EUROPEAN
PLASMA RESEARCH
ACCELERATOR WITH
EXCELLENCE IN
APPLICATIONS

EuPRAXIA
Preparatory Phase

EuPRAXIA_PP:
General status of the project (WP1, coordination)

P. Campana (INFN-LNF)

RP2, July 15th 2025

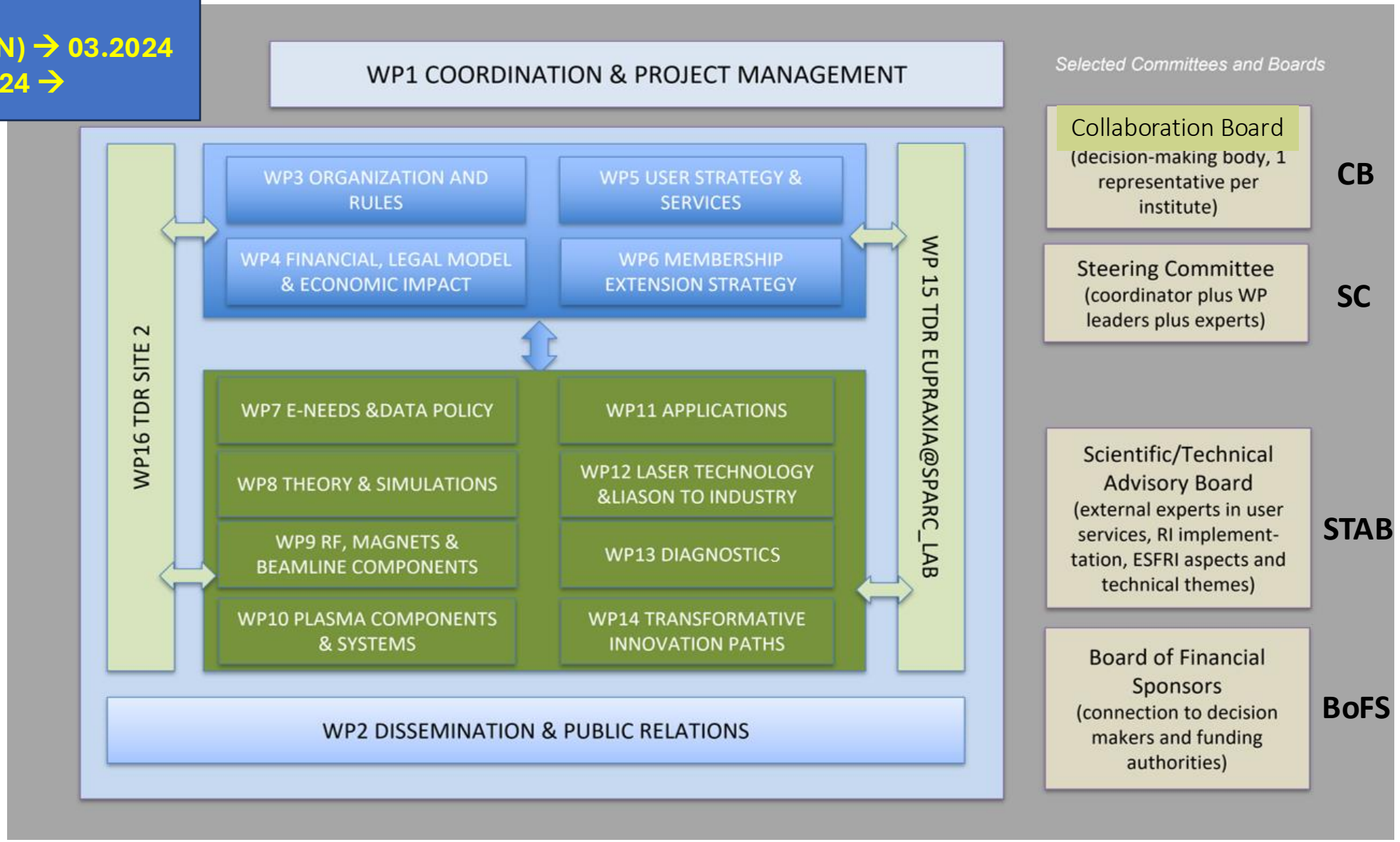
Funded by
the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101079773. It is supported by in-kind contributions by its partners and by additional funding from UK and Switzerland.

EuPRAXIA PP structure

Funded by the European Union

Project coordinators:
R. Assmann (DESY & INFN) → 03.2024
P. Campana (INFN) 03.2024 →



EuPRAXIA_PP Consortium & ancillary EU programs

Funded by the European Union

28 EU institutions, beneficiaries
10 ass. partners (CH & UK, w/matching funds)
8 observers

Horizon EU Grant Agreement n. 101079773

Consortium Grant Agreement signed (large overlap with ESFRI applicants)

Direct Involvement of EU Laser Industrial Companies

ANCILLARY SUPPORTING PROGRAMS

- EuPRAXIA Doctoral Network 3.1 M€

This project has received funding from the European Union´s Horizon Europe research ar innovation programme under grant agreement no. 101073480 and the UKRI guarantee fu

- EuAPS 22 M€

R&D on betatron plasma sources, based on IT Next-Gen. EU Recovery Funds (INFN, CNR, Rome TV Univ.)

- PACRI EU Horizon EU Grant 11 M€

NEW !

Program to develop plasma based sources (achieved thanks to EuPRAXIA framework). Starting March 2025

EMPA*	CH
EPFL*	CH
PSI*	**CH**
DESY	DE
FBH Berlin	DE
FHG-ILT Aachen	DE
FZ Julich	DE
HZ Dresden	DE
LMU Muenchen	DE
HHU Dusseldorf	**DE**
GSI-FAIR Darmstadt	**DE**
ELI Beamline ERIC	CZ
CEA	FR
CNRS	FR
THALES	FR
AMPLITUDE	**FR**
IASA Athens	GR
WIGNER	HUN
Uni. Szeged	HUN
Uni. Pecs	HUN

* associate partners

CERN	INT. ORG.
H. Univ. Jerusalem	ISR
CNR	IT
ELETTRA Trieste	IT
ENEA Frascati	IT
INFN	IT
U. Roma Sapienza	IT
U. Roma Tor Vergata	IT
IST Lisbon	P
ALBA Cells	SP
CLPU Salamanca	SP
IC London*	UK
QU Belfast*	UK
STFC*	UK
U. Liverpool*	UK
U. Oxford*	UK
U. Strathclyde*	UK
UCLA*	US

38 members, 8 observers

new partners in 2024

EMPA left the consortium

UJT Shanghai (observer)	CN
HZ Jena (observer)	DE
U. Cote d'Azur Nice (observe	FR
NTUA Athens (observer)	GR
U. Milano Bicocca (observer)	IT
U. Palermo (observer)	IT
NCBJ Otwock (observer)	PL
U. Manchester (observer)	UK

EuPRAXIA Consortium Networking

Funded by the European Union

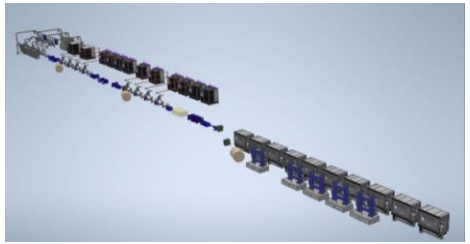
2 Implementation Pillars
@ INFN – LNF & @ ELI-ERIC

Several National Nodes. Roles to be fully defined

Project Clusters

A large collection of European know-hows in accelerators, lasers and plasma technologies

Network organization
- **Sites (PWFA/LWFA): new users facilities**
- **National nodes**
- **Technology clusters**



Status of Milestones & Deliverables

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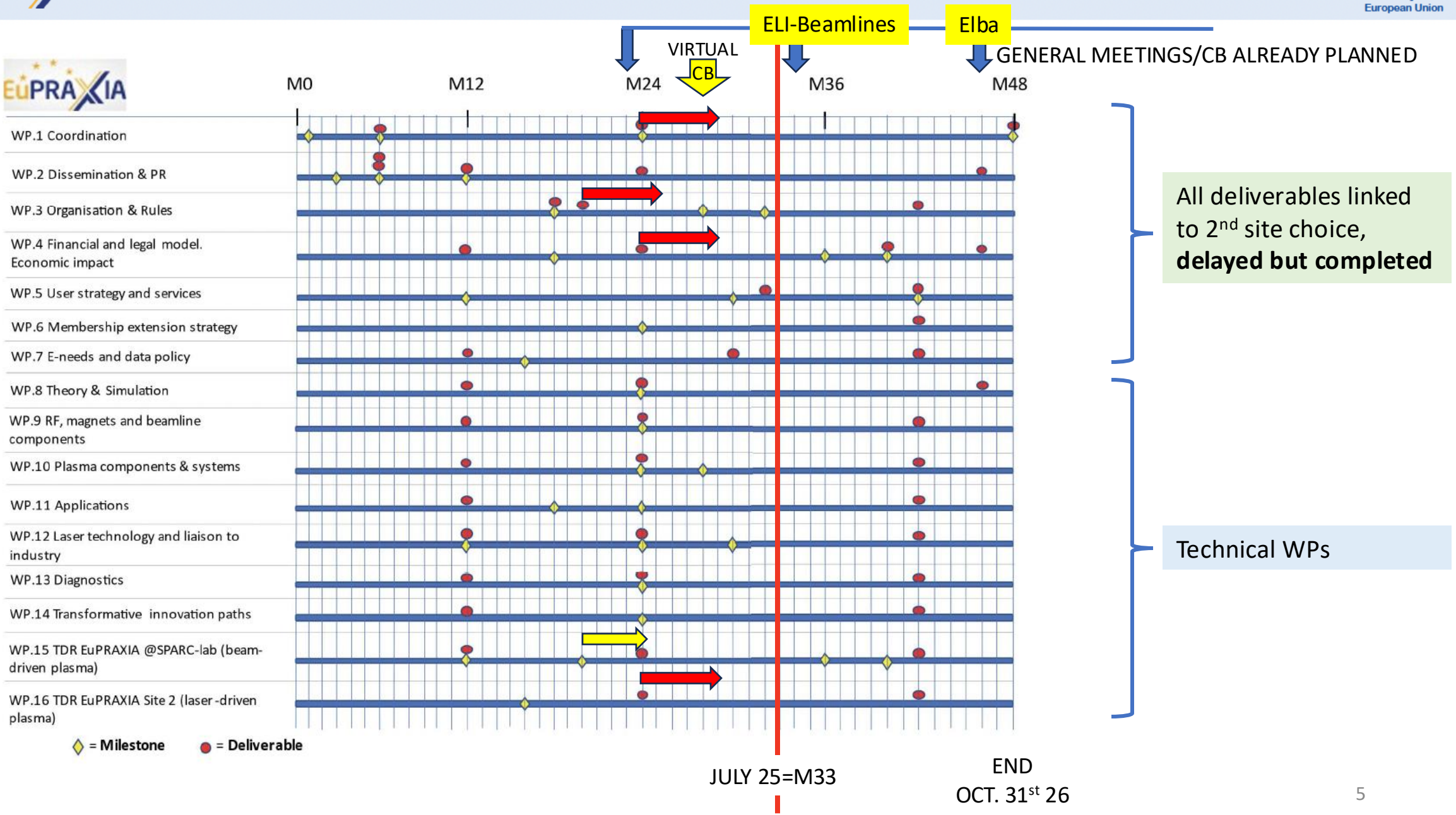


All deliverables linked to 2nd site choice, **delayed but completed**

Technical WPs

ESFRI PP governance meetings

Intense consortium collaborative activities during Reporting Period no.2

- *Steering Committee Meetings*

December 23, March 24 (in person), June 24, September 24 (in person), December 24, March 25

- *Collaboration Meetings*

March 24 (in person), September 24 (in person), March 25

- *Complete overview meetings of WPs status at the start of mandate of the new Project Coordinator* April 24

- *General Consortium Meeting*

September 24 (Elba Island, 100 pp attendance), with satellite workshops

- *STAB Meetings*

September 24, March 25

- *BOFS Meeting*

March 25

+ a large number of WP internal meetings.
Next General Consortium Meeting to be held at ELI-ERIC, Prague, October 25

Activation of Advisory Boards: STAB

FROM EU GRANT AGREEMENT: *A **Scientific and Technical Advisory Board** comprising external international experts will review and advise on EuPRAXIA's strategy on implementation, scientific and technical activities*.

Members are chosen among world experts in accelerators, plasma, lasers and photon facilities.

Composition
Lenny Rivkin (EPFL, CH, Chair) - Ursula Bassler (CNRS, FR), Mike Dunne (SLAC, US), Fernando Ferroni (INFN, IT), Roland Sauerbrey (HZDR, DE), Sandro de Silvestri (PoliMI, IT), Thomas Tschentscher (XFEL, DE), László Veisz (UMU, SE), Hagen Zimer (Trumpf Laser, DE)

In the first two meetings, the STAB reviewed the general structure of the consortium, the evolution of second site choice, and of technical advancements within the Consortium
Particular emphasis was set on the status of the implementation of collaboration between national nodes, technical clusters and sites, which is one of the most important outputs of EuPRAXIA.
All internal EuPRAXIA_PP documentation made available to members.

Activation of Advisory Boards: BOFS

FROM EU GRANT AGREEMENT: *A **Board of Financial Sponsors** will be created to meet regularly with potential sponsors of the research infrastructure. This Board will be composed of representatives of research funding bodies and other potential sponsors.*

BoFS is expected to endorse 2nd site choice, legal framework, governance, funding scheme (in-kind & cash), together with general EuPRAXIA layout and operation (sites + national nodes + technical clusters).
Heterogeneous composition: National Institutes, Universities, Ministries, Int. Org., ERIC, etc.
All internal EuPRAXIA_PP documentation made available to members.

Country	Name	other info
CERN	Steinar Stapnes	CERN (interim)
Czech Rep	Radka Wildova	Director General for Higher Education, Science and Research section
	Marek Vysinka	Research Infrastructures Department
France	Antoine Rousse	CNRS, Scientific Delegate CNRS-Physics
	Catalin Miron	CEA, Director - Research Infrastructures, European & Intern. Affairs
Germany	Andreas Maier	DESY, lead scientist (interim)
Greece	Emmanuel Varvarigos	Vice Rector of Nat. Technical Univ. Athens
Hungary	Peter Stefan	National Research, Development and Innovation Office
Italy	Sandra Malvezzi	INFN Executive Board
	Roberto Cimino	Italian Research and University Ministry
Portugal	Marta Fajardo	Instituto Superior Tecnico, Physics Department
Spain		
Switzerland	Mike Seidel	Head PSI Center for Accelerator Science and Engineering
UK	John Collier	CLF Director and Executive Director of Laserlab Europe

First meeting (17.3.2025)
Second meeting next October

Attendees from CERN, Czech Rep., France (CEA, CNRS), Germany, Greece, Hungary, Italy (MUR, INFN), Portugal, UK.
Spain so far not yet represented

Prof. **Radka Wildova** (DG for Higher Education Czech Min.) was nominated Chair of the Board

RP2 Completed Milestones

M1.3 Decision on ranking of legal models for RI
M3.1 Benchmark of comparable RI organisational models
M3.2 Organisational requirements: requirements for internal procedures and tasks
M4.1 Report on legal requirements from partners
M5.2 EuPRAXIA report on access policy
M6.1 Outreach Workshop
M7.1 Benchmark within existing facilities on E-needs and data policy
M10.1 Workshop on EuPRAXIA plasma concept
M11.1 Survey of user facilities to test equipment and/or advanced concepts of beamlines
M12.2 Design and project of transport beamlines focusing on the preservation of beam parameters
M15.2 Workshop on "EuPRAXIA@SPARC_LAB machine upgrade and additional beamlines (moved from June 2024 as per PO agreement)"
M16.1 Review and visit of candidate sites proposals
MG.1 Update of concepts for EuPRAXIA, systems status report 8,9,10,11,12,13,14

RP2 Completed Deliverables

D1.2 Description of updated implementation scheme after site decision (moved from Oct 2024 as per PO agreement)	Delay due to 2nd site choice
D1.4 Policy Brief RI - RP2	
D2.4 EuPRAXIA Symposium and outreach event	
D3.1 Criteria and methodology for 2nd site selection	
D3.2 Report on the decision on the 2nd site (moved from June 2024 as per PO agreement)	Delay due to 2nd site choice
D4.2 Cost Implementation and service preliminary assessment (moved from Oct 2024 as per PO agreement)	Delay due to 2nd site choice
D7.2 Report integration into European facility landscape and standards	
D8.2 Report on results achieved in the field of theory and simulations	
D9.2 Report on technical results achieved in the field of RF, Magnets and beamlines components	
D10.2 Report on technical results achieved in the field of plasma components	
D12.2 Report on technical results achieved in the field of Lasers	
D13.2 Report on technical results achieved in the field of diagnostics	
D15.2 Mid-term report on TDR status for EuPRAXIA@SPARC_LAB	
D16.1 Update on EuPRAXIA plans for selected site 2 (moved from Oct 2024 as per PO agreement)	Delay due to 2nd site choice

2nd site decision procedure (as approved by CB, Sept. 2024)

- Preparation of templates for 2nd site bid-books (applicants: ELI-ERIC, STFC-EPAC, CNR-INO)
- Deadline for bid-books (December 22nd, 2024)
- Setup of panel for 2nd site choice: striving at consensus, focusing the selection on site(s) ready to met EuPRAXIA Phase 1 requirements within ESFRI timeline requirements

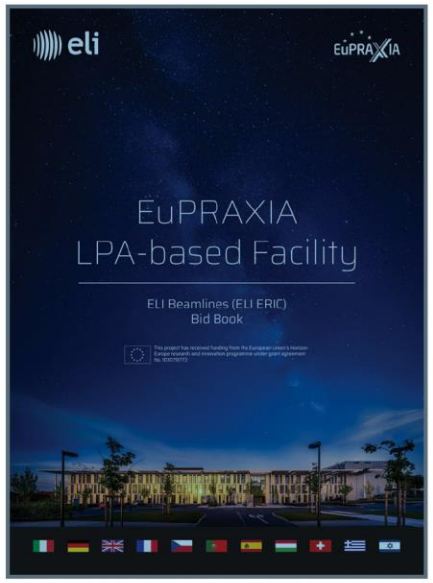
Panel composition: R. Assmann (Chair, GSI), P. Campana (INFN), A. Falone (INFN), M. Ferrario (INFN), G. Gatti (CLPU), A. Ghigo (INFN), L. Gizzi (CNR), A. Molodozhentsev (ELI-ERIC), R. Pattatill (STFC), A. Specka (CNRS), C. Pelliccione (INFN, secretary)

Panel meetings:
January 17, Bid-books presentations and discussion;
January 29, Proponents answers to written question and discussion; draft of procedure to prepare the resolution proposal to CB;
February 21, Discussion and approval of the resolution proposal to CB
March 21, Finalization of resolution proposal to CB

March 25, CB meeting – approved with nearly unanimous consensus (36 yes - 1 abstain - 1 no)

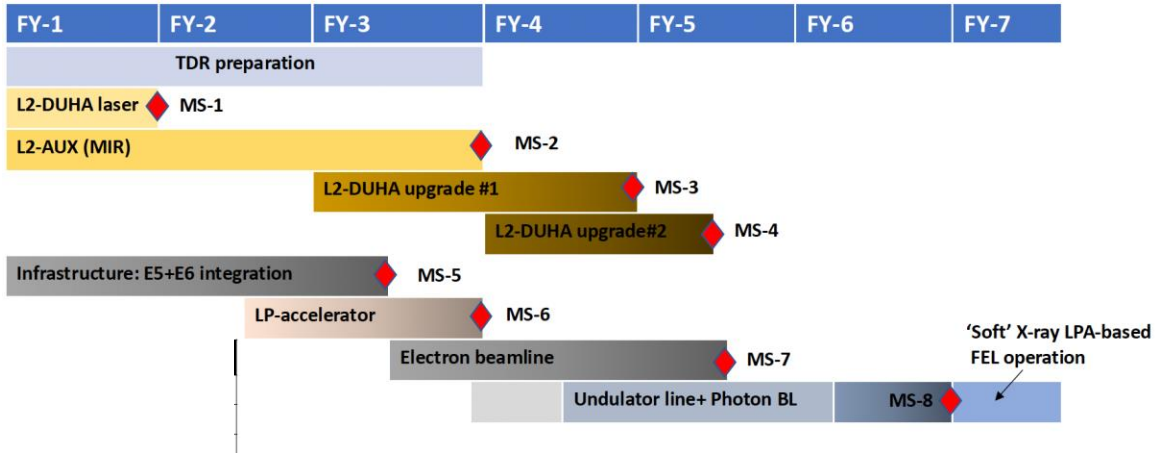
ELI-ERIC Beamlines, Prague (CZ)

- Institutional Capability to Host the Site
- Technical Overview of the Laser-Driven Site Proposal
- Required and Available Resources
- Project Phases and Budget Timeline
- Support from EuPRAXIA Partners
- Political Endorsement
- Alignment with EuPRAXIA Governance
- Additional Considerations



- **Government Endorsement**
  - Backed by the Czech Government's ESFRI Roadmap support and a financial commitment to support the implementation of EuPRAXIA within the established funding framework of ELI Beamlines.
- **ELI General Assembly Support**
  - Members endorse ELI's application to host EuPRAXIA's second site.
- **Framework Readiness**
  - Adaptable financial and governance models to be tailored to meet the specific requirements of EuPRAXIA's construction and operation phases.

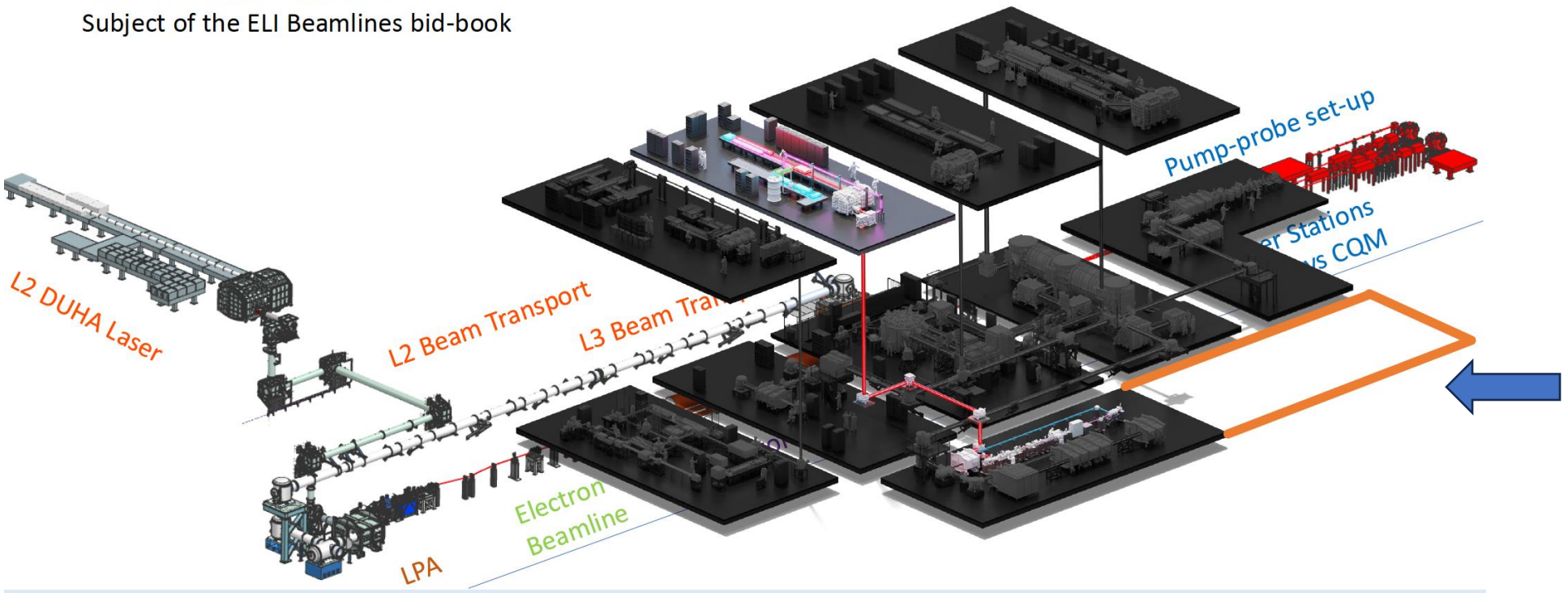
Timeline for EuPRAXIA – PHASE 1



ELI-ERIC Beamlines, Prague (CZ)

Funded by the European Union

Conceptual model of the EuPRAXIA Phase-1
1GeV electron LPA scheme
Subject of the ELI Beamlines bid-book



Area available for 1 GeV FEL (Phase 1)

Prep + Phase 1 + Phase 2	mEUR	In-kind
Total Cost of Existing Infrastructure	54	54
Total Budget to Complete Phase 1 Scope	58	23
Total Estimated Budget for Phase 2	112	67
Total additional cost	**224/170**	**144/90**

2nd site: discussion output

- **ELI-ERIC Beamlines proposal to CB**

Proposal – Officially adopt ELI-ERIC Beamlines as EuPRAXIA`s **second user site**: pillar for a laser driven, plasma-based Free-Electron Laser for users (Phase 1 at 1 GeV beam energy). Europe's most compact, most high tech and most Eastern FEL!

- **STFC-EPAC proposal to CB**

Proposal – Officially support EPAC as EuPRAXIA Facility for R&D on a 5 GeV electron beam that is produced in a compact laser-plasma accelerator and that has sufficient beam quality for the FEL application.

- **CNR-INO proposal to CB**

Proposal – Officially support CNR-INO as the EuPRAXIA National Node in Italy for Laser R&D and as an additional formal link between the two EuPRAXIA pillars in Italy and Czech Republic.

Brief status of WP6 - Membership Extension Strategy

Funded by the European Union

The primary objective is to outreach to European and international communities interested in the Technology and User Science (EU, China, Japan, US, Africa, South America, …), definition of extension approach, integration into international landscape.

Tasks:

- Management of the WP: identification of contributing partners, interaction with other EuPRAXIA WPs
- Organization of a workshop: to present EuPRAXIA opportunities to accelerator developers and scientific users
- Identification of collaborative structures and institutions

Progress: A one-day outreach workshop (Sept. 2024) was organized to bring together worldwide representatives of conventional accelerator facilities for radiation sources and of users who may contribute to the development of EuPRAXIA. The workshop had several sessions, including general introduction to present the EuPRAXIA project to the workshop participants, discussion of outreach to different parts of the world (including Middle East, India, Africa, Central and South America) as well as presentation of scientific topics that could be investigated in synergy with the development of EuPRAXIA.

EuPRAXIA contribution to the organization of future the ALEGRO Plasma Linear Collider workshops to engage with the high energy physics community was also highlighted. The workshop ended exploring options related to training activities of EuPRAXIA directed toward less favored communities

Brief status of WP9, WP13

Funded by the European Union

WP9 – RF, Magnets & Beamline Components
WP13 – Diagnostics

Tasks:

- Assess and develop conventional accelerator components and systems for implementation in the EuPRAXIA accelerator and beamlines, including electron and photon diagnostics for both sites
- Review potential prototype R&D
- Organize scientific and technical workshops

Progress:
WP9 & WP13 led a series of topical meetings to assess the present state-of-the art in the four main subfields covered, namely RF technology, compact magnets, high-field undulators, and diagnostics elements.

Based on the best understanding of the design parameters and requirements of the EuPRAXIA FEL WP9 & WP13 have made significant progress in identifying and assessing solutions for the two sites, including the exploration of future in-kind contributions from collaborating institutions.

Brief status of WP14 - Transformative Innovation Paths

Funded by the European Union

The primary objective is to develop innovative, high gain future concepts with possibly transformative potential for EuPRAXIA, as specified in the CDR.

Tasks:

- Develop several innovative, high gain concepts with possibly transformative potential
- Generation of hybrid LWFA-PWFA approaches for the two sites
- Development of plasma photocathodes, high repetition rate LWFA, etc…
- Development of spin-polarized electron beam sources

Progress:

Experimental and theoretical work continued on all concepts. The combination of hybrid LWFA-PWFA and high-brightness, high energy witness beam production has made significant experimental progress thus raising its TRL further

Recent simulations have shown applicability of innovative techniques at ELI-ERIC Beamlines and potentially other locations.

Request of revised RP (8/7/2025)

Funded by the European Union

Working on received observations:

- **financial part**, asking for corrections to CNRS & Fraunhofer

- **technical part**
  - verifying largest discrepancies (CNR, Elettra, UniSapienza, CEA, CNRS, ELI-ERIC) in PM use and contacting concerned institutions
  - so far, PM use is ~ 1/3 of expected (slow startup of activities, etc…) w.r.t. an hypothetical "flat rate" use (elapsed time of the grant ~60%)
    accounted funding: ~ 50%
  - recently approved second site activities will increase rate of PM use
  - discrepancy between "average PM cost" & effective one

- **recheck** of institute contribution to working packages (done)

- **fill in PID** for papers presented (to be done soon). ***Explicit adherence to open science provisions***

We will resubmit soon a new update report

Summary

New partners on board on relevant WPs (PSI, GSI, HHU, Amplitude) to strengthen related activities

A selection procedure for 2nd site choice has been setup in Sept. 2024, and concluded with a CB unanimous decision in March 2025, to appoint ELI-ERIC Beamlines.
Together with the second site, the other two proponents STFC-EPAC and CNR-INO will play a well identified role as national nodes in EuPRAXIA Network, allowing, possibly, the bidding for new resources

In RP2, the Consortium has developed an intense series of operational meetings of its governance bodies (Steering Committee and Collaboration Boards), together with the full operativity of STAB and BOFS boards. This step is crucial for any future governance, funding and implementation decisions, part of which will happen in the remaining period of the grant (~ 15 months)

Governance, funding and operational model sketched (see next WP3 & WP4 presentations), in strong consultation with WP1 project coordination

In general, very good advancement on R&D in technical WPs for the implementation of sites (see next specific presentations).

Acknowledgements

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EuPRAXIA Doctoral Network

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EuAPS

Co-funded by the European Union

This project has received funding with the co-funding of European Union Next Generation EU.

PACRI

Funded by the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement n. 101188004

EuPRAXIA-PP Consortium