IMPULSE PROJECT

Integrated Management and Reliable Operations for User-based Laser Scientific Excellence

EUOM 2024

Alexandra Schmidli and IMPULSE team

23 April 2024

IMPULSE is funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871161

IMPULSE Project Objectives

- IMPULSE focuses on achieving an **effective transition** of ELI ERIC from **construction into sustainable operations** by **uniting the ELI Facilities** and making them **accessible for users** through one **single, high-quality access point**.
- IMPULSE addresses the **key scientific, technical, organisational, and management requirements of this integration**, **building user communities** and **expanding the ELI member consortium.**

Integration of the Facilities

- *Develop a joint management culture and the capabilities of the ELI facilities with an efficient use of resources.*

Technical Synergies

- *Identify technical synergies to lower operations costs and increase availability for users (standardising metrology, optimise spare parts management, provide training for operating teams, identify and develop new key optical components, standardise target design and debris shielding*

Access and User Programme

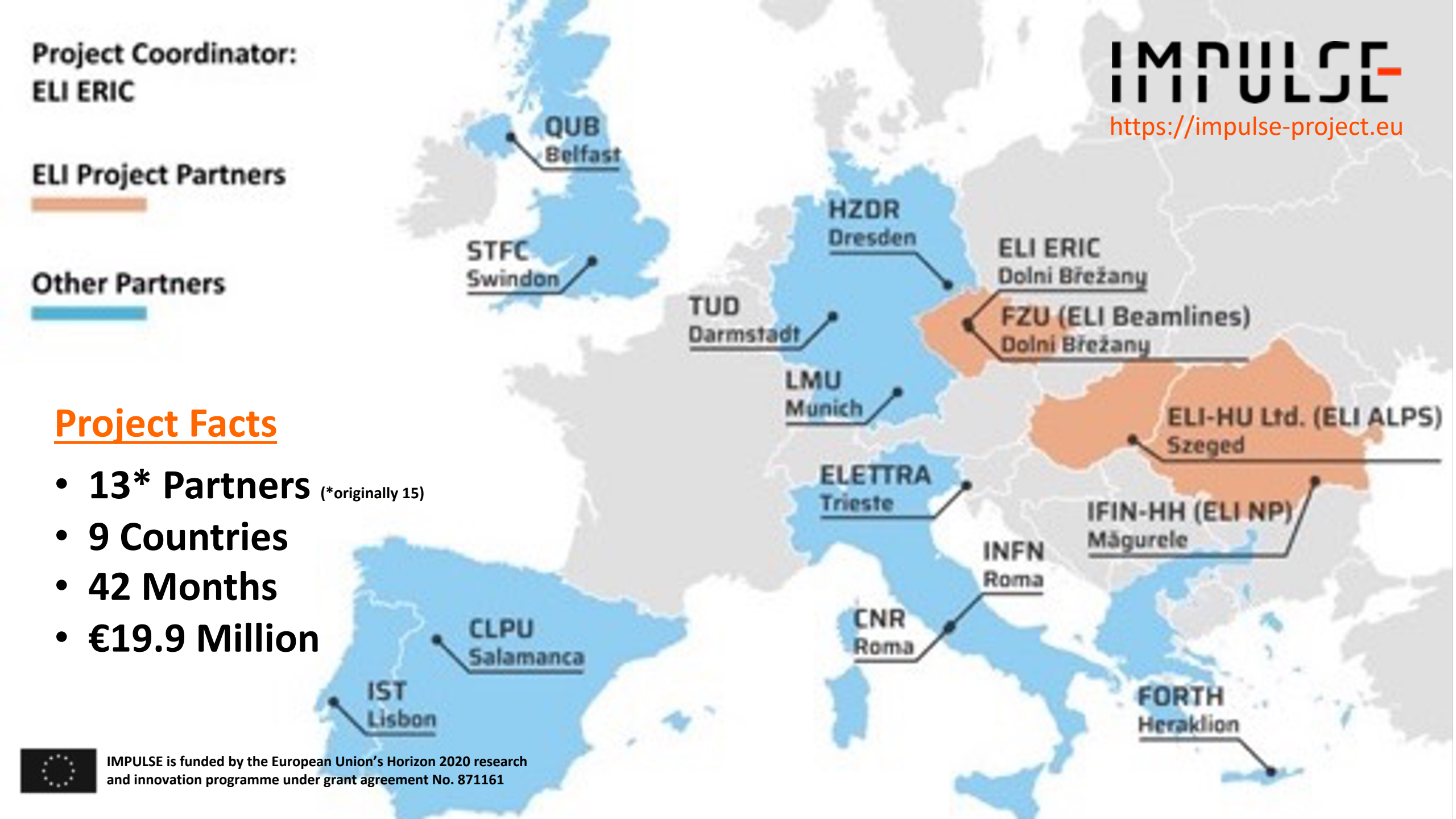
- *To support the user experience and the establishment of ELI as the most advanced laser-based science facility in the world, the project will develop resource management rules and processes, user management processes and offices, and a user portal including data services.*

Project Coordinator:
ELI ERIC

ELI Project Partners

Other Partners

IMPULSE
https://impulse-project.eu

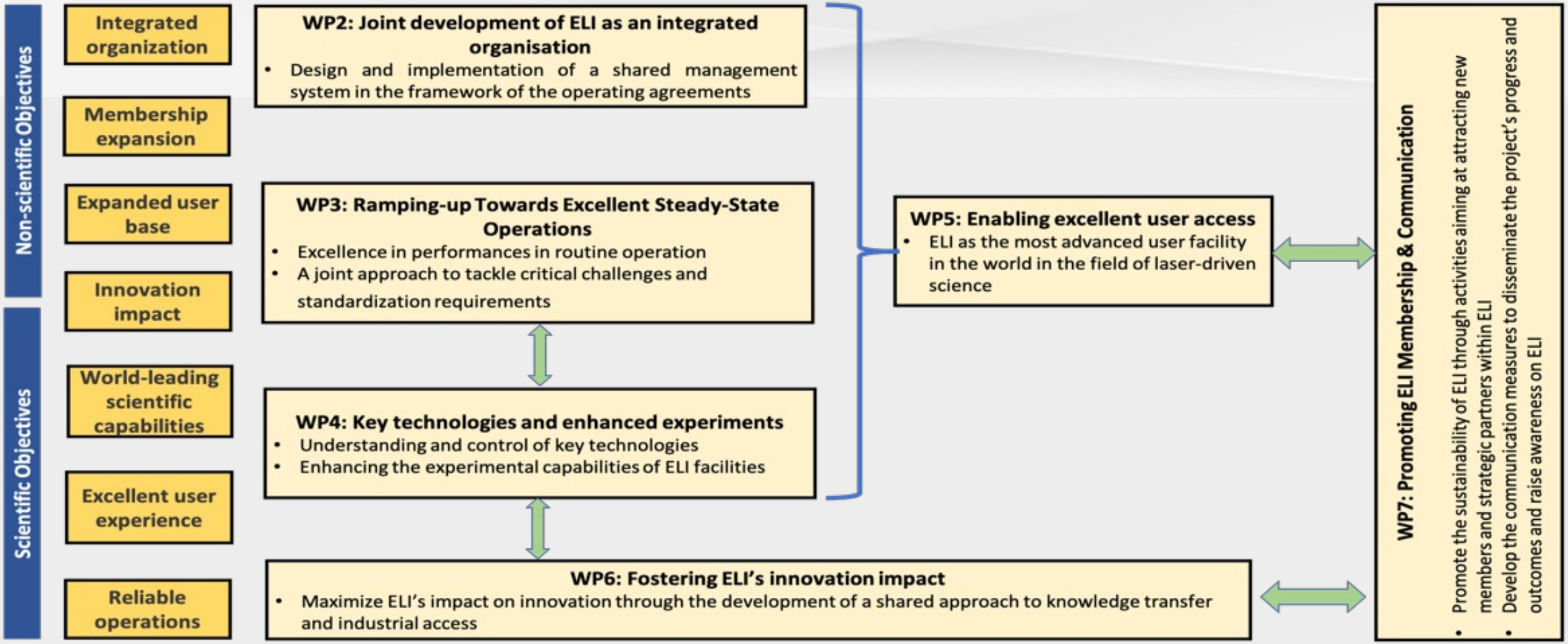


Project Facts

- **13* Partners** (*originally 15)
- **9 Countries**
- **42 Months**
- **€19.9 Million**

IMPULSE is funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871161

Project Structure



WP1: Setting-up and project management

Gábor Németh (ELI ERIC)

WP2: Joint development of ELI as an integrated organization

- Design and implementation of a shared management system and supporting systems enabling joint operations during Initial Operations Phase
- Implementation of the operating agreements between the ERIC and the ELI Facilities

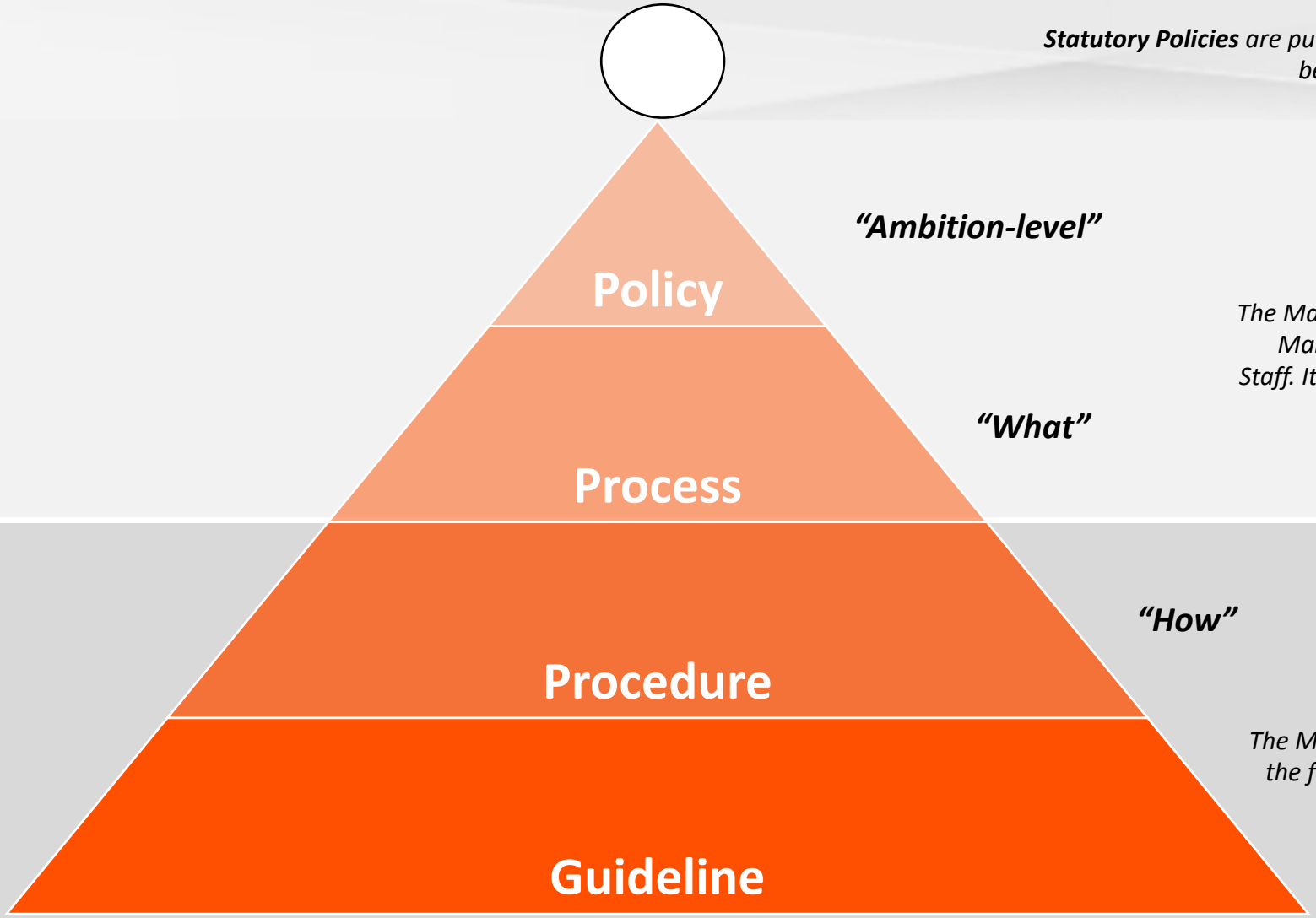
Deliverables

D2.1 Proposed access agreements with ELI hosting organisations
D2.2 Financial rules, including in-kind management rules and first version of ELI cost book
D2.3 ELI ERIC management and organizational concept
D2.4 ELI ERIC statutory policies
D2.5 Detailed requirements and implementation roadmap for ELI ERIC IT systems and ERP
D2.6 Reports on roll-out of integrated management system
D2.7 Report on implementation of initial elements of ELI ERP system
D2.8 Report on transition from access agreements to fully integrated operations
D2.9 Lessons learnt and revision of ELI integrated management system

Partners: ELI ERIC, ELI-ALPS, ELI Beamlines, ELI-NP

IMPULSE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 871161

The ELI ERIC Management System



Statutory Policy for All ELI ERIC

General Assembly & DG

Statutory Policies *are put in place when establishing ELI ERIC, but can be changed or modified based on voting of GA*

Common to All Facilities

DG & Management Board

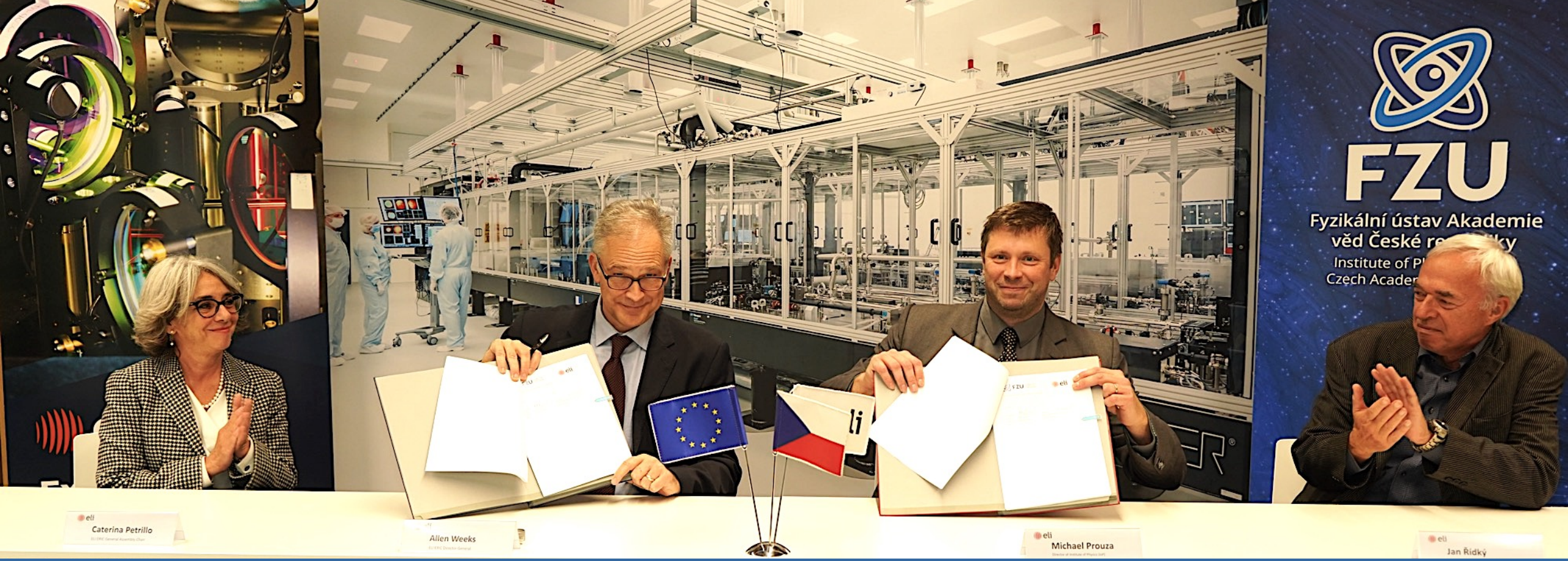
The Management System is put in place by the DG & Management Board and shared with the GA and Staff. It is consistent on the ***Policy*** *and* ***Process*** *levels across the facilities, ensuring quality.*

Facility Specific

Management Board & Staff

The Management System is flexible in that it allows the facilities to have Procedures and Guidelines to adapt to local conditions, regulations, etc.

ELI aims to be ISO 9001 Certified by 2026



Strategic Agreement with FZU Integrates ELI Beamlines into ELI ERIC from 1 January 2023

Strategic Agreement with University of Szeged Integrates ELI ALPS into ELI ERIC from 1 January 2024

Romania joined ELI ERIC as a Founding Observer January 2024

ELI-NP fully participates in all IMPULSE integration activities and intends to integrate with the other ELI Facilities

András Makai (ELI-ALPS)

WP3: Ramping-up Towards Excellent Steady-State Operations

- Joint approach to optimization of operational performance and efficiency through standardization of operational processes and metrology and R&D initiatives addressing critical challenges

Deliverables

D3.1 Facility Operations and Maintenance Standard Operating Procedures (SOP)

D3.2, 3.3 Facility report on implementation and review process for SOPs

D3.4, 3.5, 3.6 Detailed definition of metrology procedures and diagnostics instrumentation for operators and users of ELI Facilities

D3.7 Report on ELI-led metrology standardisation initiative with key stakeholders
D3.8 Detailed specifications of spare parts database and development roadmap
D3.9 Report on implementation and use of spare parts database by ELI Facilities
D3.10 Report on training needs and implementation of training measures for ELI operators

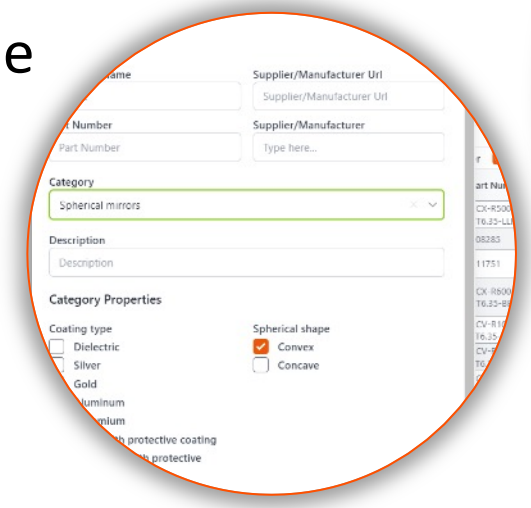
Partners: ELI ERIC, ELI-ALPS, ELI Beamlines, ELI-NP, STFC, CLPU, LMU MUENCHEN, HZDR

IMPULSE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 871161

ELI Operations and Maintenance Database (ELI-PANDA)

- Design and programming by ELI colleagues (**in-house know-how**)
- Containes systems, subsystems, **key components**, connected procurements, availability
- Efficient **procurement** planning
- **Risk management**
- Reports, risk analysis
- ~ 3000 parts in catalogue

- Synergy with WP2
- Beyond IMPULSE:
  - Connection with ERP



Pavel Bakule
T3.3 leader

STAMPLASS Workshop hosted at ELI-NP
led by WP3 on 21-23 March in Măgurele, România

The availability of reliable solutions and accepted protocols for the metrology of high-peak power, high-repetition rate lasers and the secondary sources derived from them is critical both for the operation of the ELI Facilities and for enabling excellent research and user access at ELI.

Workshop Objective

- Identifying standard diagnostics in metrology procedures available for implementation at the ELI Facilities;
- Exchange of experience with the scientific community (users, partners, industry) on standard diagnostics for the high-peak-power lasers;
- **110 participants** (ELI facilities, 24 companies and 38 from academia);
- **3 day programme**
- **37 talks / speakers**
- **12 posters**

Daniel Kramer (ELI Beamlines)

WP4: Key technologies & enhanced experiments

- Risk mitigation through development of key technologies enhancing the capabilities of the ELI facilities (e.g., LIDT, targetry, control systems)

Deliverables

D4.1 Guidelines for optimisation of LIDT of key optical components
D4.2 Feasibility study and cost-benefit analysis of ELI-wide mirror coating facility
D4.3 Detailed analysis of users' target needs to implement mitigation strategies of EMP protection and debris shielding
D4.4 Target production strategy and report on implementation
D4.5 Report on Development of integration solutions to control system for critical diagnostics instruments
D4.6 Simulation solution for optimisation of high-peak power laser operation
D4.7 Report on implementation of setup for generation and characterisation of attosecond pulses with circular polarization by CNR
D4.8 Report on implementation of proton diagnostic solution by INFN
D4.9 Report on implementation of helical coil targets by QUB
D4.10 Report on implementation of magnetic bottle electron time-of-flight spectrometer by FORTH
D4.11 Report on implementation of XUV induced ionization studies in water-solved samples by STFC

Partners: **ELI ERIC, ELI-ALPS,ELI Beamlines, ELI-NP, TUDA, STFC, CNR, ELETTRA, HZDR, INFN, QUB, FORTH**

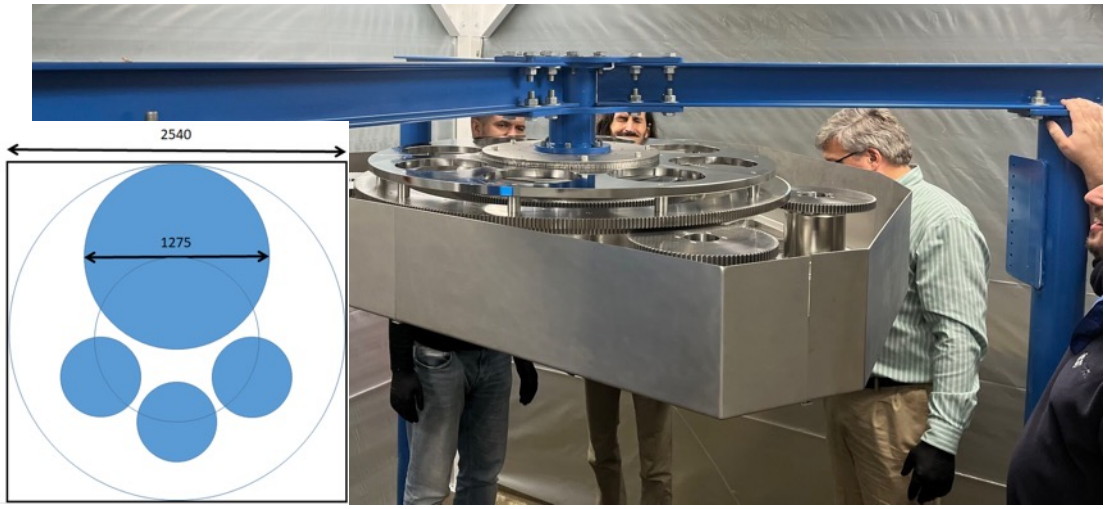
IMPULSE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 871161

ELIAS – ELI Advanced coating System

Task 4.1

J. Oliver (Vacuum Innovations), T. Tolenis, D. Kramer (ELI BL), et al.
ELI BL technical teams, S. Hejtmánek (Streicher)

- ELIAS laboratory created in ELI BL
- Experience from largest US laser labs helped in the design (SANDIA, LLE, LLNL)
- Unique 1.2 m aperture for HE laser optics in planetary motion
- Coating Process R&D and related LIDT funded by THRILL Horizon Europe project
- Enables largest >5 PW laser projects



WP4.2 targets, EMP and Debris shielding

Task 4.2

M. Cernaianu (NP)
And many others

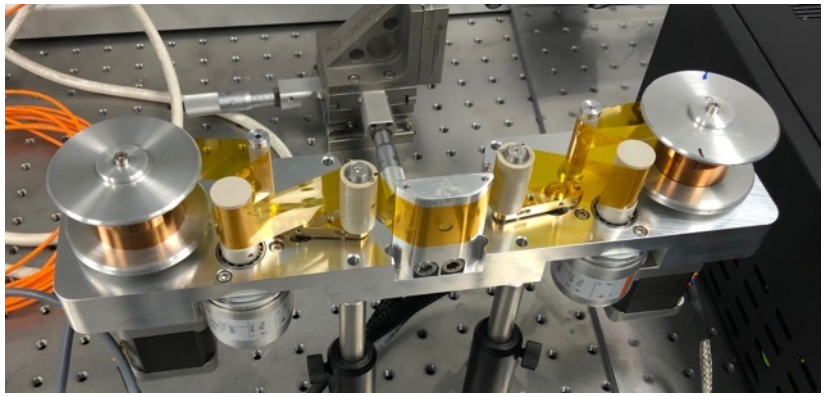
- 2 key deliverables
- **+User Workshops**

D4.3 – Detailed analysis of users' target needs to implement mitigation strategies of EMP protection and debris shielding

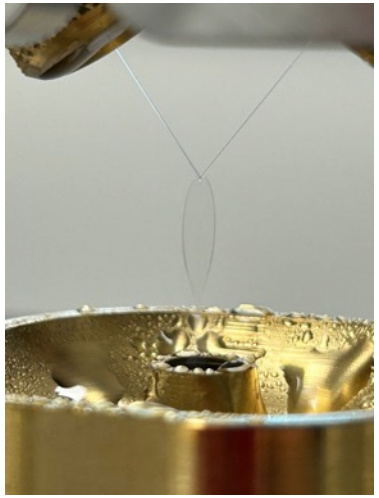
D4.4 – Target production strategy and report on implementation

- Many target types developed and produced for experiments
- Exhaustive list of
  - target type requirements for each facility
  - manufacturing/procurement methods
  - Decision trees for user proposals

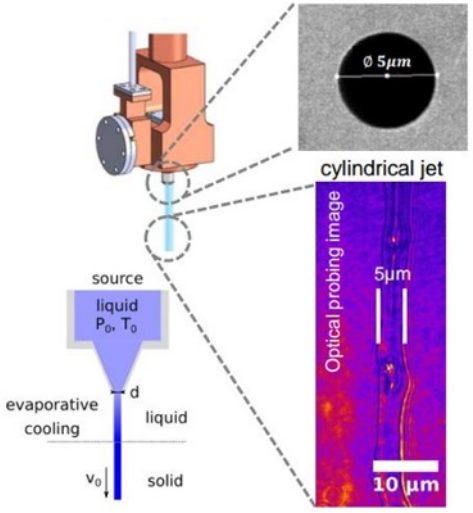
Tape targets developments STFC



Liquid leaf/jet target developments STFC



Foam/aerogel developments in TUD



Cryo targets HZDR

Ovidiu Tesileanu (ELI-NP)

WP5: Enabling excellent user access

- Implementation of common standards and practices in all areas related to user experience to support the development of ELI as the most advanced user facility in the world in the field of laser-driven science
- Implementation of access pilots and flagship experiments

Deliverables

D5.1 Management procedures and workflows of user offices and access-related processes
D5.2 Conceptual design report for ELI user portal
D5.3 Report on implementation of ELI user portal
D5.4 Annual reports on implementation of access pilots –
D5.5 Detailed description of training measures and tools for users
D5.6 Report on implementation of user training activities

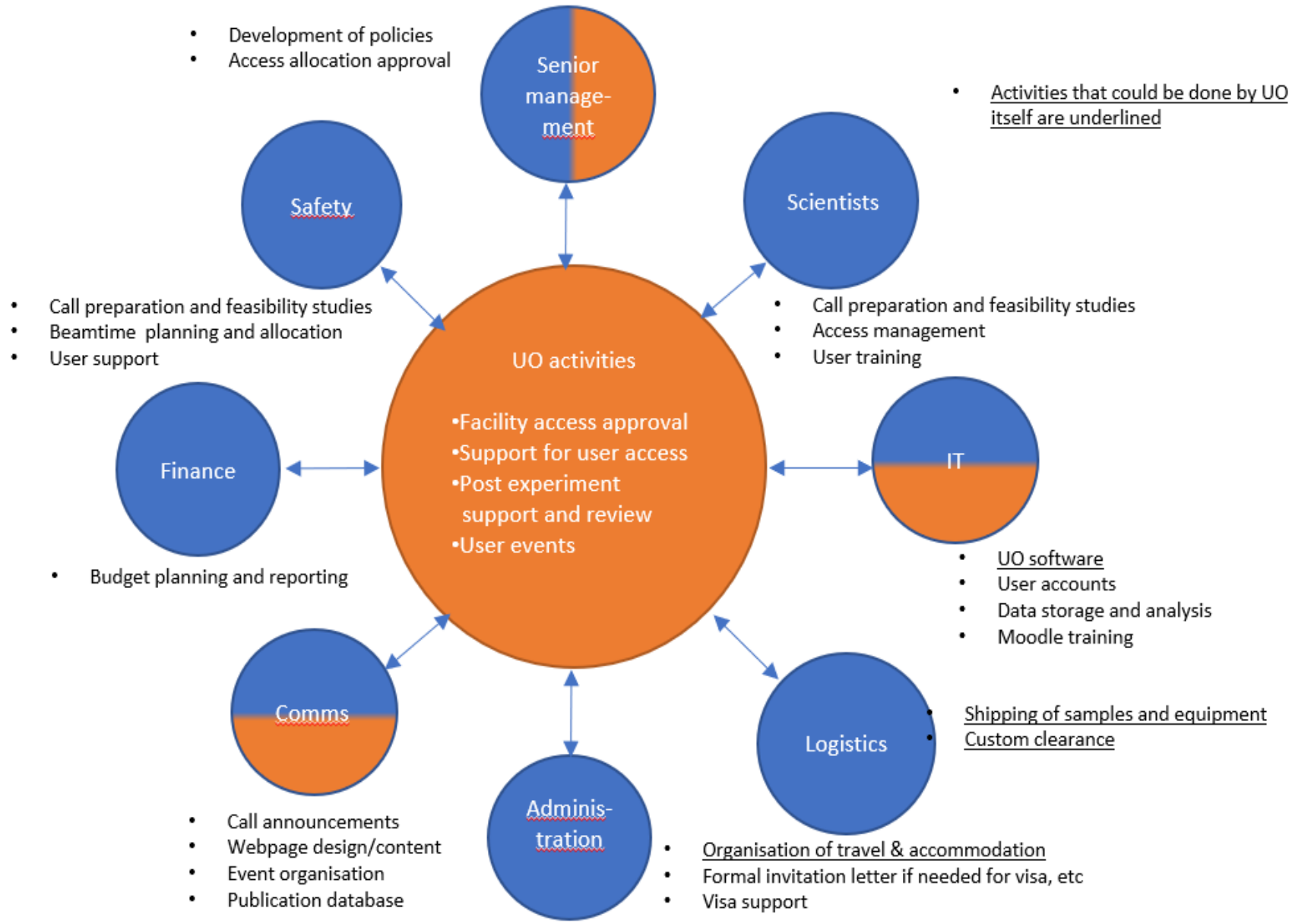
Partners: **ELI ERIC, ELI-ALPS, ELI Beamlines, ELI-NP, STFC, ELETTRA, HZDR**

IMPULSE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 871161

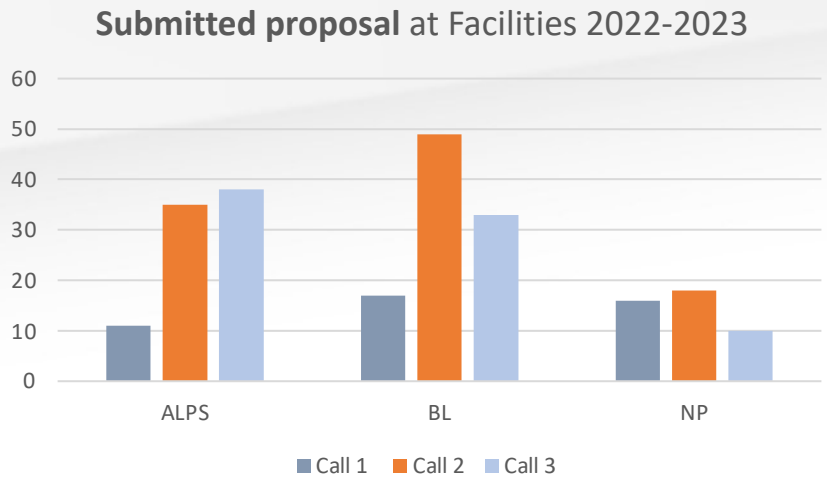
Joint ELI User Programme

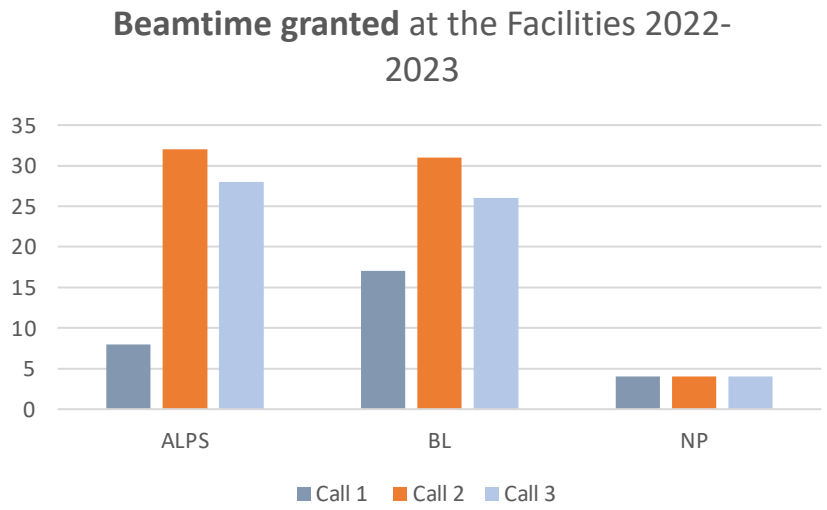
The vision for the ELI User Office (UO) is a single organisation that extends across the ELI Facilities.

The ELI ERIC UO is being led by Zita Varadi who is line manager for UO teams in the two Facilities and coordinates closely with local teams



3rd Call Overview by Facility





ELI USER CALLS 1-3 Overview						
Year	User Call	ELI Facilities Combined		ELI Facilities Individually		
		Proposals Submitted	Beamtime Granted	Proposals Submitted / Beamtime Granted		
				ELI Beamlines	ELI ALPS	ELI NP
2022	1st	44	29	17/17	11/8	16/4
2023	2nd	102	67	49/31	35/32	18/4
2023	3rd	81	58	33/26	38/28	10/4
Total	3	**227**	**154**	**99/74**	**84/68**	**44/12**
Application Success Rate			**≈ 68%**	**≈ 75%**	**≈ 81%**	**≈ 27%**

4th Joint ELI Call for Users

- **ELI Facilities:**
  - **ELI ALPS,** Szeged, Hungary
  - **ELI Beamlines,** Dolní Břežany, Czech Republic
- **4th Call period: 25 March - 29 April 2024**
- **Unique scientific opportunities provided by access to a wide range of complementary instruments**
- **Single point of access** (https://up.eli-laser.eu)
- **Access is free** based on a **peer-reviewed** evaluation of **scientific excellence**
- Contact Integrated **ELI User Office**
  user-office@eli-laser.eu
  or **technical contacts** listed on **User Portal**.

19

Aleš Hála (ELI Beamlines)

WP6: Fostering ELI's innovation impact

- Maximize ELI's impact on innovation through the development of a shared approach to knowledge transfer and industrial access

Deliverables

D6.1 Setting-up and operation of ELI central ILO and local units, annual reporting of activities
D6.2 Strategy for ELI Innovation
D6.3 Report on implementation measures of ELI Innovation Strategy
D6.4 Setting-up of ELI Industry Board
D6.5 Report on meetings of ELI Industry Board
D6.6 Report on organization of industry events at ELI

Partners: **ELI ERIC, ELI-ALPS, ELI Beamlines, ELI-NP, STFC, ELETTRA**

IMPULSE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 871161

Alexandra Schmidli (ELI ERIC)

WP7: Promoting ELI membership and communication

- Promote ELI's sustainability through activities aiming at attracting new members and strategic partners
- Promotion of community-level strategy planning and road-mapping
- Communication and dissemination of the project's results and outcomes

Deliverables

D7.1 Project website and portal
D7.2 Project communications and dissemination strategy
D7.3 New members and strategic partners engagement plan
D7.4 Scientific community outreach strategy
D7.5 Corporate identity guide and Communications rules for ELI
D7.6 Annual reports on activities to engage new Partners
D7.7 Annual reports on community outreach activities
D7.8 Report on 'Laser Science and Technology Roadmap for Europe'

Partners: **ELI ERIC, ELI-ALPS, ELI Beamlines, ELI-NP, CLPU, IST, FORTH**

IMPULSE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 871161

Summary of Outreach Activities

18
Workshops organised

64
Conferences and Workshops participated in

15
Exhibitions

23
Conferences organised

250+
Total activities

9
Trade Fairs

30+
Scientific publications

7400+
Visitors at ELI annually

The Most Important Success:
IMPULSE has brought us together!

IMPULSE Annual Meeting 2022, Szeged Hungary

IMPULSE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871161

The Most Important Success:
IMPULSE has brought us together!

IMPULSE Annual Meeting 2023, Măgurele Romania

IMPULSE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871161

The Most Important Success:
IMPULSE has brought us together!

IMPULSE Closing Meeting 2024, Brussels, Belgium

IMPULSE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871161

IMPULSE

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

UKRI Science and Technology Facilities Council

IST TÉCNICO LISBOA

QUEEN'S UNIVERSITY BELFAST

TECHNISCHE UNIVERSITÄT DARMSTADT

HZDR HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

CNR IFN Istituto di Fotonica e Nanotecnologie

FORTH FOUNDATION FOR RESEARCH AND TECHNOLOGY HELLAS

CLPU CENTRO DE LÁSERES PULSADOS

INFN LNS Istituto Nazionale di Fisica Nucleare Laboratori Nazionali del Sud

Elettra Sincrotrone Trieste

eli

eli nuclear physics

IMPULSE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871161