

IP2i



EINSTEIN
TELESCOPE

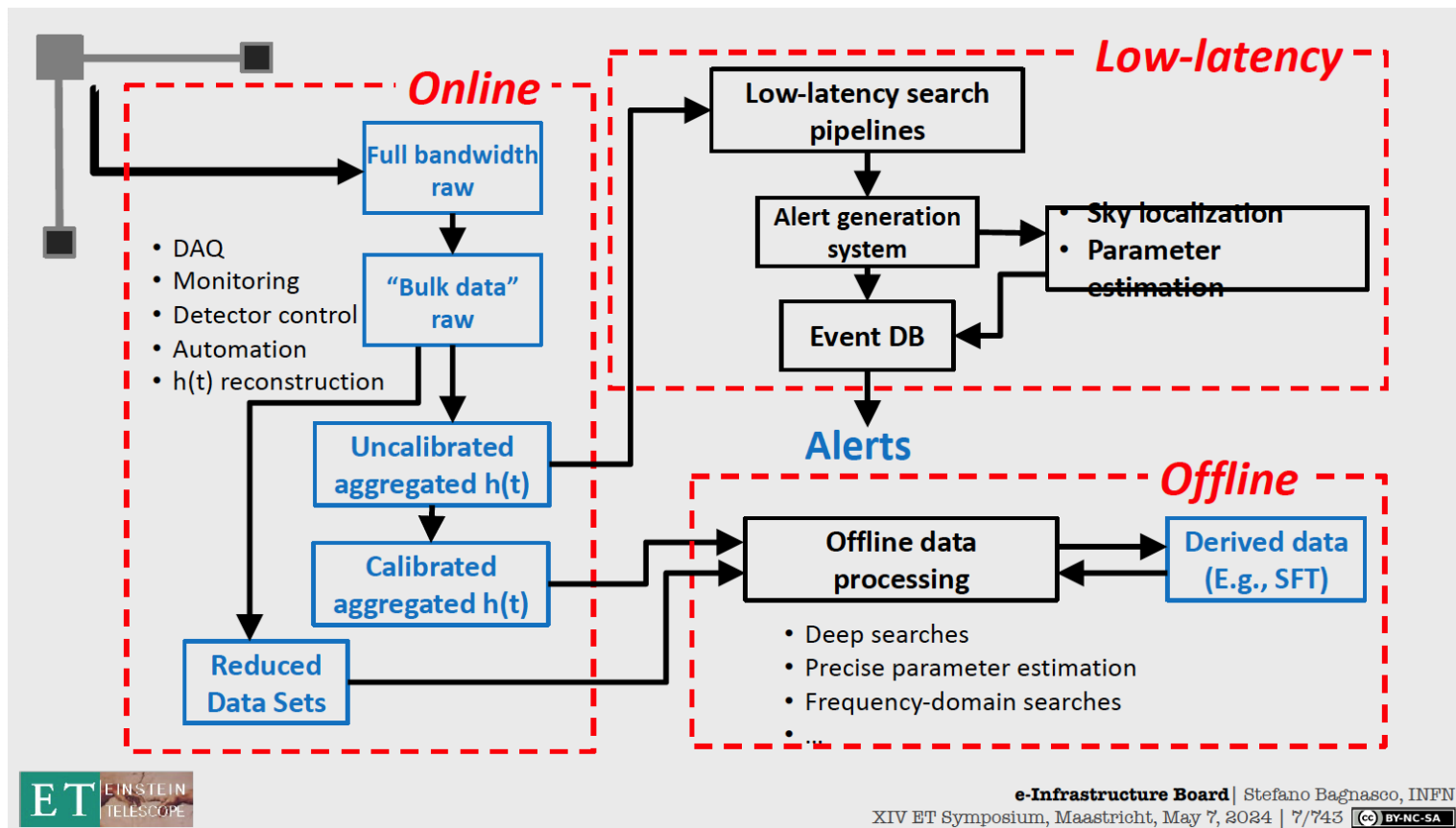
IN2P3

Institut national de physique nucléaire
et de physique des particules

e-Infrastructure Board

ET France meeting – IP2I Lyon
October 8th, 2025

patrice.verdier@in2p3.fr for ET-EIB



EIB Chairs: Stefano Bagnasco (INFN), Patrice Verdier (IP2I Lyon - IN2P3)

ET-PP WP8 leaders: Achim Stahl (U. Aachen), Nadia Tonello (BSC)

Division 1: Software, frameworks, and data challenge support

Andres Tanasijczuk (Université Catholique de Louvain)

Division 2: Services and Collaboration Support

Antonella Bozzi (EGO)

Division 3: Computing and data model, Resource Estimation

Gonzalo Merino (PIC)

Division 4: Multimessenger alerts infrastructure

Steven Schramm (Université de Genève)

TTG: Technology Tracking working Group

Sara Vallero (INFN Torino)

Task 8.1: T0 data center

Leader: Patrice Verdier (IP2I-IN2P3)

Task 8.2: Computing and Data Model

Leader: Paul Laycock (U. Geneva)

Task 8.3: Resources

Leader: Silvio Pardi (INFN Napoli)

Task 8.4: Data Access Implementation

Leader: Nadia Tonello (BSC)

Liaison with OSB Div. 10: John Veitch (University of Glasgow), Elena Cuoco (EGO)

Joint WP8+EIB weekly call for coordination

- OSB-Div. 10 is coordinating the MDCs
- Strong links with EIB
- 1st MDC done with available tools
- 2nd MDC with upgraded tools:
 - Ex: Rewriting of the MDC code (in C++)

General overview

mdcpp

- C++ library + bindings to Python
- standard application to simulate all implemented components

Example: simulate noise and blips [for a build using libtorch, job o] with standard application detsim for a ET-triangle-like dummy network:

```
./bin/detsim -j 0 \
  --add_ET_dummy --gen_gcnoise --gen_blipgl \
  --output_dir ./validation/output \
  --input_dir ./cfg \
  --start_time 1000000000 --segment_duration 2048 \
  --output_format gwf
```

@ Elena Cuoco

Einstein Telescope data analysis workshop

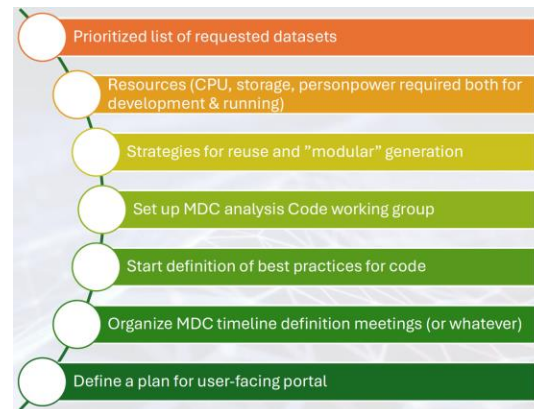
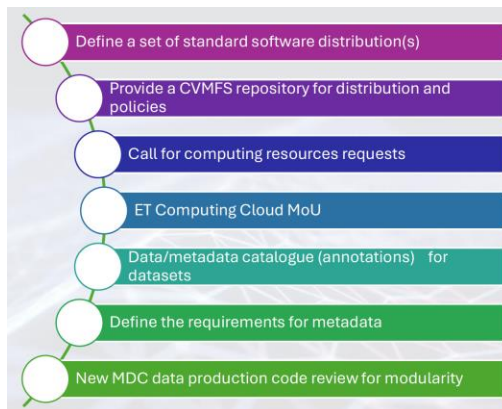
18–19 Feb 2025
Europe/Rome timezone

Overview

Timetable
Contribution List
Places for lunch time
Registration
Participant List

Elena Cuoco

✉ elena.cuoco@unibo.it





ET Authentication and authorization infrastructure (AAI)

- Implementing the AAI solution developed within ESCAPE and supported by major European centers/labs in HEP and astroparticle physics (AAI solution adopted by CERN, CC-IN2P3, CNAF...) : Indigo IAM: <https://indigo-iam.github.io/v/v1.8.3/>
- Working Group in place: CNAF, EGO, IJCLab**
 - Deploying an Indigo IAM instance for ET : **done** - <https://iam-et.cloud.cnaf.infn.it/>
 - Interface the ETMD with Indigo IAM : in progress
 - Implement first service/tool with this AAI system : to come
- Discussion also in progress to backport this development to IGWN (IGWN DIP Committee)**



EINSTEIN
TELESCOPE

Welcome to **et**

Sign in with your et credentials

 Username

 Password

Sign in

[Forgot your password?](#)

Or sign in with



Not a member?

Apply for an account

Register an account with eduGAIN

[Info and Privacy Policy](#)



July 2023:
ET application to
join the ESCAPE
consortium was
approved



Open Call for Open Science Projects

Launch event

15 March 2024
Online

- Opens: ~ March 2024 / Nov. 2024
- Submission within 60 days
- Project start: Sept-Dec. 2024 / Aug-Oct. 2025
- Budget: 100 - 250 k€ / project
- Duration: 1 - 2 years

GOAL:

Build on the science cluster approach to ensure the uptake of EOSC, i.e., consolidate FAIR services of the five Science Clusters and, more broadly, perform excellent science and pursue societal benefits by leveraging an Open Research approach.

TARGET USER COMMUNITIES:

Science Clusters and wider community (RIs, Universities, Institutes, either consortia, or individual researchers)

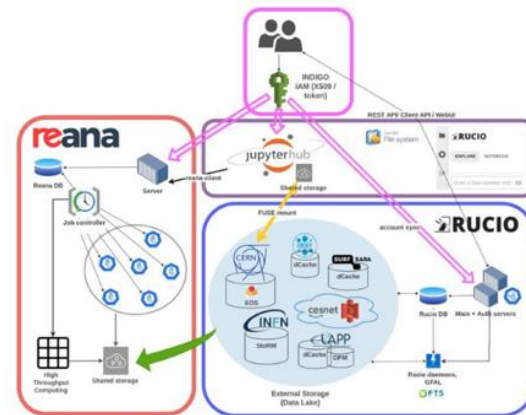
Evaluation criteria for the independent expert panel

- Project description: clear objectives, towards FAIR and open
- Scientific impacts: multiple RIs / cross-cluster
- Digital resources: use of EOSC services / new EOSC service
- Implementation: realistic within budget

GLAMANNA

EVERSE & OSCARS Meeting – 13 March 2024

11

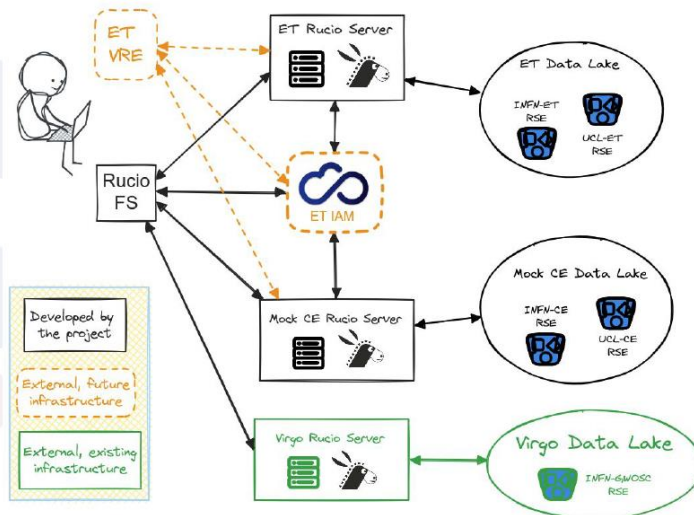


@ Federica leger

Proposed Setup



- The **Multi-RI data lake** for ET and CE is the innovative development
 - OpenID Connect (OIDC)** for authz
 - CE Rucio to trust ET IAM as an IdP
 - allow Rucio client to connect to more than one Rucio server
- POSIX like view of the data with **RucioFS**



Collaboration
Torino, Louvain, Geneva
2 software engineers hired

Preparing an ET contribution for the next ESCAPE steps:

=> **HORIZON-INFRA-2026-01-EOSC-01**

WP8 Deliverables are well on track thanks to close collaboration between WP8 and EIB



ET-PP WP8 Computing and Data models

Workshops		WPs	Due date	
WP8 milestones	M8.1	Workflows Requirements collection and constraints: computing and data		Sep 2023 Oct 2023
	M8.2	Computing Infrastructures availability for ET workflows, characteristics and sustainability	WP9	Aug 2024 July 2024
	M8.3	On site infrastructure, computing and data model	WP6	Aug 2025
	M8.4	Low latency and offline workflows and computing model	WP6	Dec 2025
	M8.5	Data management, access, policy and implementation	WP2, WP6	July 2026

Workshop at CCIN2P3
June 2025

		Lead	Due date	
WP8 Deliverables	D8.1	Computing and Data Requirements	<u>UniGe</u>	Feb 2024 Feb 2024
	D8.2	Computing and Data Model	<u>UniGe</u>	Feb 2026
	D8.3	Data Access Implementation Guidelines	IFAE	July 2026

➡ Huge effort
in progress
(next slide)

All details in the presentation of Paul Laycock in Bologna: <https://apps.et-gw.eu/tds/?r=19727>

THE COMPUTING MODEL AS D8.1

- The **overall architecture of the e-Infrastructure**, either as a single integrated system or as a few separate systems (e.g. instrument control and DAQ, low-latency, and offline)
- A **documented way of evaluating the required computing power** and storage space from the **evolving scientific program of the collaboration**
- ~~Estimates of the involved costs and growth timelines~~
- A **description of the data flows**, with estimates for the needed network performances
- A description of the **User Experience and workflows** for relevant activities
- A description of ~~the tools to be chosen or developed to provide all~~ the required functionalities (foundation libraries, frameworks, middleware,...)
- ~~Subsequent “Work Breakdown Structure” and “Implementation Plan” documents~~



**EINSTEIN
TELESCOPE**

ET Computing Model Writing Workshop

14–16 Oct 2025
Dipartimento di Fisica e INFN, Università di Torino
Europe/Rome time zone

Overview

Timetable

Registration

Practical info



Next EIB-WP8 Workshop : <https://indico.ego-gw.it/event/937/>

Torino – October 14-16

Contents

I Introduction	11		
1 Scope	12		
2 Science Drivers	14		
2.1 Basic principle of GW detectors	14	6.3.4 Data for Open Science	24
2.1.1 Interferometers	14	6.4 Workload management	24
2.1.2 Auxiliary signals	14	6.4.1 Workloads requirements definition	24
2.2 Analysis of GW signals	14	6.4.2 Monitoring and accounting	24
2.2.1 GW events	14	6.5 Software management	24
2.3 Multimessenger Astrophysics	15	6.5.1 Software framework	24
		6.5.2 End-to-end testing and CI/CD	24
		6.5.3 Release management	24
		6.5.4 ML training	25
		6.6 Identity and Access Management	25
		6.7 Network	25
3 Core Mission	16	7 Onsite Computing	26
4 Collaboration Science Goals	17	7.1 Detector controls	26
		7.2 DAQ	26
		7.3 Calibration	26
		7.4 Detector characterisation	26
II Core Mission	18	8 GW Events	27
5 Computing Model Overview	19	8.1 Search pipelines	27
5.1 Onsite Computing	19	8.2 Parameter estimation	27
5.2 Offsite Computing	19	8.3 Alert system	27
		8.3.1 Alert generation	27
		8.3.2 Event generation	27
		8.3.3 Event enrichment	27
		8.3.4 External alert handling	27
6 Core Services	20	9 Resource estimates	28
6.1 Data Format	20	9.1 Computing and data resource estimates	28
6.1.1 FAIR Principles	20	9.2 Computing and software personnel estimates	28
6.1.2 GW detector data format	23		
6.1.3 GW event/alert format	23	III Analysis	29
6.2 Databases	23	10 Collaboration	30
6.2.1 EventDB	23	10.1 Training and Documentation	30
6.2.2 Event-metadata capture	23	10.2 User support	30
6.2.3 Conditions metadata	23	10.3 Collaborative services	30
6.3 Data management	23	10.4 Interface to ETO-IT	30
6.3.1 Data archival	23	11 Open Science	31
6.3.2 Low latency data distribution	23	11.1 Open Science support	31
6.3.3 Distributed data management	23	11.1.1 Data Management	31
		11.1.2 FAIR software	31
		11.1.3 User support	31
		11.2 Resource Estimates	32
		11.2.1 Computing and data estimates	32
		11.2.2 Personnel estimates	32
		IV Strategic Considerations	33
		12 Sustainability	34
		13 Training of the next generation of experts	35
		14 Technology tracking	36
		15 Tracking evolving computational needs	37
		16 Potential	38
		16.1 Is there something specific to equal opportunities for ET?	38
		16.2 Cooperation with Industry?	38
		V Executive Summary	39
		17 Summary tables	41

Writing phase:
Due by the end of November
External Review before submission to
EC in February 2026

- **Data Access Policy is a Deliverable from ET-PP WP6 (for**
 - Strong pressure from EC officer for having the policy, aligned with all EU recommendations (Open data, FAIR)
 - Strong pressure from ET-PP review referees for having an ET DAP aligned with CE very early statement (arxiv preprint) that CE data will be immediately fully open

WP6 — TDRs and Physics Case

Liasion with ET Collaboration providing Science Case and Detector TDR
 Vacuum and RI TDRs under direct ETO supervision

#	Details	WP	Status	Due by	Delivered	Comment
D20	D6.1: Refined Science Case	6	Submitted to EC	Feb 2024	Feb 2025	Expected to be approved
D21	D6.2: Vacuum pipe Design	6	Submitted to EC	Aug 2024	Dec 2024	Expected to be approved
D22	D6.3: Preliminary RI TDR	6	Delayed	Aug 2024	July 2026	
D23	D6.4: Preliminary DET TDR	6	Delayed	Aug 2024	Feb 2026	
D24	D6.5: RI TDR	6	Delayed	Dec 2025	Delayed	Maybe not within ET-PP time
D25	D6.6: DMP and Data Access Policy	6		Jun 2026		Expected to be on track
M8	ET Collaboration in place	6		July 2023	June 2022	Done

**EC OFFICER AGREED WITH THIS PLAN
 TOOK NOTE ON DROP OF D6.5 — AGREED**

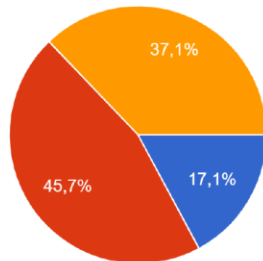
ACTION ITEMS OUT OF THIS MEETING

- D6.5 dropped ; D6.3 by July 2026 (under ETO supervision); D6.4 by Feb 2026
- Continue discussion on D6.6 preparation — anticipate some concepts in the Sept 10th document

A survey of DAP preference has been done by M. Punturo
 (c.f. Presentation in Bologna)

What is the data policy you expect in ET?

35 risposte



- Full open access: the calibrated "h-reconstructed" ET data is openly and immediately available
- Open access after a proprietary period of 1 year
- Open access after a proprietary period of 2+ years

Backup

«...to design, create and operate an evolving, efficient and functional e-infrastructure environment at a reasonable cost for the collaboration. Initially the focus will be the development of a Computing Model for the ET »

- Prepare a plan of the studies and activities that need to be undertaken for the development of the ET computing.
- Propose a computing model and its updates to the collaboration.
- Provide a software framework allowing **traceability and reproducibility, efficient job submission and data access**

Out of scope: actual science code, physics and engineering tools

JENA - Joint ECFA, NUPECC, APPEC Activities

The JENA Symposium in May 2022 in Madrid (<https://indico.cern.ch/event/1040535/>) revealed an increased need for discussions on the strategy of EU federated computing at future large-scale research facilities.

Focused workshop on the strategy of computing in [Bologna June 2023](#) aimed to define computing requirements in the next decade and to try and find synergies.

Outcome: creation of 5 WGs to generate input (whitepapers) for JENA Symposium in 2025:

- WG1: HTC, WLCG and HPC
- WG2: Software and Heterogeneous Architectures
- WG3: Federate Data Management, Virtual Research Environments and FAIR/Open Data
- WG4: Machine Learning and Artificial Intelligence
- WG5: Training, Dissemination, Education



Gonzalo Merino