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Status of the ET project

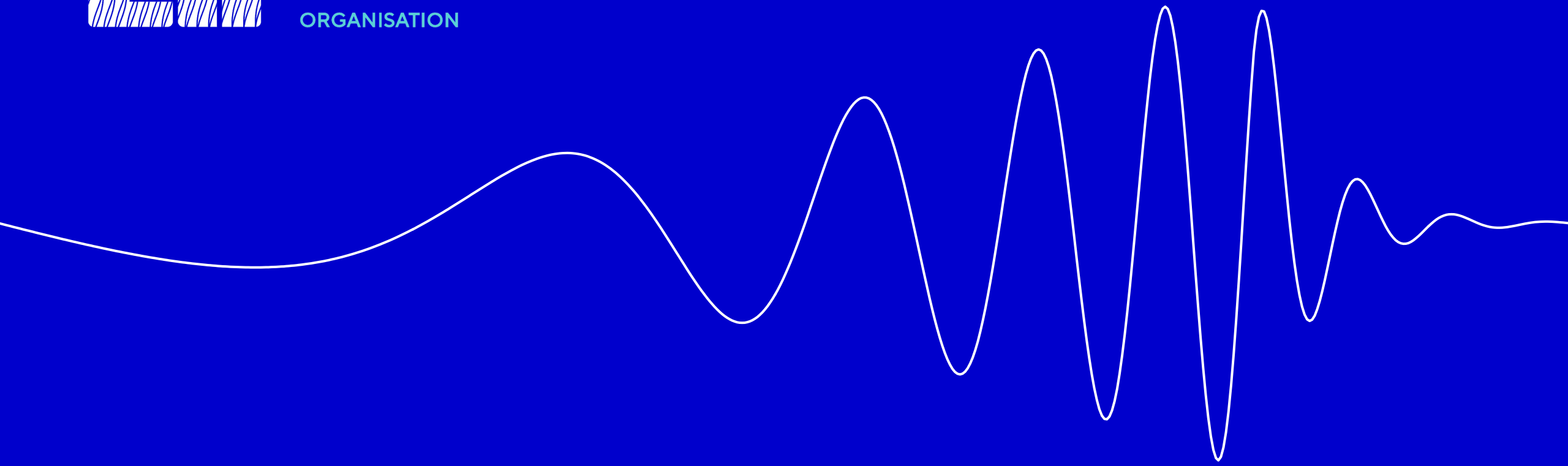
Fernando Ferroni

ET-Spain 4 November 2026

Overview

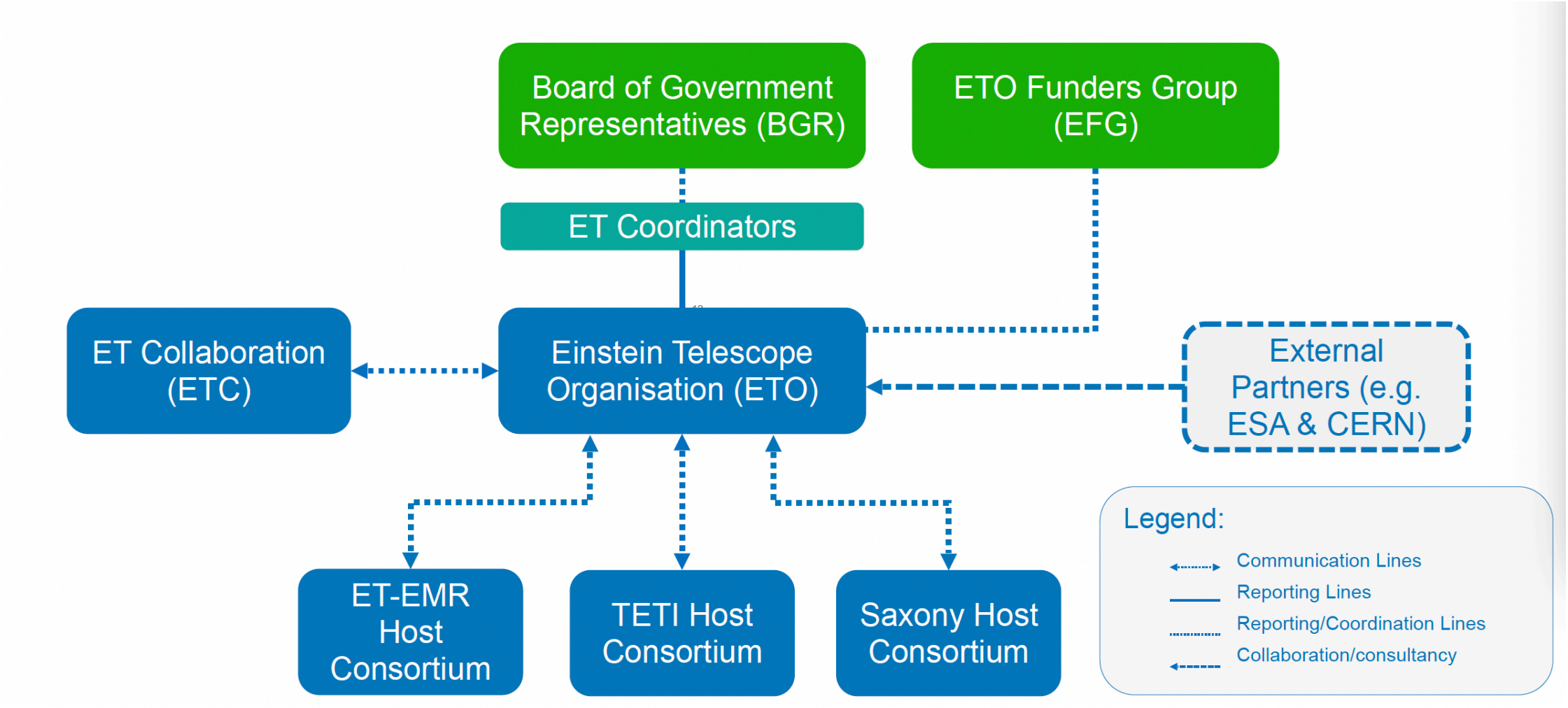
- ET Project Landscape
- ETO Activities
- Geometry Comparison Report

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ET Project Landscape

The ET (complex) landscape



Board of Governmental Representative (BGR)

Country	Status	Comment
Italy	Member	ESFRI Road 2012 Application – Lead
The Netherlands	Member	ESFRI Road 2012 Application – Co-Lead
Belgium	Member	ESFRI Road 2012 Application
Poland	Member	ESFRI Road 2012 Application
Spain	Member	ESFRI Road 2012 Application
Croatia	Member	New Member since ESFRI Application
France	Member	New Member since ESFRI Application
Greece	Member	New Member since ESFRI Application
United Kingdom	Member	New Member since ESFRI Application
Germany	Member	New Member since ESFRI Application
Czech Republic	Member	New Member since ESFRI Application
Austria	Observer	

ETO Funders Group

EFG: Established through the 2024 MoU

- Joint ETO Fund created by Nikhef, INFN, BELSPO and FWO
- Establishes the ETO Funders Group (EFG)
- Appoints Nikhef as administrator of the Fund; Operational arrangements governed through a dedicated Service Level Agreement
- **IFAE acceded in December 2025**

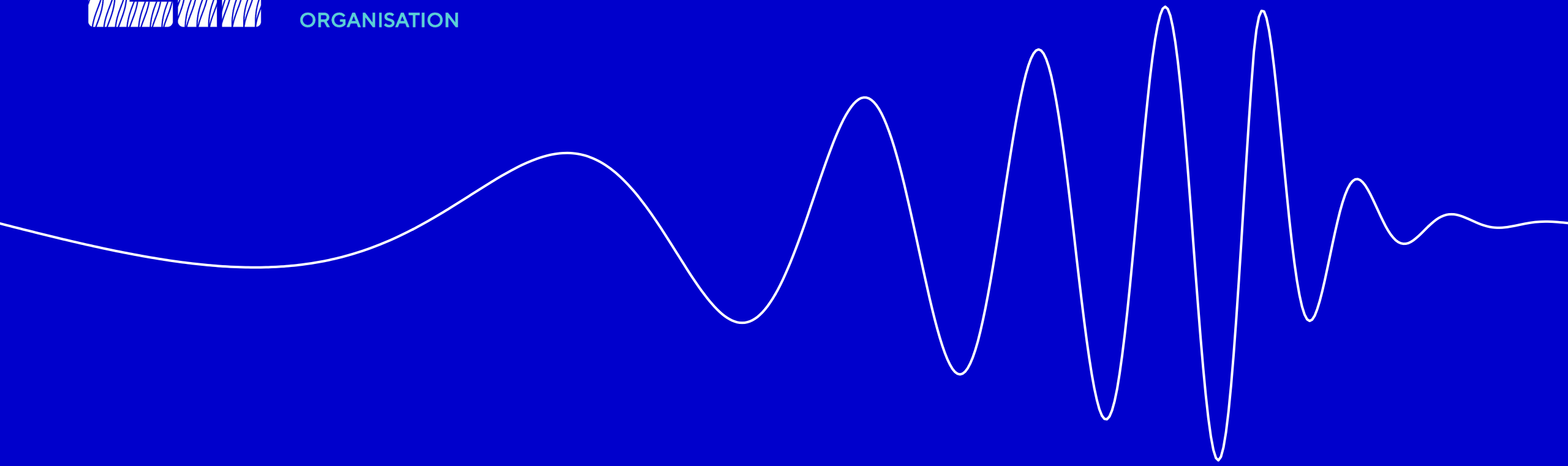


EFG members and guests at INFN, Rome, 16 July 2026

In person EFG meeting on 16 July 2026 | Rome

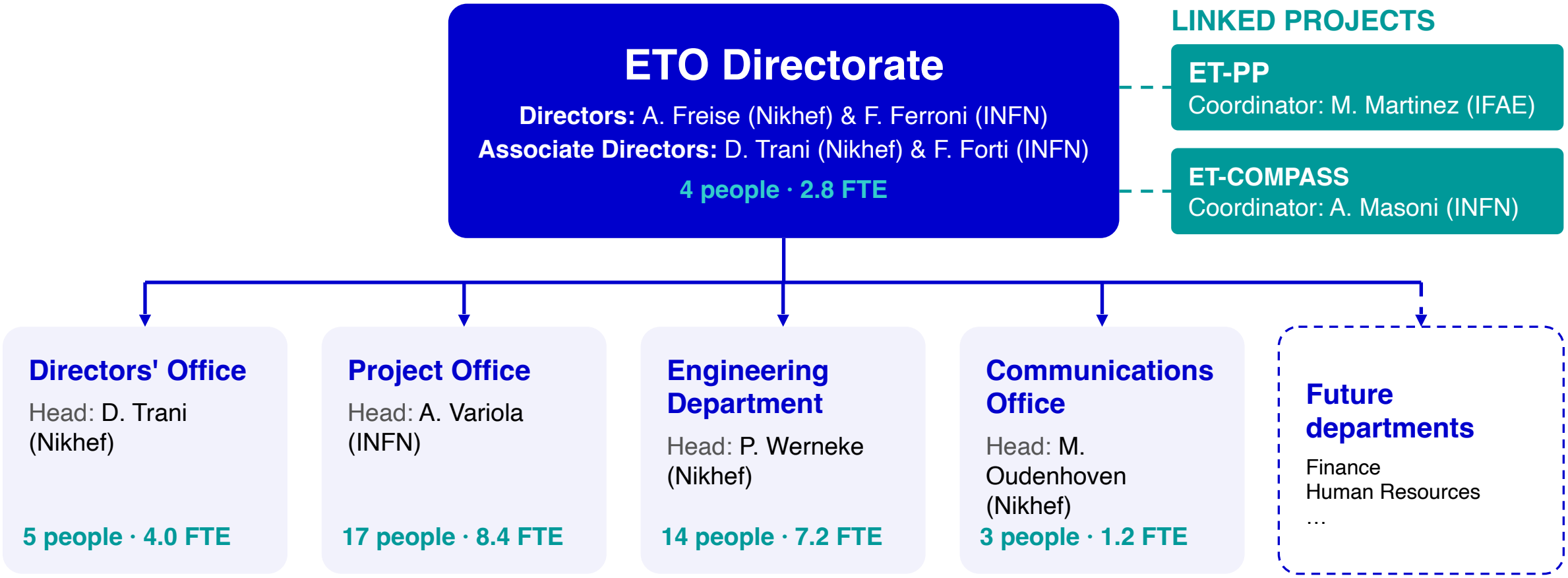
- IFAE participated for the first time as EFG member, Represented by Eugenio Coccia and Mario Martínez
- BMFTR joined as observer Represented by Eckart Lilienthal
- Updates were provided on the technical, financial and organisational progress of ETO

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Einstein Telescope Organisation

How ETO is structured



Status June 2026: 43 people provided in-kind to ETO, ≈ 24 FTE.

ETO personnel overview

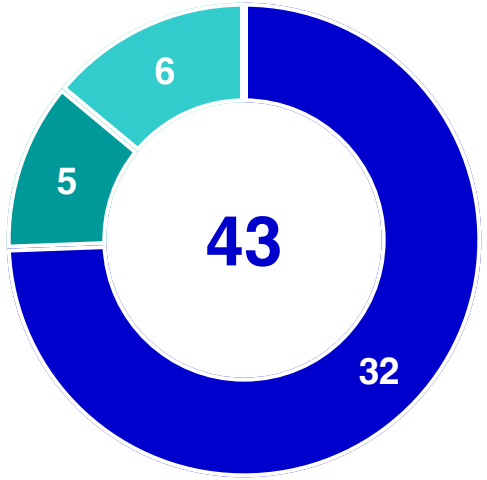
44 people* are seconded **in-kind** to ETO and embedded in its departments, representing **≈ 24 FTE**

- **Permanent staff** — seconded on permanent contracts — **32** people · **14.4** FTE
- **Temporary staff** — seconded on temporary contracts — **5** people · **3.9** FTE
- **ET-PP funded** — (partially) funded through ET-PP — **6** people · **5.3** FTE

20+ CERN staff also contribute via CERN–ETO agreements.

*Status June 2026

Headcount



FTE



ETO mandate

This mandate must be concluded, as phase 1, within 2027. Tt defines the Directors' mandate based on ETO's current mission for the ET project, namely:

- To coordinate the execution and delivery of specific work elements required for decision-making by the BGR […]
- To set up the project organisation necessary to successfully design, plan, structure and manage the ET project.

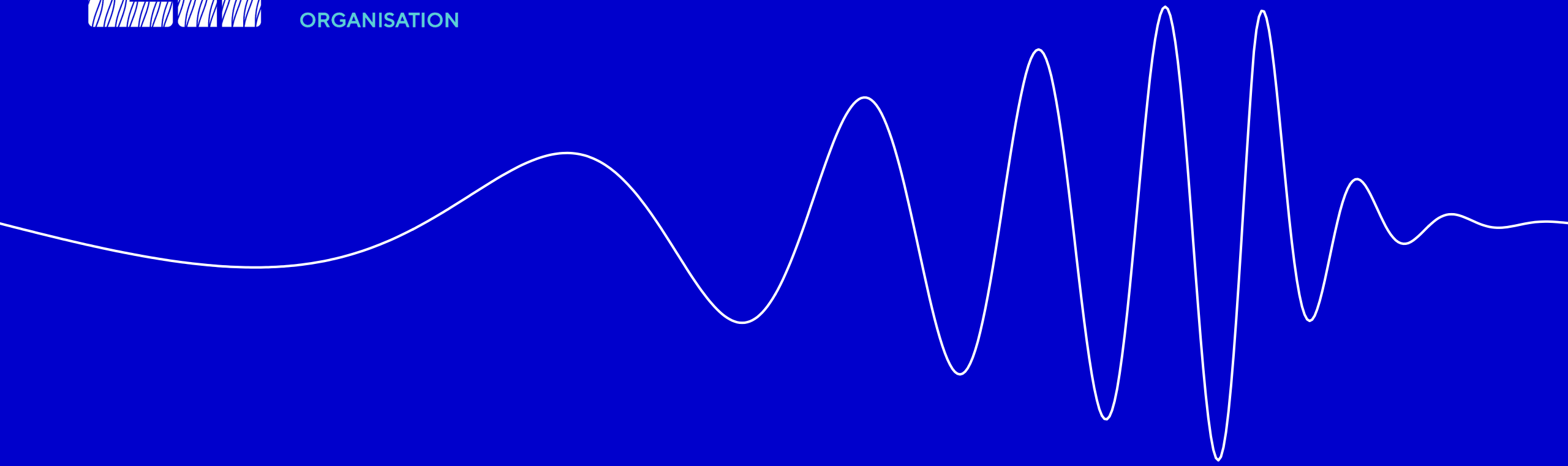
Scope of Mandate:

- Setting up and managing a coherent project framework for ET, which must include and enable all relevant stakeholders.
- Managing preparation and delivery of key documentation for the BGR-decision making process.
- Managing budget and resources assigned to ETO, including the ETO Funds and all in-kind personnel contributions.
- Being responsible for preparing coordinated responses to European calls supporting the further development of ET as an ESFRI Research Infrastructure and for the management of such funded projects.
- Managing the timely and effective reporting on ET within the ESFRI framework and contributing to its strategic visibility and positioning at European level.

In practice it gave a clear priority

- Project Management and Planning
- Detector Technical Design Report (DTDR)
- Civil Infrastructure Technical Design Report (CTDR)
- Technical Infrastructure Technical Design Report (TTDR)
- Costing and Financial Strategy
- Site independent Geometry comparison report
- Legal Affairs
- Stakeholder Interface Management
- Development and management of ETO
- Communication, External Relations and Public Affairs

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Directors’ Office

CERN's 2026-2030 Strategy commits to supporting ET

ET is explicitly named in CERN's strategy, giving a firm basis for continued collaboration through the preparation phase.



> *[…] Furthermore, given the significance to European science of the proposed Einstein Telescope (ET), CERN will continue its support through* ***externally funded activities****, including vacuum, civil engineering and other relevant technologies where CERN has unique and critical expertise.*

CERN's strategy and main objectives for the period 2026-2030 – Pillar 3, Aim 12

CERN and ESA extensions secure key expertise beyond 2026

ETO is negotiating extensions under both collaborations to retain access to internationally recognized expertise in areas critical to the ET preparation phase.

CERN

Scope

Collaboration spans Vacuum, CE, TI and Safety.

Current Agreement

Civil Engineering Collaboration ends in Dec 2026

Proposed Extension

2027-2028

ESA

Scope

Collaboration spans strategic and technical advice on Costing

Current Agreement

TPA ends in Dec 2026

Proposed Extension

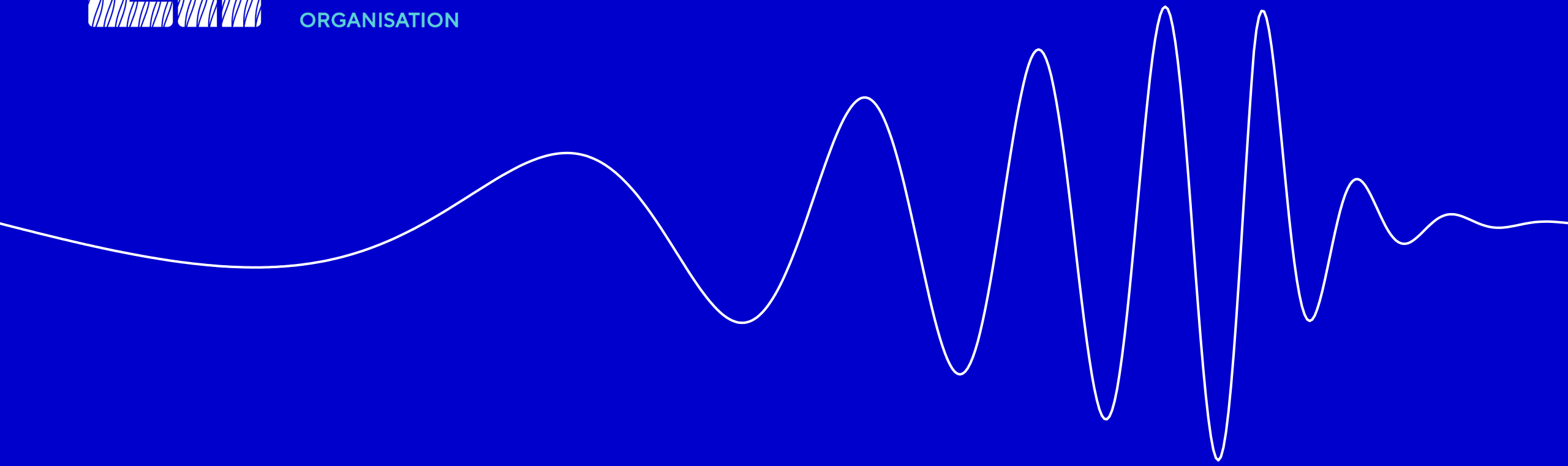
Extend and expand support beyond 2026

- ✓ Retains trusted, independent expertise of Europe's two leading Research Organisations
- ✓ Strengthens technical and cost preparation
- ✓ Supports transition from design studies to implementation planning

Next steps – Q4 2026

Finalise CERN extension & advance ESA discussions

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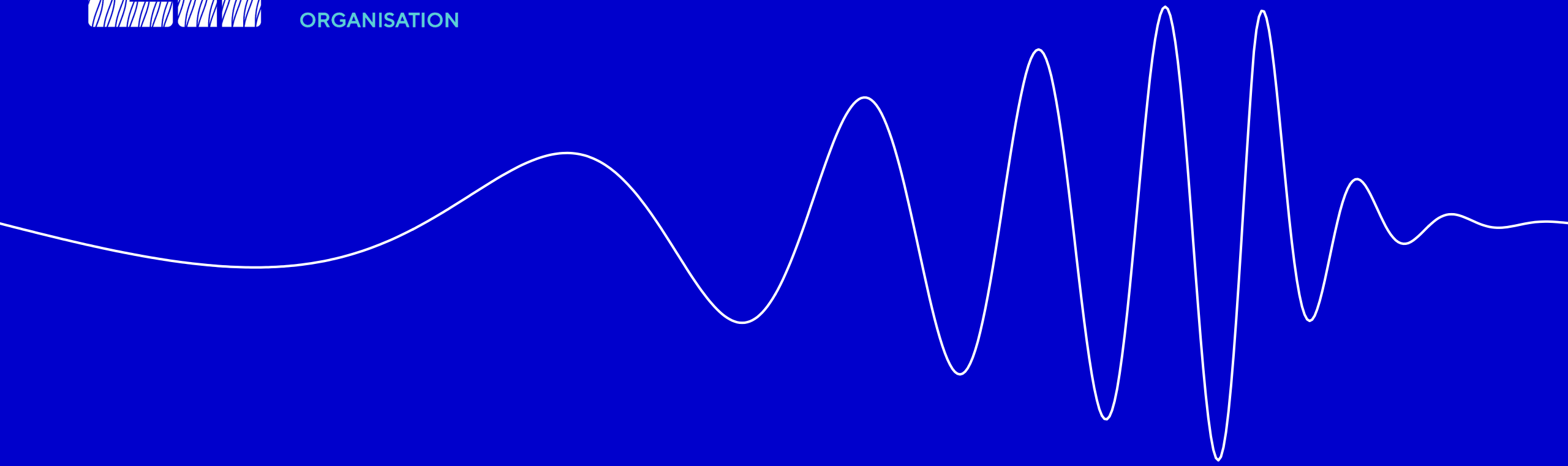


Project Office

Project Office: transitioning to a common, continuous framework

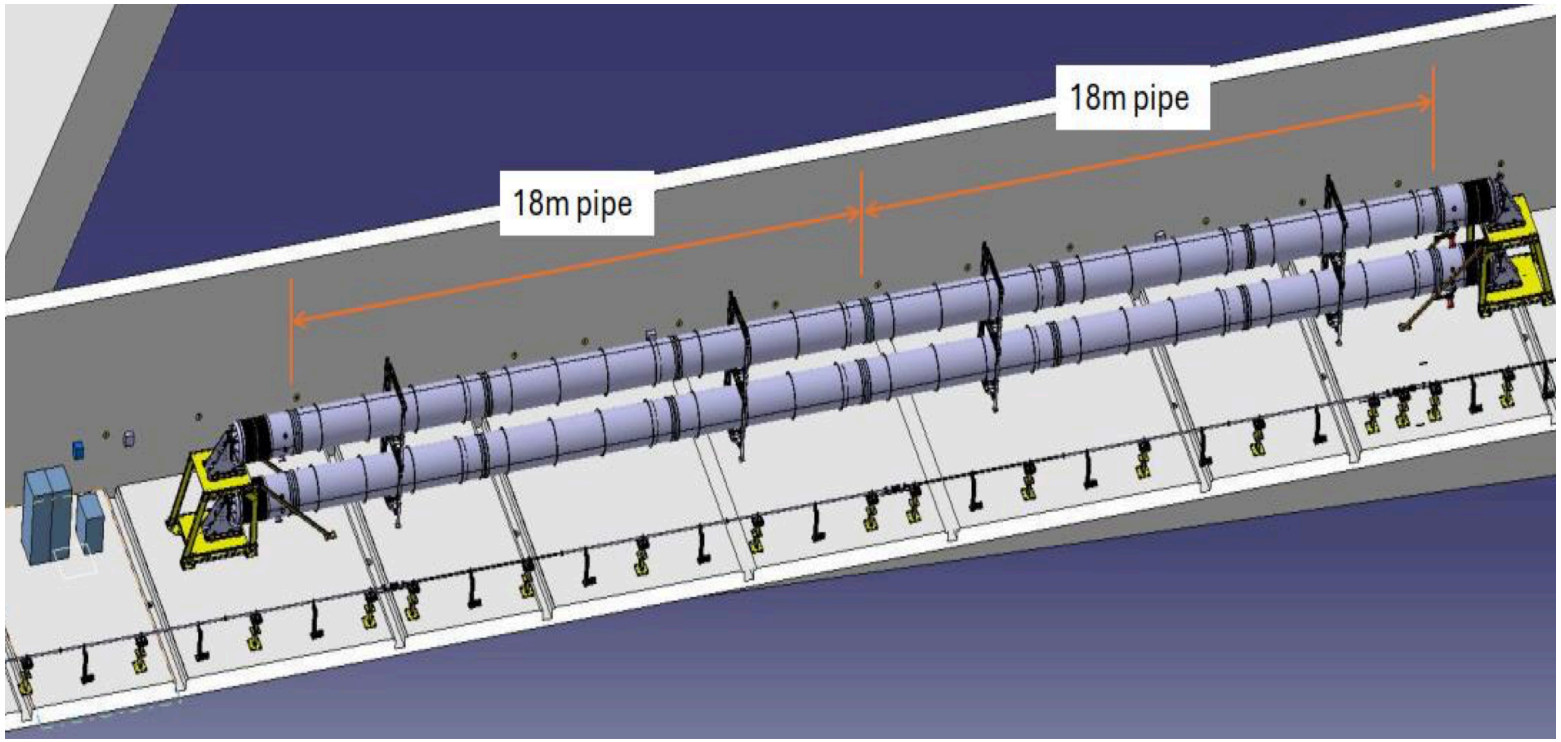
- The ETO project office led the **2025 Design Task Force** and the **2026 Geometry Comparison Report**.
- In both exercises we developed, introduced and further developed professional project management processes.
- These frameworks are new ingredients that ETO provided to the ET community and they will be essential for a cost-efficient and feasible project.
- **The challenge for the project office now is to manage a transition of these separate activities to a common, continuous framework for the whole Einstein Telescope project.**

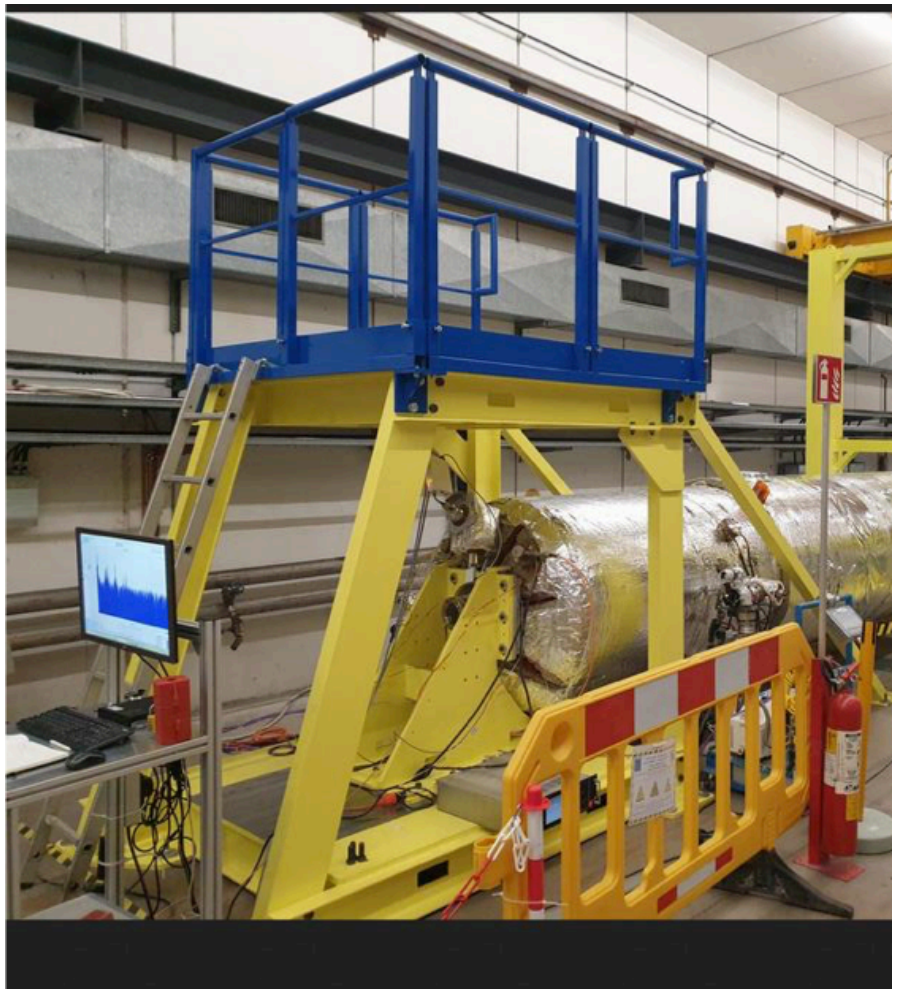
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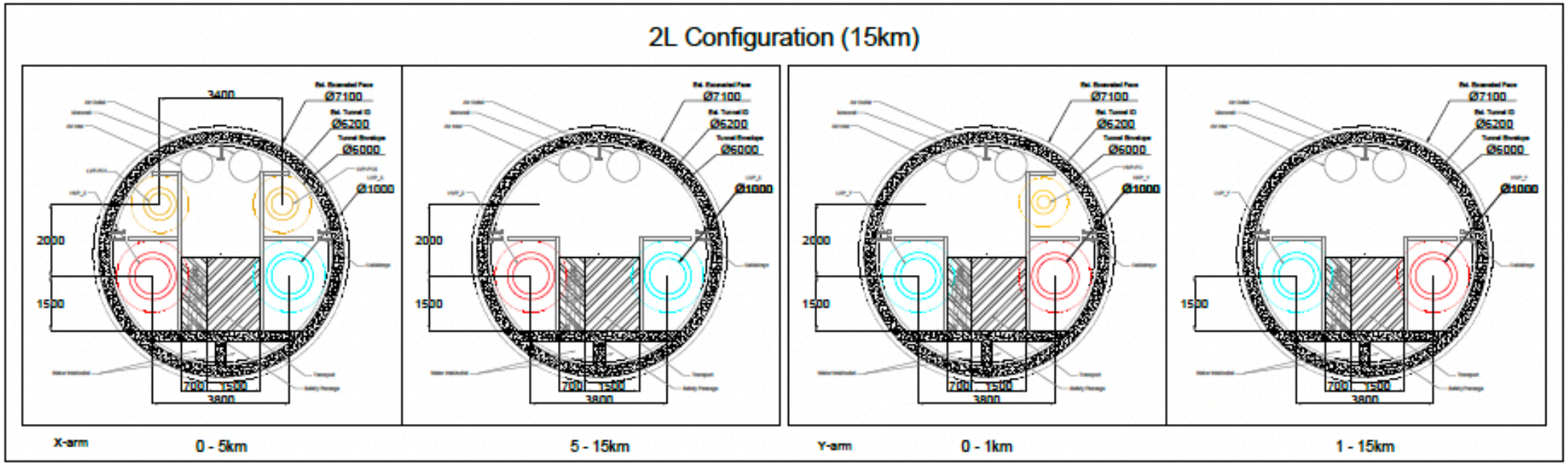
Engineering Department

CERN vacuum arm test stand



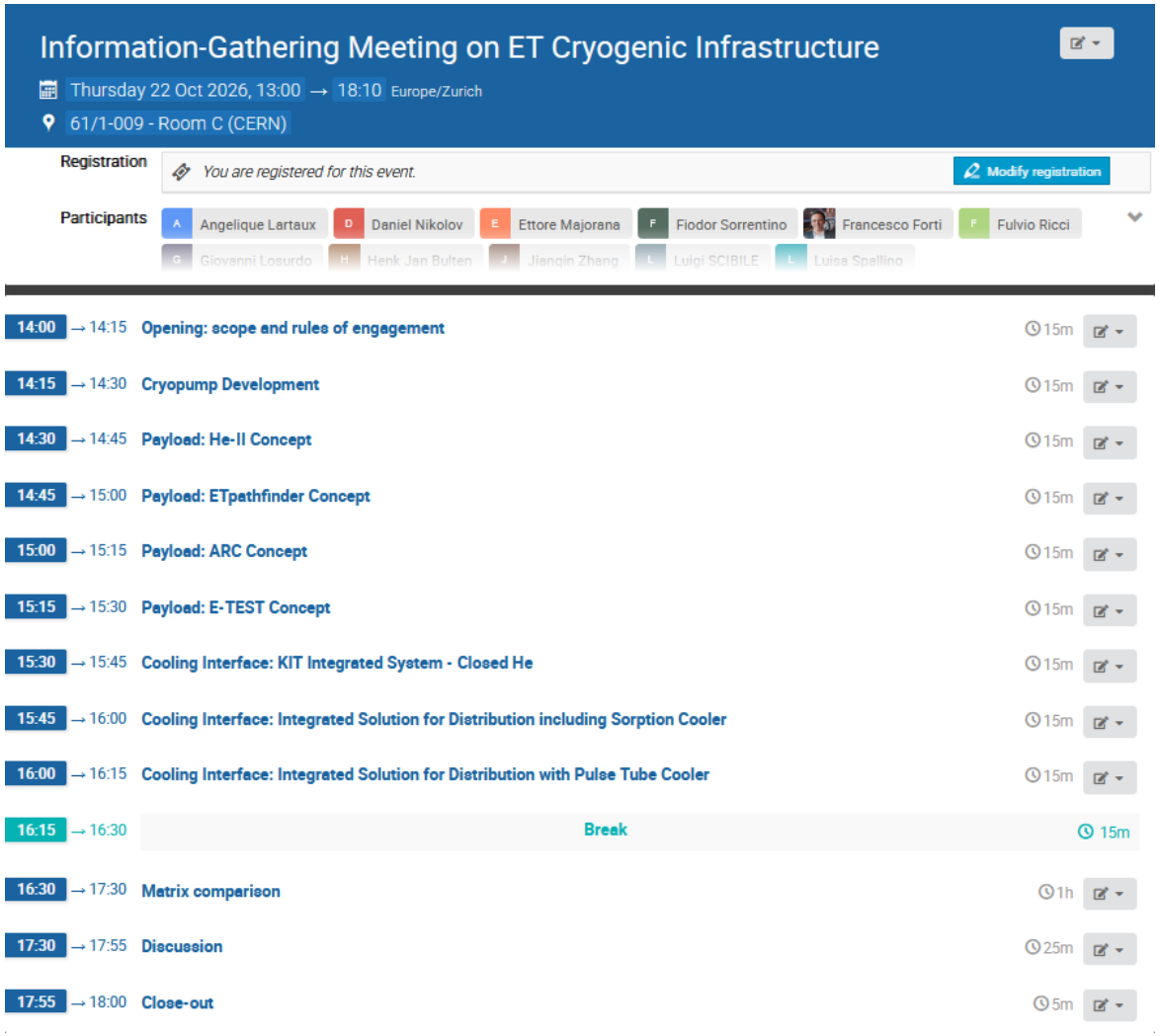


Cavern conceptual x-section for 2L configuration

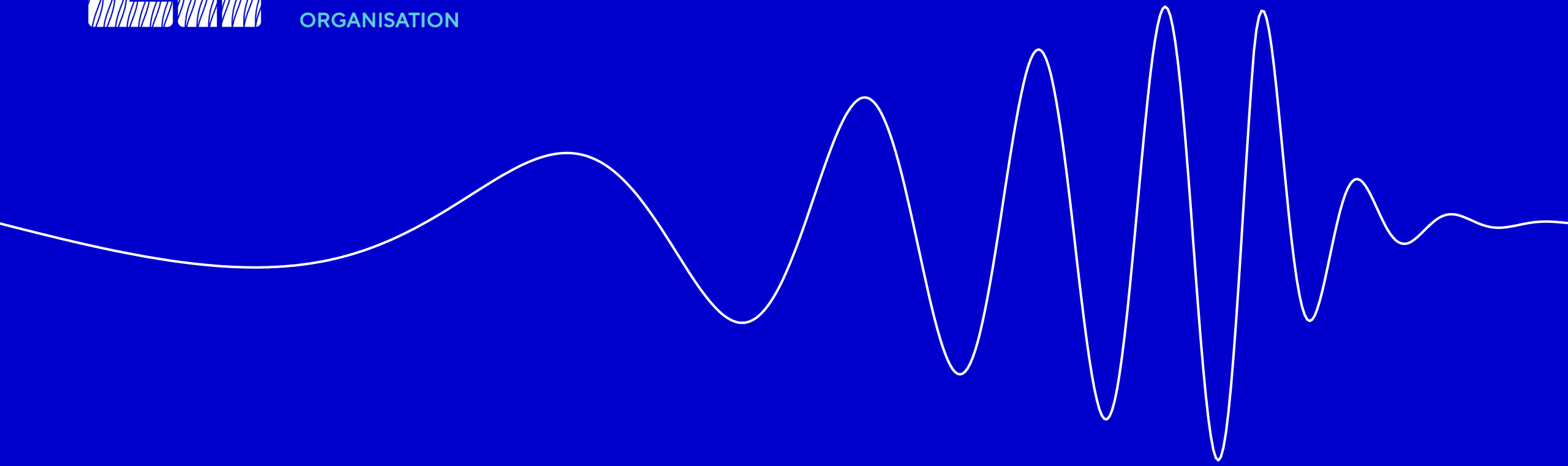


Upcoming: Cryogenic Information Gathering Meeting

- 4 payload - cryostat concepts
- First step: an information- and requirements-gathering meeting: October 22nd at CERN
- Establish a common overview
- Identify main commonalities and differences between concepts



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Communication

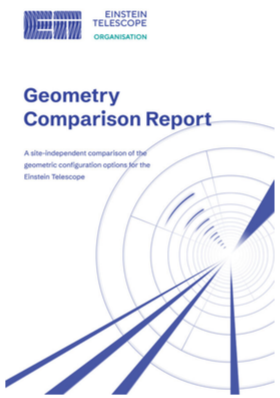
Highlights from the Communication Office

- Stories on the website:
  - LISA and Einstein Telescope team up to catch cosmic echoes https://einsteintelescope.eu/news/lisa-and-einstein-telescope-team-up-to-catch-cosmic-echoes/
  - Preparing the groundwork for site selection https://einsteintelescope.eu/news/preparing-the-groundwork-for-site-selection/
  - Building the quietest 120km in Europe https://einsteintelescope.eu/news/building-the-quietest-120-km-in-europe-how-cern-is-helping-prepare-beam-pipes-for-et/
  - Over 200 contributors deliver Einstein Telescope Geometry Comparison Report https://einsteintelescope.eu/news/over-200-contributors-deliver-einstein-telescope-geometry-comparison-report/



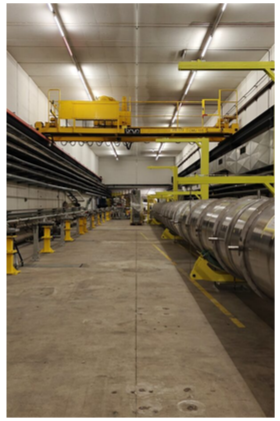
Newsroom

News
Events



9 OCTOBER 2026

Over 200 contributors deliver Einstein Telescope Geometry Comparison Report



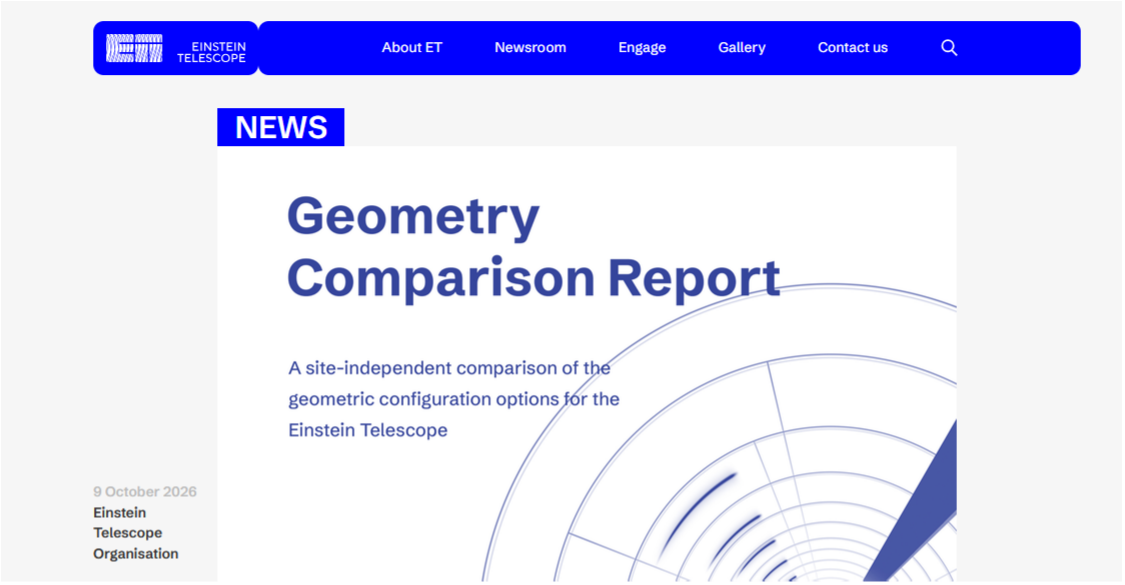
7 SEPTEMBER 2026

Building the quietest 120 km in Europe: how CERN is helping prepare beam pipes for ET



12 AUGUST 2026

Preparing the groundwork for site selection



Over 200 contributors deliver Einstein Telescope Geometry Comparison Report

On 7 October 2026, the Geometry Comparison Report was submitted to the Einstein Telescope Board of Governmental Representatives. That marked a major milestone after an intense half-year for the many people involved in developing this report. Over 200 experts from more than 20 research institutions contributed to the work, which

Coordinated news item with ET partners to get broad endorsement, and with communication professionals for distribution: managed to set the tone for the news articles that followed.

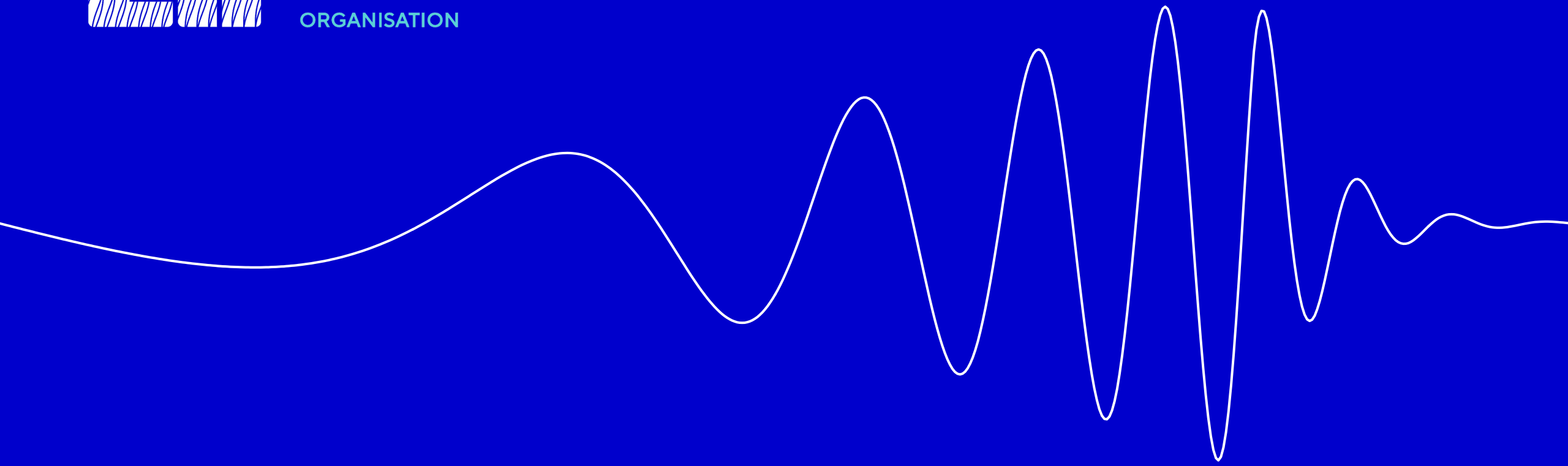
Highlights from the Communication Office

- Preparations for the Big Science Business Forum 2026 and ICRI2026, including the Einstein Telescope featuring in promotional campaigns in advance.



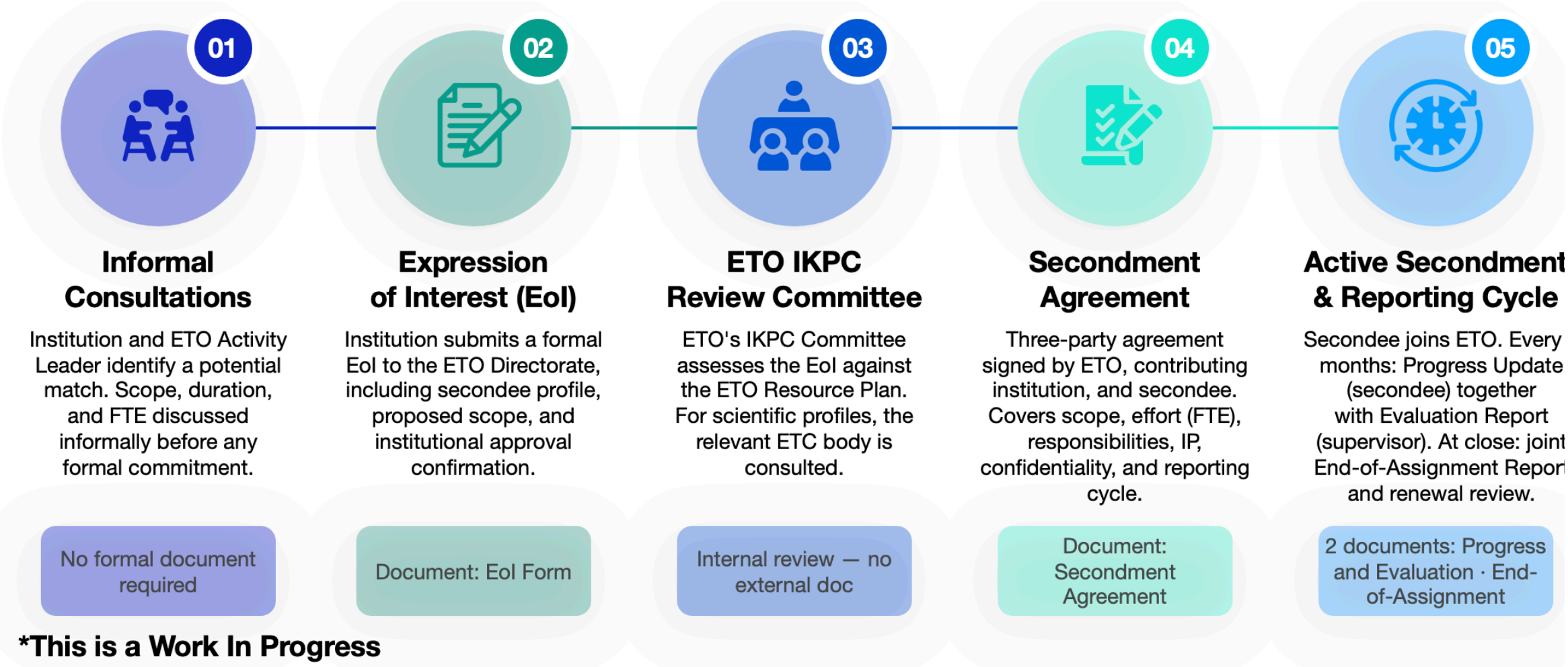
- In preparation: a framework for logo variations for various entities.
- Nice to know: the Einstein Telescope featured in the media >670 times between 30 June (last BGR meeting) and 15 October. ETO is monitoring this.

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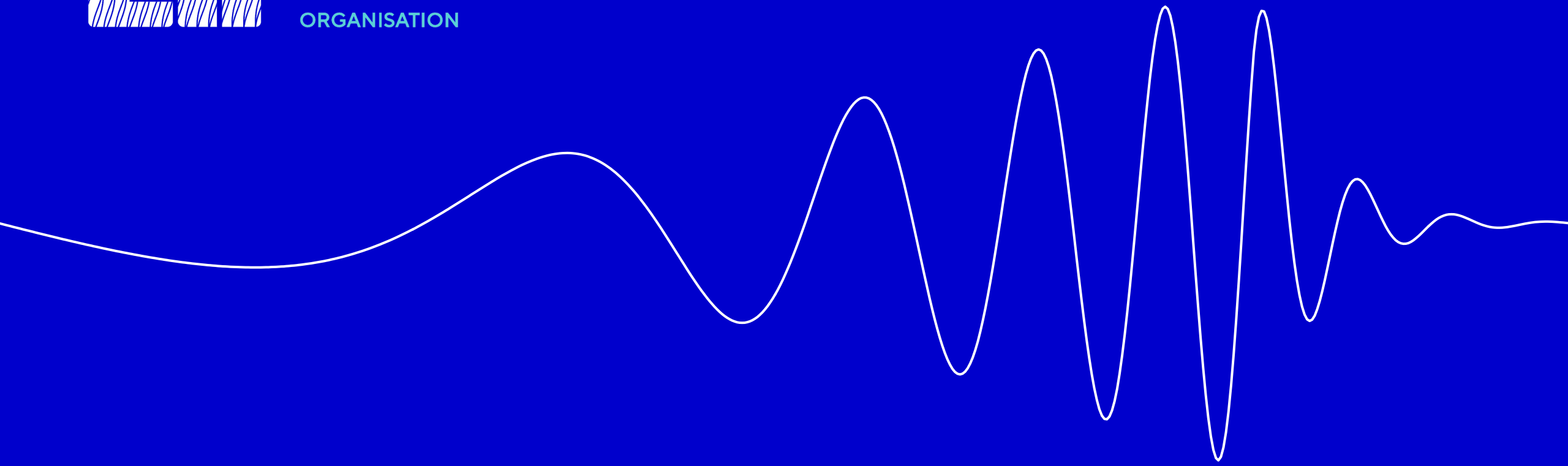
In Kind Personnel Contribution Framework

Concept IKPC process* – From interest to assignment and review



***This is a Work In Progress**

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Memo on cost sharing

Raising awareness of the cost sharing issue

- The cost-sharing memo is not a final funding agreement: it creates a common starting point for discussing responsibilities.

1 The problem

ET cost estimates are becoming more mature, but there is not yet a definition of who should pay for which construction elements.

The site and geometry are still to be defined, so a final allocation would be premature.

2 The organising principle

Use the existing Product Breakdown Structure (PBS) as the common language.

Start at high level where technical/cost maturity is limited; go deeper only where the breakdown is sufficiently mature.

3 The intended result

A transparent first model linking:

- technical scope
- ownership / operational responsibility
- lifecycle considerations
- funding responsibility

—not simply a division of the total cost.

The key idea: funding follows the nature and lifecycle of the item

- For infrastructure, the proposal distinguishes what belongs to the host site from what is added, operated or maintained by a legal entity.

HOST NATIONS

Typically responsible for infrastructure inherent to the site and civil works.

Examples:

- underground civil engineering
- surface civil engineering
- general service infrastructure
- water management
- core electrical distribution installed with the excavations

FUTURE LEGAL ENTITY

Typically responsible for systems installed after excavation / handover and operated or maintained by the legal entity over its lifetime.

Examples:

- cooling & ventilation
- access control
- communications
- cryogenics
- cleanroom equipment
- infrastructure sensors

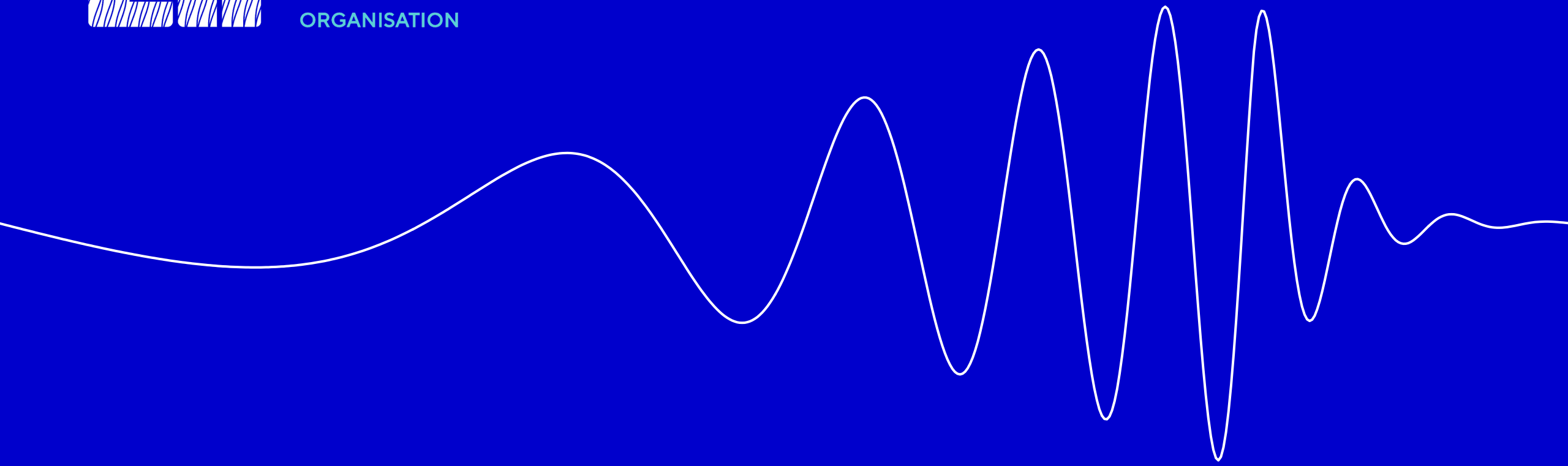
SUBSYSTEM CONSORTIA

Typically responsible for detector-specific scientific equipment and defined subsystem deliveries.

In the detailed infrastructure proposal, SC involvement appears where an item interfaces directly with scientific equipment.

Example: vacuum infrastructure is proposed as SC + LE.

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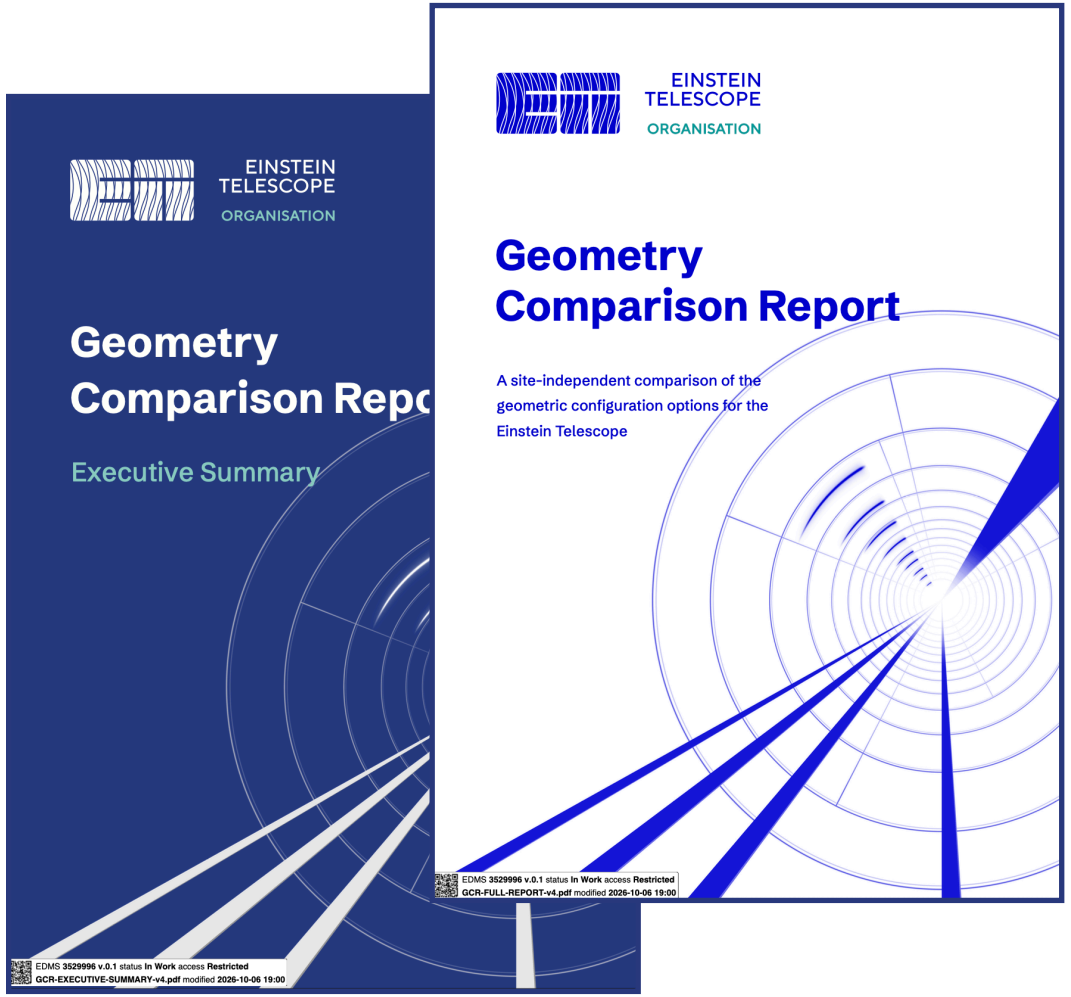


Geometry Comparison Report

Reports delivered by ETO

- Delivered to BGR on 07.10.2026
  - Executive summary, 22 pages, 3MB
  - Full report, 280 pages, 22MB

- Both documents include links to the public EDMS version of the GCR documents, which were made available on Friday 09.10.2026. The linked folders include associated documents such as, for example, the list of contributors, and excel tables with data.



GCR - Work Organisation

ETO organized the study into five work packages (WPs):

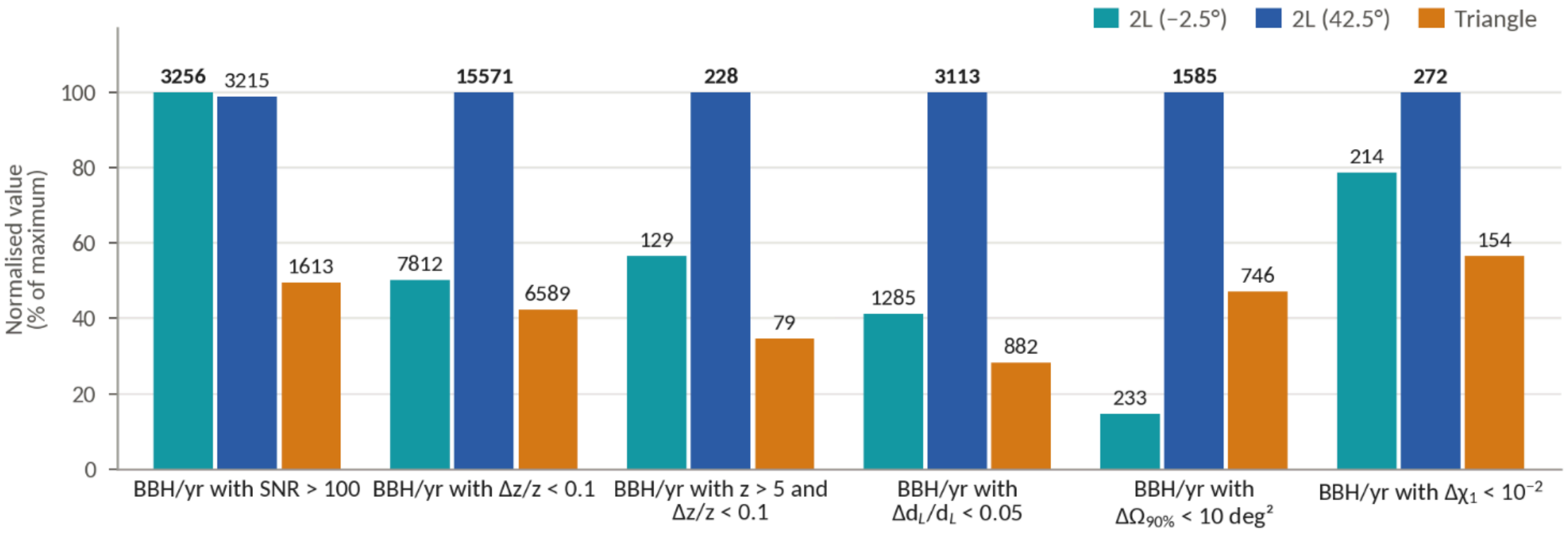
- WP1, **scientific added value**: selected representative science cases and compared how each geometry performs on them.
- WP2, **lifetime costs**: reviewed the cost-estimation methods the Host Consortia used for civil and technical infrastructure. It also estimated detector and interface costs over the project lifecycle. Site-dependent costs are given in universal units (FTEs, kWh, etc.) rather than in currency.
- WP3, **risks**: built a risk register covering political, technical, scope, financial, scheduling and organisational risks.
- WP4, **governance**: no governance structure exists yet for ET, so this WP assessed organisational risks and opportunities for a set of predefined scenarios, together with a SWOT analysis.
- WP5, **socio-economic and environmental impact**: developed a site-independent method with expert input and applied it to both configurations.

WP1 - Scientific Added Value

- **What is new**: we used mostly the same methodology as in COBA paper, but with up-to-data population data and tooling, and selected cross-checks against more powerful methods. Definition of scientific golden channels provide easier to read presentation. The results do not yet include a detailed study of the null-stream performance.
- **Take away**: Both the triangular design with 10km arms and the double-L configuration with 15 km arms meet the Einstein Telescope science requirements successfully. The report indicates that the 2L geometry is better suited to address the broadest range of these channels. The analysis also reveals that no single geometry maximises every aspect of the ET science case. In particular, the angular orientation between the two L-shaped detectors offers a parameter to be optimised.

WP1 - Scientific Added Value

Example golden channel: Exquisite Observation of Binary Black Holes



WP2 - Lifetime Cost

- The report provides a cost methodology for the ET project and an estimate for the cost of the scientific instrumentation hardware, referred to as ‘detector costs’. **This cost estimation excludes, for example, the technical and civil infrastructure** and computing hardware renewal. Therefore the reported figures must not be interpreted as a project budget or a full comparison in itself. The report shows that the detector costs are higher for the triangular geometry.

- This exercise is obviously incomplete without the cost of the technical and civil infrastructure. Internally we believe that from a site-dependent civil-engineering perspective, the underground tunnels of the triangle can be expected to require less capital investment than those of the 2L, but that the difference is less than initially expected.

WP2 - Lifetime Cost

Cost of the ET scientific instrumentation (also known as 'detector cost')	2L	Triangle
Total Procurement and Integration cost [B€]	1.14	1.48
Commissioning – Operational cost [k€/y]	9,628	13,696
Commissioning – Person-power [FTE/y]	364	470
Commissioning – Energy [MWh/y]	40,172	57,173
Operation (80%Observation, 20% Maintenance) – Operational cost [k€/y]	6,236	8,608
Operation (80%Observation, 20% Maintenance) – Person-power [FTE/y]	142	144
Operation (80%Observation, 20% Maintenance) – Energy [MWh/y]	34,884	49,501

The uncertainty is in the range -25%-+40%. However, it should not affect much the 2L vs. Triangle cost ratio.

WP2 - Lifecycle

- Lifecycle costs are linked to the other cost items and are therefore presented in association with them. The lifecycle cost scope covers both the **commissioning** and **operation** phases.
- **Operation** costs include energy consumption, personnel costs, maintenance activities and system replacements. They are further divided into two categories: **observation** and **maintenance** costs.
- **Commissioning** costs are system-dependent.

Lifecycle item	Commissioning 2L	Commissioning Triangle	Delta (2L – Triangle)	2L/Triangle
Operational cost k€/y (b)				
Person-power FTE/y (c)	360	466	-106	77%
Energy consumption MWh/y (d)	42,143	59,055	-16,912	71%

Lifecycle item	Observation 2L	Observation Triangle	Delta (2L – Triangle)	2L/Triangle
Operational cost k€/y (b)	10,500	18,300	-7,800	57%
Person-power FTE/y (c)	132	136	-4	97%
Energy consumption MWh/y (d)	33,713	46,767	-13,054	72%

Lifecycle item	Maintenance 2L	Maintenance Triangle	Delta (2L – Triangle)	2L/Triangle
Operational cost k€/y (b)	10,500	18,300	-7,800	57%
Person-power FTE/y (c)	160	157	3	102%
Energy consumption MWh/y (d)	42,073	58,967	-16,894	71%

Operation

WP3 - Risk

- Risk analysis: The risk analysis does not show one geometry to be preferable over the other. However, the nature of the identified risks differs between the two approaches: while **the triangular geometry shows a stronger exposure to risks associated with technical challenges and scientific exposure, the 2L geometry is more exposed to risks related to governance and organisational aspects.**

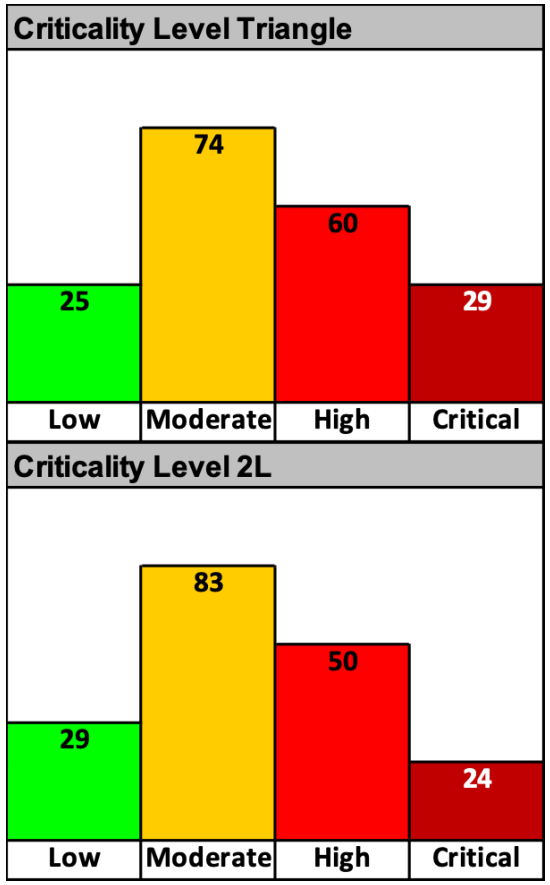
WP3 - Risk

Example: distribution of technical risks

Table 29: Count of technical risks per Likelihood and Severity for the Triangle and 2L geometries

Likelihood	Triangle				
L5	0	1	4	5	0
L4	0	7	14	15	9
L3	0	14	27	33	5
L2	0	7	18	8	3
L1	7	5	4	2	0
Severity	S1	S2	S3	S4	S5

Likelihood	2L				
L5	0	1	2	4	0
L4	2	7	7	12	8
L3	1	18	32	30	9
L2	1	12	16	10	1
L1	11	1	0	1	0
Severity	S1	S2	S3	S4	S5



WP4 - Governance

- WP4 has carried out:
  - a SWOT analysis
  - a study of Organisational Risks and Opportunities
- Six governance scenarios were designed based on three aspects and different options for each of these:
  - Possible geometry - options: Triangle and 2L
  - Geographical configuration - options: single site (for triangle only) and multi-site (for both triangle and 2L)
  - Final legal entity - options: the European Research Infrastructure Consortium (ERIC) and the Intergovernmental Organisation (IGO).

WP4 - Governance

- **The governance model can and should follow, not drive, the geometry and site decisions.** Both geometrical configurations are considered viable and carry distinctive risks and opportunities in terms of governance, but the genuine multi-site option associated with the 2L configuration emerges as offering a more favourable balance of opportunities and risks. **It was also highlighted that for both geometries, strong central coordination and management is a crucial condition for successful ET governance**.

WP5 - Socio-economic and environmental impact

- When it comes to socio-economic impact and sustainability, many details depend on local opportunities and future, international partnership agreements. Hence an in-depth study of environmental sustainability and socio-economic performance is required once the shape and location of the Einstein Telescope observatory have been chosen. **This initial analysis, in the form of a differential evaluation, already shows that neither configuration is universally superior; instead, the two present entirely different risk and operational profiles**. This leads to a call for deciding the geometry based on science and technology first.

GCR-Conclusions

- In conclusion, **the strategic recommendations call for a science-first approach, in which technical performance and broad international participation remain the primary criteria and precede assessments of financial and operational feasibility**. If the decentralised 2L model is selected, the establishment of a robust, neutral central governance structure is mandatory to harmonise cross-border operations. Finally, both models require early, transparent community co- stewardship that manages expectations realistically without overpromising regional benefits, ensuring long-term social acceptance.

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Thank you

einsteintelescope.eu

