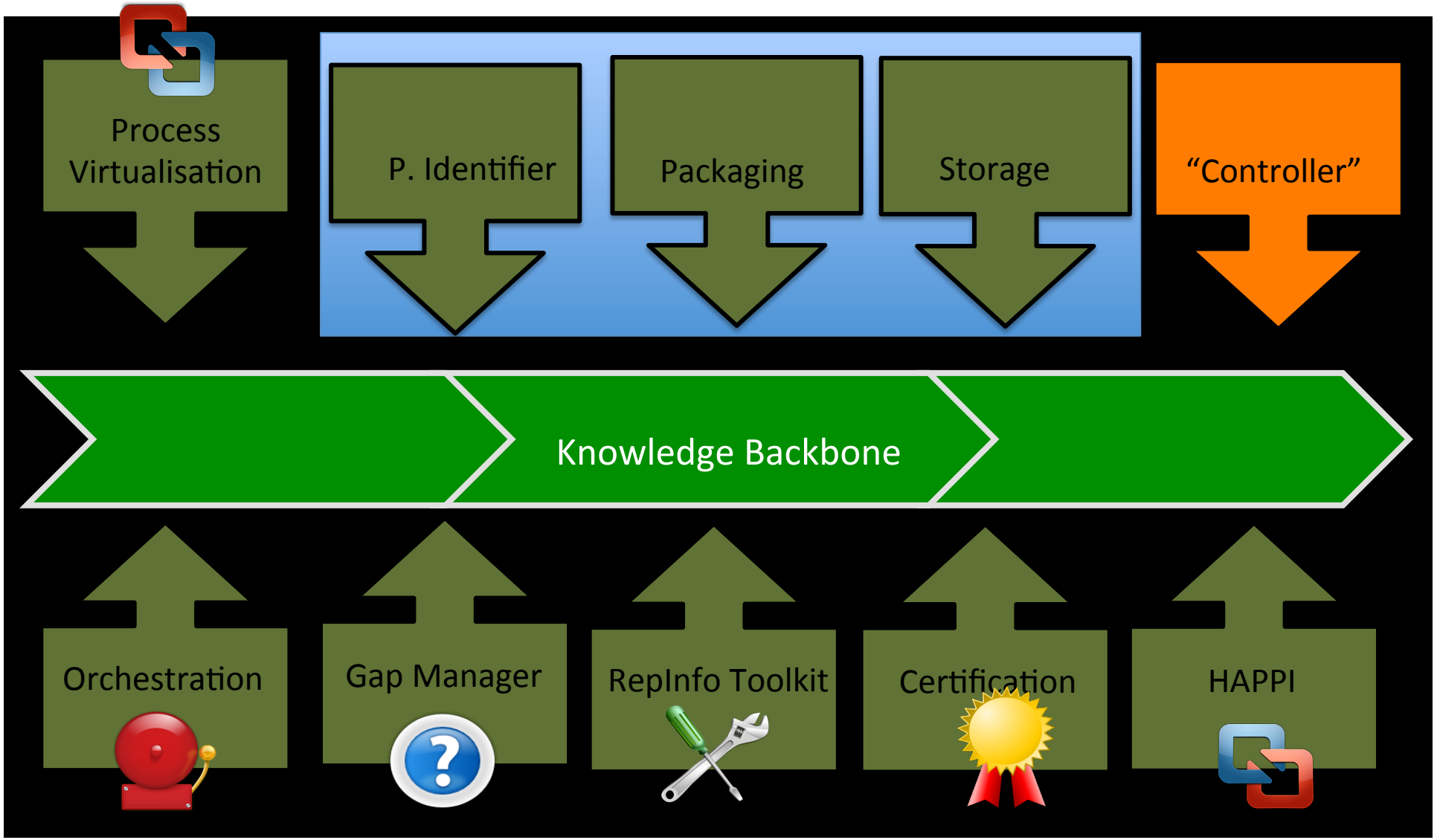
- Main Long Term Data Preservation. project Eu call INFRA-2011-1.2.2
- It address the issue of building the key information (knowledge) to allow access and understanding of experimental data in a technology independent way such that the preservation is really long term.
- The project implements components based on OAIS

EUDAT

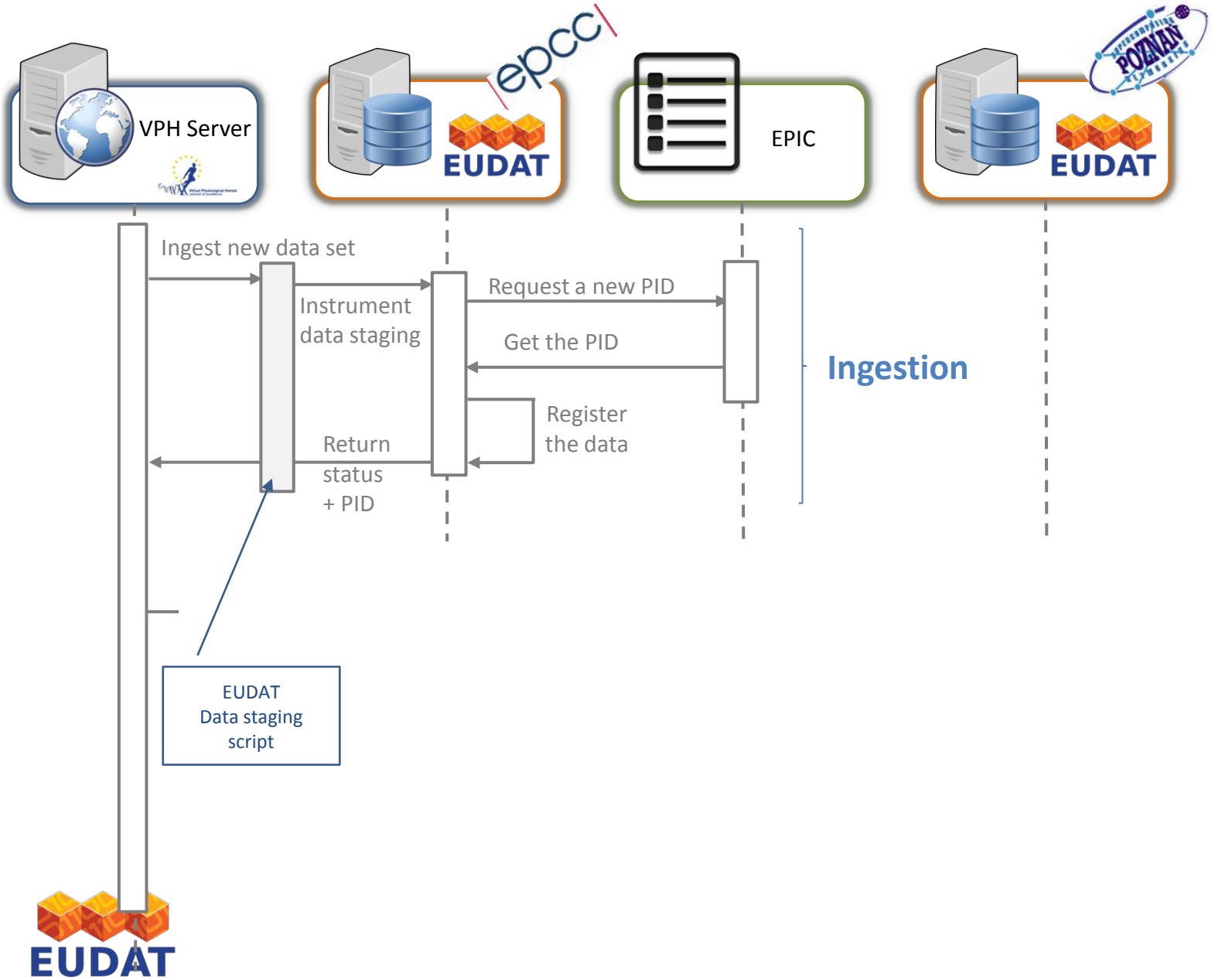
(EUropean DATa infrastructure)

- Builds data e-Infrastructure for storing, preserving and sharing through standard tools and services
- Data preservation is considered only for the bit preservation part

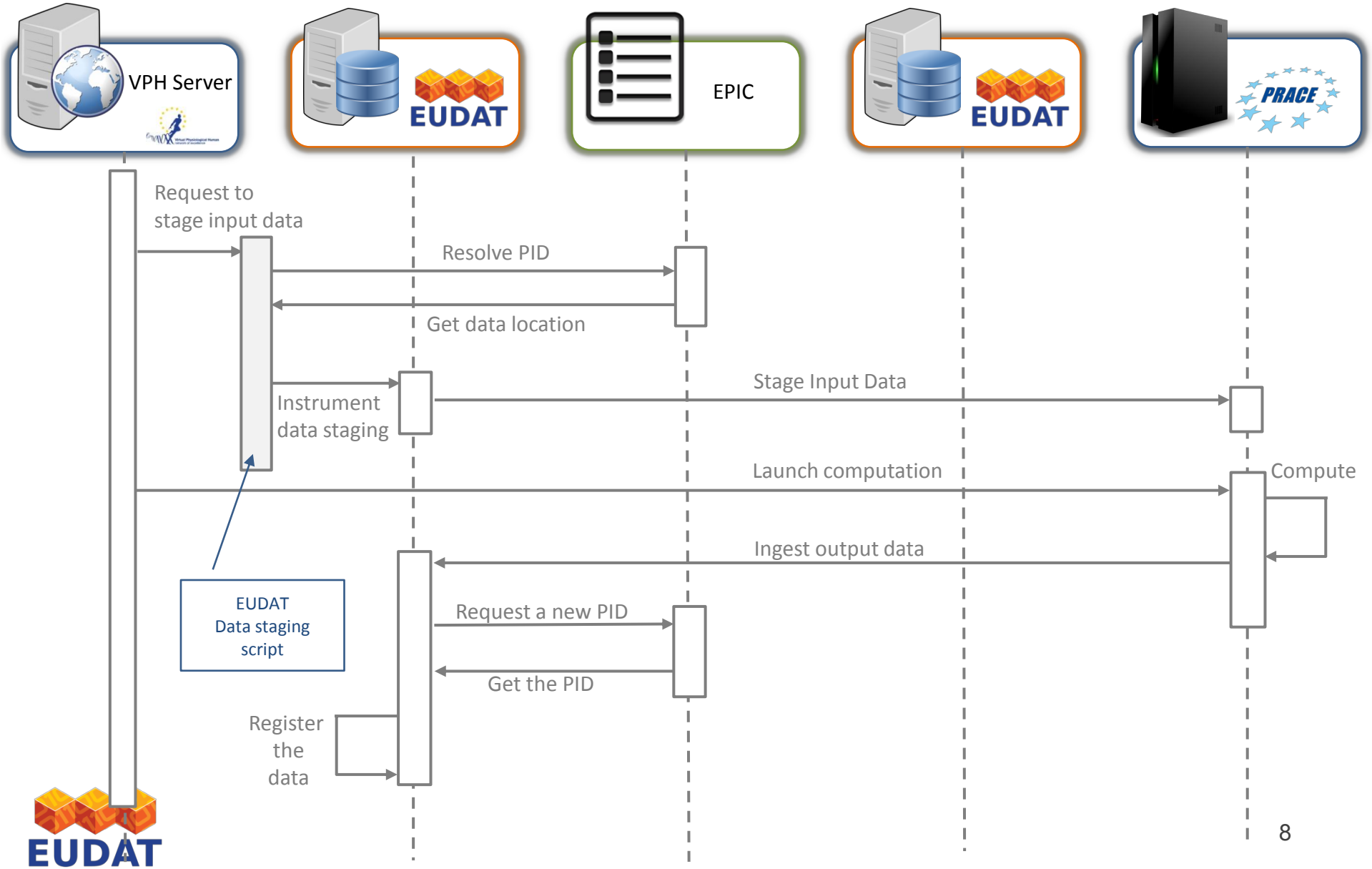
SCIDIP-ES


Process Virtualisation
P. Identifier
Packaging
Storage
"Controller"
Knowledge Backbone
Orchestration
Gap Manager
RepInfo Toolkit
Certification
HAPPI

Ingestion


VPH Server
EUDAT
EPIC
EUDAT
Ingest new data set
Instrument data staging
Request a new PID
Get the PID
Register the data
Return status + PID
Ingestion
EUDAT Data staging script
EUDAT

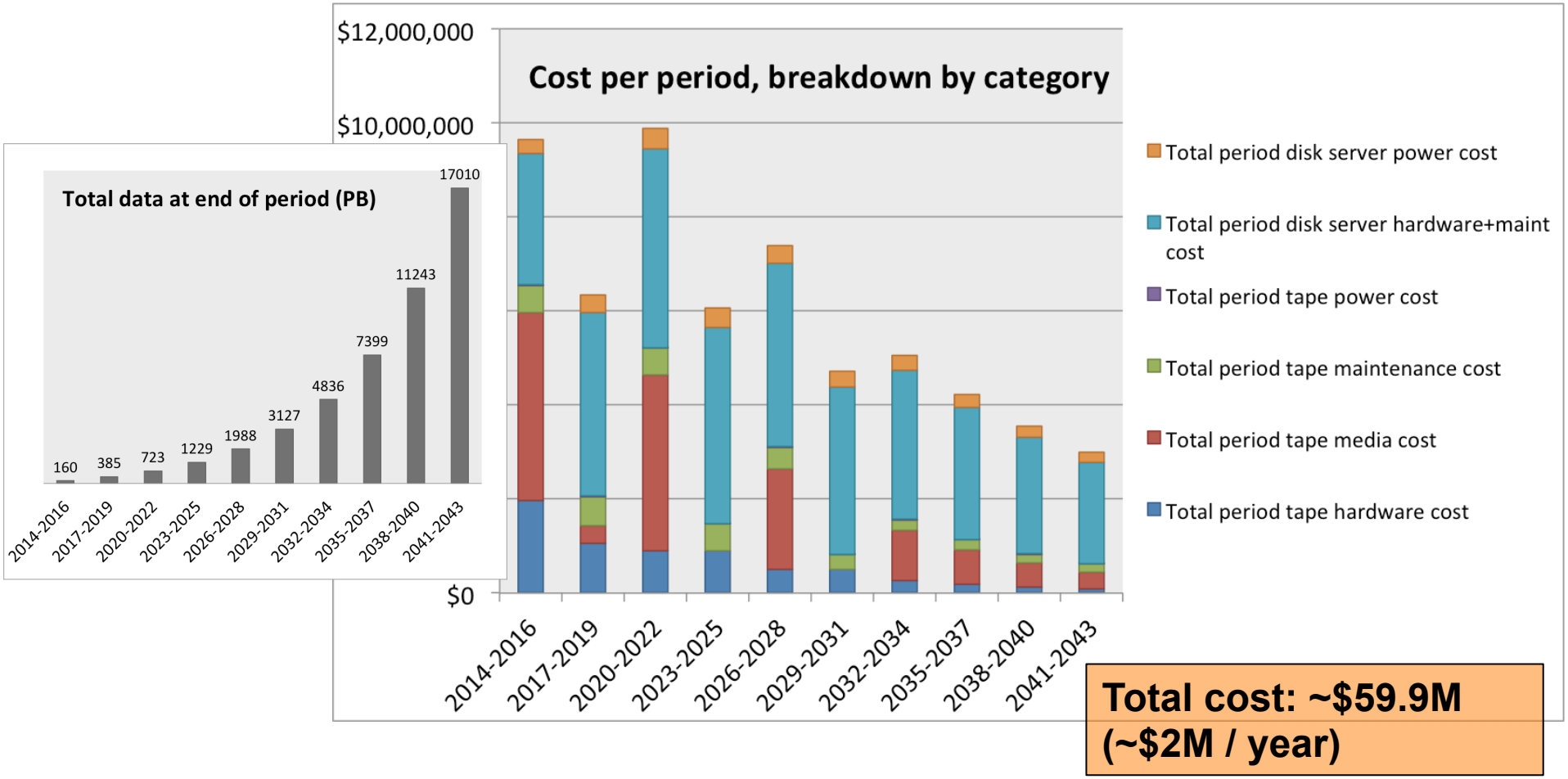
Staging


VPH Server
EUDAT
EPIC
EUDAT
PRACE
Request to stage input data
Resolve PID
Get data location
Instrument data staging
Stage Input Data
Launch computation
Compute
Ingest output data
EUDAT Data staging script
Request a new PID
Get the PID
Register the data
EUDAT

International Collaboration for Data Preservation and Long Term Analysis in High Energy Physics

- ICFA panel since 2009
- DPHEP Projet Manager appointed in October 2012 Jamie Shiers, CERN
- Intense activity in the last year:
  - Two DPHEP workshops (CERN)
  - Monthly Implementation Board meetings
  - Participation to many conferences and workshops: visibility and new opportunities
- CA agreement proposed (ICFA statement 2013)
  - Declare interest and possible areas of contributions (light commitement)
  - Strong support for further funding programs (H2020)
  - Signed by CERN, positive echo and possible imminent signature from DESY, IN2P3, INFN, discussions ongoing in US

Cost of Curaration

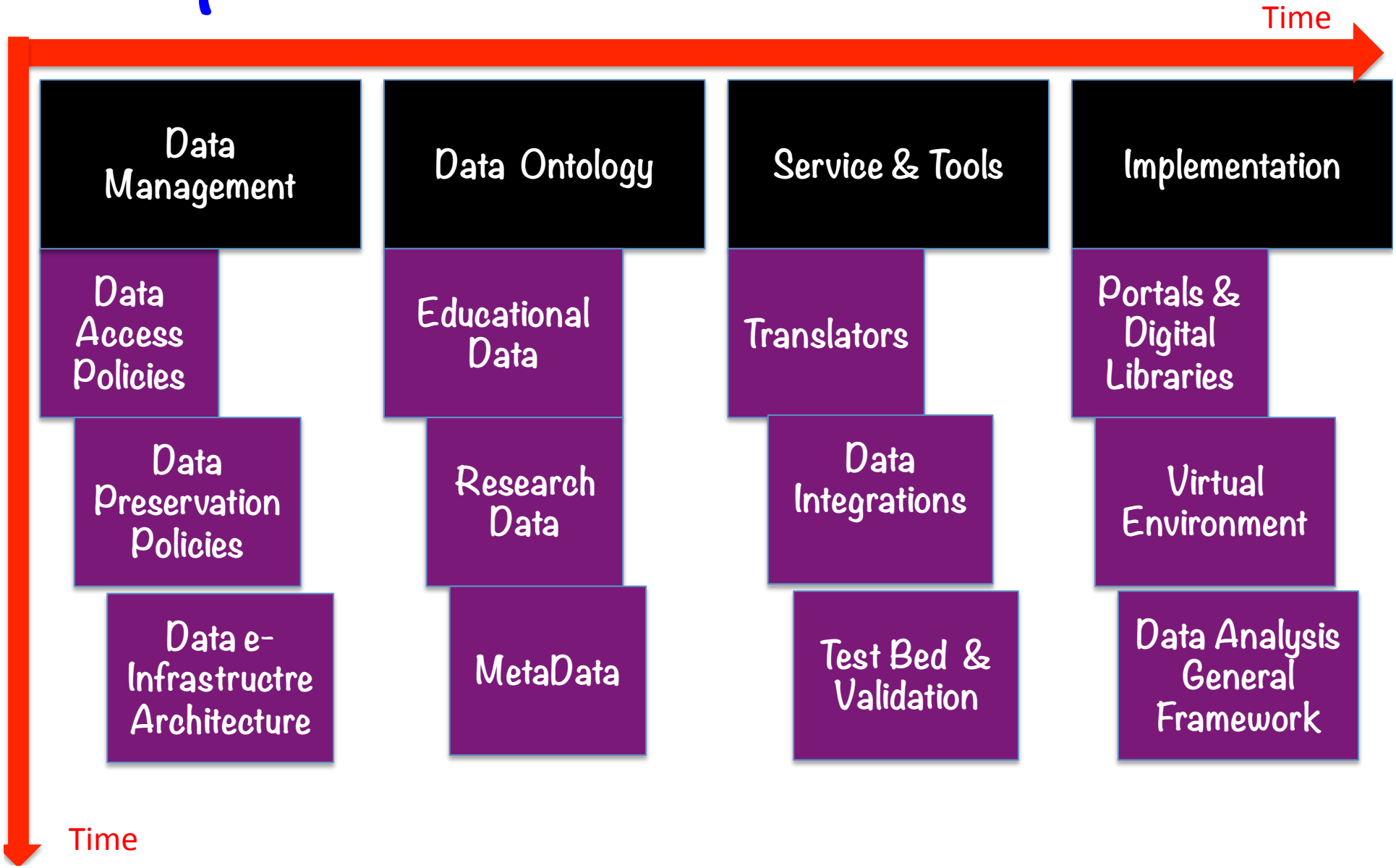


The annual cost of WLCG
(infrastructure, operations, services)
is ~100 M€

DPHEP Portal

- **Digital library** tools (Invenio) & services (CDS, INSPIRE, ZENODO) + related tools (HepData, RIVET, ...)
- **Sustainable software**, coupled with advanced **virtualization** techniques, "snap-shotting" (incl. CernVM[FS]) ***and*** **validation** frameworks
- Proven bit preservation at the 100PB scale, together with a **sustainable** funding model with an outlook to 2040/50 (+HEPiX coordination + RDA WG + H2020?)
- **Open Data ("Open everything")**

Open Data Work Plan Structure



The enemy

Each single experiments design proprietary SW and data format for resource optimization...

Not needed in Long Term

LEP decade: Factor 300 increase of CPU power

SHIFT50 DEC Alpha had 320 Cern Units = 2.5 SpecHEP

Today 1 machine is 64 core & 560 SpecHEP

Projects..?

- DPHEP portal: build in collaboration with other disciplines, including RDA IG and the APA...
  Proposal being prepared
- Digital libraries: continue existing collaborations & projects (also H2020 funding...)
  Services in place and in use
- Sustainable "bit preservation" – certified repositories as part of EINFRA-1-2014 – based on RDA WG "RFCs" for interfaces, functionality, federation etc.
  Also a service! Certification and standardisation desirable...
- "Knowledge capture & preservation": collaborate with SCIDIP-ES, APA(RSEN) and many others
- Open "Big Data": a Big Opportunity (for RDA?)
  Proposal exists – to be discussed in DPHEP shortly & with EU JRC / EUDAT / RECODE

The Picture

(OPEN) Access

Digital Library

Data Discovery

HPC

GRID

CLOUD

Experiment VRE

LOCAL BATCH

Fetch data & environment

Data Infrastructure (Ingestion, PID, Trust, Integrity, Replica, Sharing,…)

Data Curation

Storage

Storage

Bit Preservation

Knowledge Preservation

Network Infrastruture

Disaster Recovery

The proposed implementation in EUDAT

- Eudat competitive call for data preservation

ALEPH as "model experiment"

30 TB divided in 150000 files with a typical size of 200 MB.

for

Data Volume Collection

Data Disovery System

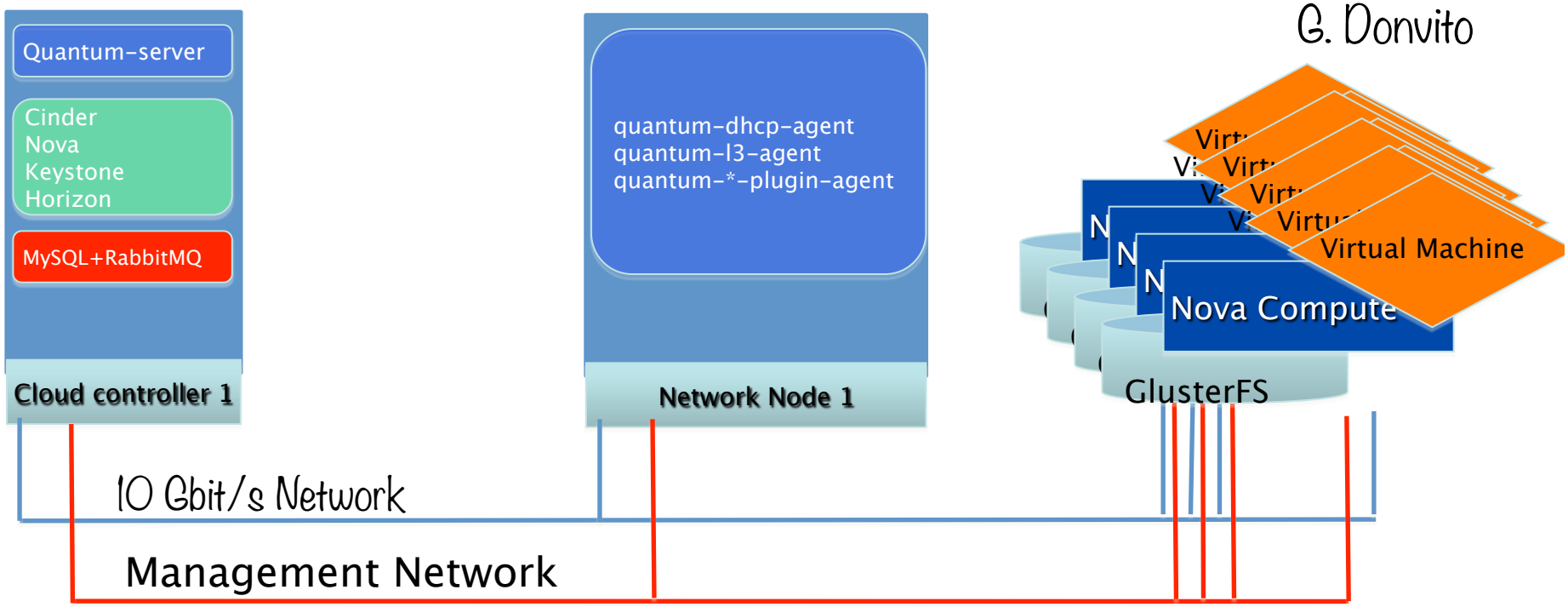
Data Analysis Cycle

Interplay between

a tailored Virtual Research Environment

and the use EUDAT tools to access the data

Implementation in Prisma Cloud



- 11 server
- 264 CPU/Core
- 880 GB di RAM
- 66TB HDD (DAS) 7.2K rpm

- 1 Manager Node
- 1 Network Node
- 10 Gbit/s on Wide-Area-Network
- In production with KVM nodes

Summary

- In several key areas, there are **services** and **solutions** in place that needs to be made interoperable and be integrated ("lego" project)
- Other requires further R&D (Scidip-research?)
- Preservation costs are negligible in a long term