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Table of Contents

About Lasers4EU	1
1 Introduction and objectives	2
2 Task 4.1: Short-term R&D projects	4
2.1 Scope, objectives, and expected outcomes	4
2.2 Calls	4
2.3 Selection process and criteria	5
2.4 Projects and progress	6
3 Task 4.2 Joint experiments	6
3.1 Scope, objectives and expected outcomes	6
3.2 Calls	7
3.3 Selection process and criteria	7
3.4 Projects and progress	7
4 Task 4.3. Staff exchanges	9
4.1 Scope, objectives and expected outcomes	9
4.2 Calls	10
4.3 Selection process and criteria	10
4.4 Projects and progress	11
5 Task 4.4. Standardised performance assessment	11
5.1 Scope, objectives and expected outcomes	11
5.2 Implementation and results	12
5.3 Next steps	14
5.4 Conclusion	14
6 Task 4.5 FAIRness	15
6.1 Scope, objectives and expected outcomes	15
6.2 Implementation and results	16
6.3 Next steps	16
6.4 Conclusion	17

List of tables

Table 1 - Proposals received in the 2025 call for short-term R&D projects	5
Table 2 – Proposals received in the first year of the project for curiosity-driven joint experiment between Lasers4EU partners.....	8
Table 3 – Proposals received in the 2025 call for joint experiments for standard procedure and instrument calibration.....	9
Table 4 – Proposals received in the 2025 call for staff exchanges	10

List of figures

Figure 1 Process toward a standardised performance assessment	13
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About Lasers4EU

Lasers4EU is incorporating the major laser research infrastructures, in a large number of European member states, into a comprehensive virtual distributed laser research infrastructure that is offering to a broad user community, from academia and industry, access to an exceptional portfolio of technical and scientific capabilities. This unique set of instruments together with the specific scientific expertise at the host facilities allows Lasers4EU users to carry out high-level research in an extremely wide range of high-impact topics in life sciences, materials nano-processing, etc. Laser technology has experienced remarkable advances and breakthroughs during the last 60 years and is now a key innovation driver for highly diversified societal applications and products, thereby substantially contributing to economic growth and to solving challenges in the areas of health, environment and energy. Through its strategic approach, Lasers4EU aims to strengthen Europe's leading position and competitiveness. It facilitates long-term coordination of the laser research activities within the European Research Area and provides concerted and efficient services to scientific, industrial and medical researchers. The main objectives of Lasers4EU are to:

- provide coordinated access to high-quality services based on a coherent and comprehensive consortium of 27 leading European laser installations offering to users from academia as well as from industry cutting-edge performances at the forefront of the laser technologies,
- structure the European landscape of laser Research Infrastructure through enhanced access, extended geographical coverage, novel science diplomacy activities, improved synergies with other European networks and projects,
- increase European human resources in the field of laser science by implementing training activities towards researchers from new domains of science and technology and from geographical regions where laser communities are still less developed.

Disclaimer

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1 Introduction and objectives

The five tasks of work package 4 form a coherent framework for strengthening the scientific, technical, and organisational foundations of Lasers4EU. Task 4.1, short-term R&D projects, drives targeted innovation by developing new tools and methods; Task 4.2, joint experiments, reinforces collaboration and standardisation across the consortium partners through shared experiments; Task 4.3, staff exchanges, ensures that personnel across the network is equipped with the skills and experience required to operate at the highest level; Task 4.4, standardised performance assessment elevates quality assurance by introducing harmonised performance assessment protocols and extending FAIR principles to system parameters, and Task 4.5, FAIRness, embeds FAIR data management practices, providing tools, templates, and a networked approach to sustain compliance and impact.

Each of the listed tasks pursued specific objectives.

Task 4.1 aims to expand the range of instruments, methods, and digital solutions available to users through time-limited joint developments. Projects are designed to improve user-friendliness, enhance reproducibility, and add new capabilities to the Lasers4EU portfolio. With a maximum duration of two years and targeted co-funding, these projects produce tangible outputs such as simplified data acquisition systems, calibration tools, and new optical devices, which will be made available to users during the lifetime of the project.

Task 4.2 comprises two complementary streams of activity: (i) curiosity-driven collaborative experiments between Lasers4EU partners with clear scientific missions, often leading to publications, and (ii) joint experiments for the standardisation of procedures and instrument calibration across facilities. Proposals for (i) can be submitted on a rolling basis, and dedicated calls are launched for the standardisation of procedures and instrument calibration-focused activities. By fostering collaboration and reproducibility, Task 4.2 plays a vital role in harmonising practices across Europe's leading laser facilities.

Task 4.3 strives to improve user services through the professional development of scientific and technical staff. Exchanges of up to two weeks enable personnel to gain hands-on experience in partner facilities, strengthening individual skills and promoting knowledge transfer. These exchanges will create a shared pool of operational practices relevant to user access, raise the overall quality of services, and foster long-term collaboration, harmonisation of operational standards, and a sustainable network of well-trained professionals across the consortium.

Task 4.4 seeks to improve the overall quality of services provided to users by developing and piloting

unified performance assessment protocols. The initiative is aligned with further objectives including the implementation of FAIR data principles, support for open science, and fostering best practices in instrumentation calibration and joint procedures.

Task 4.5 focuses on establishing a sustainable data management framework and a FAIR (Findable, Accessible, Interoperable, Reusable) network across Lasers4EU. Its objectives are to set up a network of representatives from all access-providing facilities, collect Data Management Plans (DMPs) and institutional policies, analyse commonalities, and derive a simplified Lasers4EU-wide DMP template. A FAIR helpdesk is created to support partners and users.

Collectively, WP4 ensures that Lasers4EU consortium remains at the forefront of laser science, offering reliable, reproducible, and innovative services to its user community while contributing to the ongoing development of the European Research Area.

2 Task 4.1: Short-term R&D projects

2.1 Scope, objectives, and expected outcomes

As the name suggests, Task 4.1 supports short (completion within max. 2 years after approval), collaborative R&D projects designed to deliver tangible improvements to experimental set-ups, diagnostics and data handling. Such projects may address:

- Simplified data acquisition interfaces
- Procedures to more accurately characterise experimental conditions for replicability and reusability
- Standardised diagnostics or detectors and common calibration tools
- Automated acquisition systems for FAIR-compatible data and remote access
- Development of new optical devices (e.g., optical parametric amplifiers)
- Closed-loop stabilisation systems
- Sharable ultra-short-pulse laser diagnostics not commercially available
- Portable devices for joint experiments (e.g., post-pulse compression)

These projects aim to improve the user-friendliness of tools, add new capabilities to the Lasers4EU portfolio within the duration of the project and support developments that benefit the wider research community.

The expected outcomes include openly accessible technical documentation and operating procedures, as well as freely available tools and software published on the Lasers4EU website. In addition, the collaborations fostered through these activities will strengthen knowledge exchange across the Laserlab-Europe network. Collectively, they will expand the technological base and enhance the scientific services offered by Lasers4EU to users and support developments that benefit the wider research community.

2.2 Calls

The first call for short-term R&D projects was launched in 2025 with a deadline of 28 February. The Activity Board made funding decisions in March 2025. Four proposals were submitted, of which two were selected for funding:

Table 1 - Proposals received in the 2025 call for short-term R&D projects

Title of proposal	Lead partner(s)	Estimated duration	Result
An open-source laser-based autofocus system for microscopy	Leibniz IPHT	21 months	approved
Auto-alignment and closed-loop drift stabilization for high-power lasers	MBI & LMU	16 months	rejected
Development of a birefringent interferometer for Fourier Transform Spectroscopy in the soft X-ray domain	DESY & CUSBO	9 months	approved
Diffractive optics for optimizing OPCPA pumping	MBI & CELIA	not indicated	rejected

Projects are co-funded by the participating laboratories that cover all associated personnel costs. Support of up to €8,000 is available for consumables through the project.

The second call is planned for November 2025. Eligibility is restricted to members of Lasers4EU and/or Laserlab-Europe AISBL. Each proposal must involve at least two partners, one of which must be a Lasers4EU access provider. For this call, additional co-funding can be provided by Laserlab-Europe AISBL if a partner outside Lasers4EU is involved.

2.3 Selection process and criteria

The Activity Board evaluates proposals based on the following criteria:

- Alignment with the stated objectives of Task 4.1
- Technical and operational maturity of the proposed solutions
- Cost efficiency, including co-funding contributions
- Identification of sustainable impact that can be tracked beyond the project's lifetime

Priority is given to well-focused projects whose sustainability is guaranteed by the facilities involved. A commitment to openly sharing results, including technical drawings, procedures, and software, is a requirement.

2.4 Projects and progress

Two projects were selected from the first call:

1. Open-source laser-based autofocus system for microscopy

- Approach: Simulation to CAD, combining printed and off-the-shelf parts
- Publications: DOI: 10.1364/AO.57.009972; Preprint: <https://doi.org/10.1101/2023.05.31.542706>
- Achievements: Demonstrated basic principle of astigmatism-based focus; evaluated drift performance on both optical table and desk-mounted microscopes.

2. Birefringent interferometer for Fourier Transform Spectroscopy in the soft X-ray domain

- Progress: Components purchased and delivered, prototype assembled and calibrated with infrared light.
- First attempts at high-harmonic generation up to ~80 eV using time-delayed pulses have been conducted, with ongoing efforts to observe spectral interference.

3 Task 4.2 Joint experiments

3.1 Scope, objectives and expected outcomes

Task 4.2 Joint Experiments supports curiosity-driven collaborative research projects between Lasers4EU partners, as the members of the project have agreed that transnational access should be reserved for external users so that proposals for experiments between project partners is not eligible under the access scheme (WP3). These experiments make use of complementary expertise across laboratories to address ambitious scientific questions and to pursue innovative studies that extend well beyond the current state of the art. In parallel, the task encompasses a dedicated stream of joint experiments focused on the development of standardised protocols and calibration procedures, achieved by conducting identical experiments across different facilities and comparing results.

The joint experiments are expected to result in stronger collaborations within the consortium and demonstrable benefits for the wider research community through improved experimental reproducibility. The adoption of shared protocols and calibration procedures will increase interoperability between facilities and ensure consistent quality standards across the network. Results, datasets and validated procedures will be disseminated within the consortium and, where appropriate, made openly available.

3.2 Calls

As described above, two types of joint activities run in parallel within this task. The first covers proposals for curiosity-driven joint experiments, which may be submitted at any time through a single central online portal. To date, nine proposals have been received under the rolling call. The second concerns joint experiments focused on standard procedures and instrument calibration, which are organised in response to dedicated calls. One such call was launched in June 2025, resulting in a single proposal (see tables 2 and 3).

Looking ahead, additional calls for calibration-related joint experiments are planned for April 2026, April 2027 and November 2027.

3.3 Selection process and criteria

Curiosity-driven joint experiments will be proposed, evaluated and selected in line with the user access regulations established in WP3, i.e. by a fully external selection panel with scientific excellence as main criterion. Proposals focusing on standardisation will be selected by the Activity Board. The latter are assessed against a set of criteria, namely their scientific relevance in relation to standardisation, calibration and data management objectives; their feasibility, including clarity of methodology, realistic timelines and adequate resource planning; and their comparability, ensuring that the experimental design allows meaningful cross-facility result comparisons. Further criteria include the extent to which a proposal contributes to the development or validation of common procedures, as well as the appropriate application of, and feedback on, the Lasers4EU Data Management Plan.

3.4 Projects and progress

Seven out of the nine proposals for curiosity-driven joint experiments have already been completed. Of the two remaining, one has been accepted and is awaiting implementation, while the other has recently been submitted. Following the completion of experiments, researchers must evaluate and reflect on the outcomes, and in some cases conduct additional work to validate the findings. As a result, the scientific impact of these activities generally becomes visible only after some time, most often through peer-reviewed publications.

Table 2 – Proposals received in the first year of the project for curiosity-driven joint experiment between Lasers4EU partners

Title	Sending partner	Hosting partner	Result
Photosynthetic efficiency enhancement of microalgae through artificial antennas incorporation: an energy transfer system	CUSBO	CLF	submitted
Broadband Fourier-transform spectroscopy in the soft X-ray using a birefringent interferometer	CUSBO	CLF	completed
Light-induced symmetry and topological phase transition in chiral tellurium	LACUS	FERMI	completed
Element specific vibrational control of superconducting cuprates	LACUS	FERMI	completed
Ultrafast emergence of chirality in a ferromagnet	HiLASE	CLF	completed
Characterisation of Non-Linear Optical Properties for Bio-Based Resins	VULRC	FORTH	completed
Electron- and subsequent X-Ray generation at PHELIX via Self-Modulated Laser Wakefield Acceleration	CLPU	GSI	completed
Optimization of the adhesion mechanism imaging of triple-negative breast cancer (TNBC) cells and the extracellular matrix (ECM) using soft X-ray and fluorescence correlative microscopy	MUT	HIJ	accepted
On fidelity of the optical Schrödinger	FORTH	MBI	completed

With regard to the joint experiments on standard procedures and instrument calibration, the project “Standardising Field Intensity Determination in Optical Microcavities” aims to improve the accuracy of light intensity determination within optical microcavities, a critical factor in interpreting phenomena such as polariton condensation, polariton LEDs, lasing and exciton–exciton annihilation. The planned activities include the preparation of thin films and microcavities with perovskite quantum dots (QDs), followed by an analysis of Auger recombination dynamics using broadband transient absorption spectroscopy. Calibration will be achieved by comparing excitation fluence in bare films and in microcavities.

This project is being carried out as a collaboration between three partners: LLC, responsible for the preparation and basic characterisation of QD films and microcavities; CUSBO, conducting intensity-dependent broadband transient absorption measurements; and LENS, also performing intensity-dependent broadband transient absorption measurements. The project is currently being conducted in preparation, with completion expected at the end of the year 2025.

Table 3 – Proposals received in the 2025 call for joint experiments for standard procedure and instrument calibration

Title of proposal	Involved partner(s)	Result
Standardizing Field Intensity Determination in Optical Microcavities	LLC, CUSBO & LENS	approved

4 Task 4.3. Staff exchanges

4.1 Scope, objectives and expected outcomes

Task 4.3 supports short staff exchanges (typically one to two weeks) between Lasers4EU facilities (including ELI ERIC) and members of Laserlab-Europe AISBL focused on training activities involving laser equipment, experimental set-ups, data acquisition systems and analysis methods. Exchanges are organised through regular calls, with proposals submitted jointly by the sending and host institutions.

The primary objective of staff exchanges is to increase the scientific and technical competences of participating personnel and, in turn, improve the services provided to users. Exchanges between established access-providing facilities and more recently commissioned installations are particularly important, as they ensure that less experienced staff receive training in specific instrumental techniques or facility operation. This contributes to the development of the next generation of highly skilled technicians and engineers serving European research infrastructures. Staff exchanges also support the sharing of operational expertise on user access provision, including aspects such as security and laboratory management. In addition, they encourage the development and implementation of standardised procedures in close connection with Task 4.4.

Staff exchanges are expected to create a pool of good operational practices and to strengthen the overall quality and consistency of user access services across the Lasers4EU consortium. The higher technical skills acquired through these exchanges will enhance the reliability, efficiency and scientific value of the facilities, while fostering the adoption of common procedures and standards. In the longer term, these exchanges will help build a sustainable, well-connected community of highly skilled staff, supporting the integration of the European Research Area.

4.2 Calls

The project foresees four annual calls for staff exchanges, with approximately five exchanges per year, resulting in around twenty exchanges over the full duration of the project.

Each call follows a well-defined process designed to ensure transparency and inclusiveness. Announcements are circulated widely across the consortium, providing equal opportunities for all eligible staff to apply. The staggered scheduling of calls accommodates different institutional calendars, thereby maximising participation. Care is also taken to achieve a balanced distribution of exchanges among partner institutions, so that the benefits of mobility and training are shared broadly across the consortium.

The first call was launched in 2025 with a deadline of 27 April. Funding decisions were made by the Activity Board in June 2025. Five proposals were submitted, all of which were selected for funding.

Table 4 – Proposals received in the 2025 call for staff exchanges

Sending partner	Hosting partner	Result
DESY	FERMI	approved
CUSBO	ISMO-CNRS	approved
MBI	HIJ	approved
CLUR	MBI	approved
HiLASE	CLF	approved

4.3 Selection process and criteria

Proposals for staff exchanges are evaluated by the Lasers4EU Activity Board according to transparent, merit-based criteria. The assessment considers the relevance of the exchange to the applicant's current role, the potential for skills and knowledge to be transferred back to the home institution, and the contribution to the overall objectives of Lasers4EU. Priority may also be given to proposals addressing strategic areas of development, such as advanced laser techniques, safety procedures or new user support protocols.

Selection criteria include the clarity and conciseness of the proposal, the extent to which the exchange is relevant for improving skills and competences, the contribution to knowledge sharing between facilities, and the feasibility of the exchange within the available timeframe and resources.

4.4 Projects and progress

Detailed event reports are not yet available, as the exchanges are scheduled for the second half of the year. Nevertheless, preliminary feedback from participants already highlights the strong interest in these opportunities. The range of proposals submitted in the first call demonstrates both the demand for cross-institutional training and the value attached to hands-on learning experiences. Once available, the reports will provide details on the host institutions, the duration of visits, the topics addressed during the exchanges, and a qualitative assessment of outcomes by both the visiting staff and the host facilities.

Looking ahead, the success of the programme will depend on sustaining high levels of participation and ensuring that the knowledge gained is effectively disseminated within the home institutions. Mechanisms such as post-exchange seminars, written reports and internal training sessions will be crucial in multiplying the impact of individual exchanges. Beyond immediate skill development, these exchanges also contribute to long-term capacity building across the European research landscape, reinforcing the collective ability of institutions to serve their user communities at an international level.

5 Task 4.4. Standardised performance assessment

5.1 Scope, objectives and expected outcomes

Task 4.4 focuses on improving the overall quality of services offered to users through the development and implementation of a unified performance assessment protocol across Lasers4EU facilities. The task also supports the adoption of the FAIR principles, extending them beyond experimental data to include system parameters that have until now been used only internally.

The first objective is to gather and review the procedures currently employed for standard performance assessments, routine quality checks and automated acquisition at the different Lasers4EU facilities. This was achieved through a workshop and a survey designed to collect information in a coherent manner. The results were analysed with respect to the facilities' size and scientific focus, in order to identify common elements and possible references to internationally agreed protocols.

Building on this, a second objective is to establish consensus on common protocols for performance and quality assessment in at least three independent research fields. Each protocol is expected to

define relevant key quantifiers (figures of merit), the procedures required to measure them, the materials or tools necessary for implementation (such as tissue phantoms), and a set of routine day-to-day tests to be run alongside experiments and recorded with open data, thereby ensuring reproducibility and reliability. Where dedicated metrology tools are required, their development may be supported through joint experiments under Task 4.2.

The task is expected to deliver a set of agreed, practical and reproducible protocols for performance and quality assessment that can be applied across facilities. These protocols will first be tested in pilot user experiments and fine-tuned prior to release, with a system for regular revision to account for the rapid evolution of laser technologies. Their adoption will harmonise quality standards, improve data reliability and reproducibility, and ensure that FAIR data management principles are applied consistently to both experimental data and system parameters. Together, these measures will enhance user confidence, strengthen interoperability between facilities and contribute to a more robust and transparent European research infrastructure landscape.

5.2 Implementation and results

A dedicated working group, with one representative from each facility, has been established to steer and implement Task 4.4. The first meeting was held online on 20 January 2025 and served to set up the team and define the overall work plan.

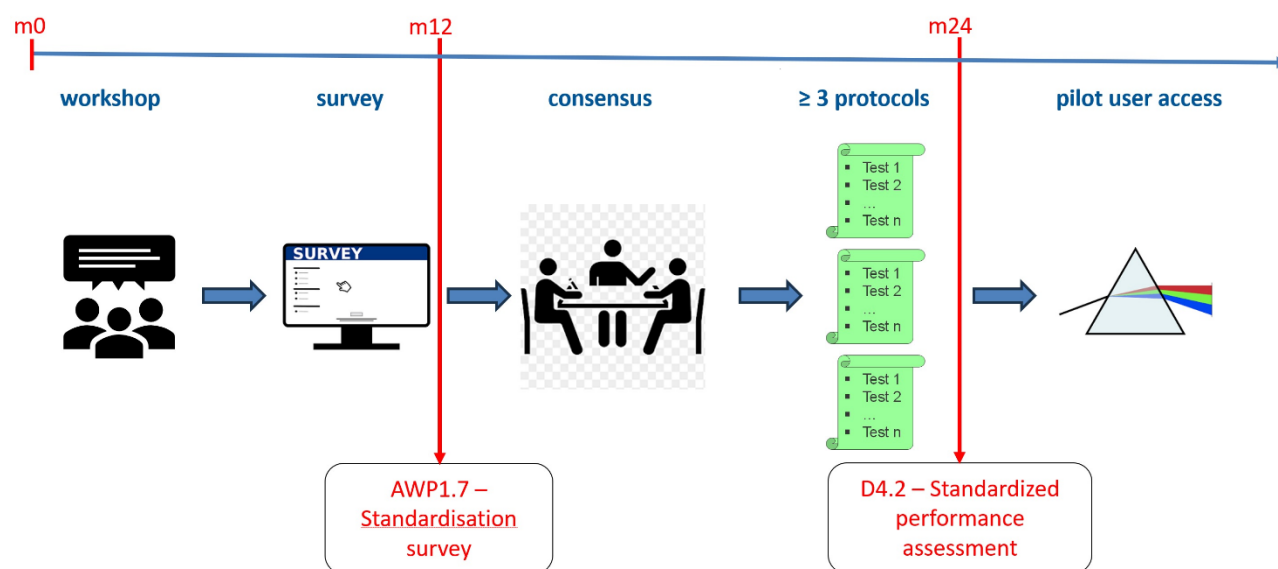
The next step focused on collecting input from participating institutions regarding their current approaches to performance assessment and quality assurance. This was structured in two stages (see Figure 1).

The first stage was a workshop held on 12 May 2025 at CLF, where experts from different facilities presented exemplary cases of performance assessment methods. The aim was to launch the initial phase by assessing current procedures and identifying best practices already adopted across Lasers4EU laboratories. The workshop was divided into two sessions. The first included presentations showcasing approaches in areas such as ultrafast spectroscopy, radiation detectors, laser particle acceleration, pulse measurement, open science data and diffuse optics. The second was a round-table discussion with facility directors, supported by strong engagement from participants. This discussion addressed the scope of performance assessment, clarifying that it should focus on hardware set-ups rather than overall facility operation. It also considered the benefits of standardisation while respecting diversity, the role of research infrastructures in promoting best practices, the potential for clustering of protocols, the integration of open data and co-registration of performance data with experiment data, best practices during user access, and the possibility of joint

experimental campaigns in connection with Task 4.2.

The second stage involved a survey directed to designated referents in each institution, requesting detailed documentation of existing practices in performance assessment, automated acquisition and routine quality checks. The survey was populated by working group members with contributions from additional researchers. 27 responses have already been collected, reflecting the broad diversity of Lasers4EU laboratories and activities, ranging from high-intensity laser sources to ultrafast spectroscopy, from the generation of secondary sources to biophotonics. The survey captured information on activity types, typical hardware and application measurands, adopted protocols and standards, routine user-access tests, automatic co-registration of performance data with experimental measurements, and links to data management plans and open-data status. A number of laboratories expressed interest in collaborating on shared assessment protocols, which will form the focus of the next phase. The consolidated outputs have been compiled into an internal report, including a structured database and commentary, thereby completing Milestone 6.

Figure 1 Process toward a standardised performance assessment



The activities undertaken during the first year were crucial in creating a shared evidence base, consolidating knowledge and initiating discussions on the feasibility of converging practices across diverse research fields. Key achievements include the establishment of a cross-facility working group aligned on goals and scope, the successful organisation of a workshop that distilled shared principles, clarified boundaries with a focus on instrumentation and generated concrete best-practice proposals, and the completion of a survey capturing existing practices, the results of which underpin Milestone 6.

5.3 Next steps

The immediate next phase, scheduled for the second year of the project, aims to prepare shared protocols for at least three different research fields. This activity will result in Deliverable D4.2, *“Commonly agreed shared protocols for performance assessment, routine quality checks, and automated acquisition”*. The work will be organised in three stages. First, clusters of laboratories with similar activities will be defined, together with their designated researchers and a cluster leader. Secondly, each cluster will establish agreed figures of merit, measurement procedures, the necessary reference materials or tools, and the routine tests to be logged alongside experimental work. Consideration will also be given to integration with data-management plans, so that performance data are captured together with experimental datasets whenever feasible. Finally, draft protocols will be prepared for each identified cluster.

As a preliminary step, three potential clusters have already been proposed.

1. **Diffuse Correlation Spectroscopy (DCS):** Extend methods established in diffuse optics to DCS and potentially to similar techniques; partners include ICFO and CUSBO, with benefits to the EU project fastMOT.
2. **Transient Absorption:** Characterise both basic hardware performance and the measurement outcomes (e.g., through reference samples).
3. **Characterisation of Ultrashort Pulses:** Define the most relevant figures of merit and robust implementations for their measurement.

The planning of the third phase, involving pilot studies during user access in the third year of the project, will be refined at the conclusion of the second phase and will depend on the protocols drafted and the clusters involved.

5.4 Conclusion

Task 4.4 represents a cornerstone of the Lasers4EU project, linking the technical excellence of individual facilities with the wider objectives of open science and research reproducibility.

The workshop held in May 2025 marked the start of a structured dialogue, showcasing diverse methodologies and underscoring the need for common frameworks. The survey extended this effort by systematically consolidating current practices across facilities, forming the baseline for harmonisation.

The roadmap towards consensus-based protocols is both ambitious and realistic, carefully balancing

the diversity of research infrastructures with the need for comparability and transparency. By October 2026, the delivery of three protocols will provide not only practical guidance for day-to-day laboratory work but also strategic value in reinforcing Europe's leadership in advanced laser research.

In conclusion, Task 4.4 ensures that Lasers4EU facilities remain at the forefront of scientific quality, reproducibility and open access, while preserving their unique strengths and capacity for innovation.

6 Task 4.5 FAIRness

6.1 Scope, objectives and expected outcomes

This task addresses data management across the Lasers4EU network, with a particular focus on the implementation of the FAIR principles (Findable, Accessible, Interoperable, Reusable). It seeks to establish common practices that will strengthen transparency, reproducibility and long-term accessibility of data generated within the consortium.

The main objectives are to develop a simplified, Lasers4EU-wide Data Management Plan template derived from Horizon Europe standards, and to collect and review existing DMPs and institutional data policies in a systematic manner. The analysis of these documents will help to identify overlaps, commonalities and opportunities for harmonisation. A further objective is to establish a network of representatives from all access-providing facilities (the FAIR network) to coordinate implementation efforts and to ensure that practices remain aligned across the consortium. In parallel, a dedicated FAIR helpdesk is being created to provide ongoing support and guidance to researchers and partner institutions.

The task is expected to deliver a coherent and sustainable framework for data management within Lasers4EU. The adoption of a common DMP template will streamline procedures across facilities, reduce administrative burden for researchers and ensure compliance with Horizon Europe requirements. The FAIR network will strengthen communication and foster mutual learning between facilities, while the helpdesk will provide practical assistance, enabling consistent application of the FAIR principles. Together, these outcomes will enhance the quality, accessibility and reusability of research data, reinforcing the consortium's contribution to open science and the integration of the European Research Area.

6.2 Implementation and results

The first objective of this task was the establishment of a network of representatives from all access-providing facilities, called the FAIR network. This network provides the backbone for exchanging expertise, coordinating practices and developing common standards. By early 2025 it had been successfully set up, with representatives from each partner institution, and held its kick-off meeting on 15 January 2025. The network now serves as a platform for collecting existing Data Management Plans and institutional data policies, which are being analysed to identify common elements as well as existing gaps. A key goal of the task is the development of a Lasers4EU-wide DMP template aligned with Horizon Europe requirements, while remaining practical for facilities and user communities. A first version of the Lasers4EU DMP was discussed at the kick-off meeting resulting in the first version of Deliverable 4.1 (Task 4.2). This DMP functions as a living document, updated throughout the project to incorporate contributions from individual facility DMPs.

To assist facilities in preparing their DMPs and to provide a forum for discussing data-management principles, a FAIR helpdesk was established in the second half of 2025 under the lead of HZDR. The helpdesk has been launched and is currently operating via email, offering guidance and responding to queries from partners. To enhance communication and visibility, a dedicated website for the task has also been created (<https://lasers4.eu/activities/fairness/>). In addition, HZDR has contributed an online tool platform that can be adapted for the Lasers4EU DMP. This tool has already been tested with a user base, demonstrating its suitability for deployment across the consortium.

6.3 Next steps

Ongoing work focuses on a more detailed analysis of the Horizon Europe DMP template in order to tailor the toolkit more effectively to the needs of users, laboratories and facilities, repository providers and research data managers. This refinement will provide greater clarity and streamline the preparation of individual DMPs. The outcomes will be discussed within the Lasers4EU consortium at the next FAIR network meeting in late 2025 and during the forthcoming General Assembly. The aim is to produce an updated version of the Lasers4EU DMP for the first reporting period in September 2026. At least one case study in data management will also be undertaken within the user base, offering concrete examples of best practices and highlighting associated challenges.

A major planned activity is the *Data Management Day*, scheduled for 11 November 2025 and hosted by HZDR. The event will be streamed online and will include presentations on topics such as data management, the use of DMPs and the HZDR-hosted platform Research Data Management Organiser (RDMO), metadata standards, electronic laboratory notebooks and the FAIR principles.

The event will be open to partner networks including Lasers4EU, LaserNetUS, DAPHNE4NFDI, the LPA community and ELI. In preparation, targeted questions on DMP practices will be circulated among FAIR network representatives, Lasers4EU facilities and, where appropriate, user groups. This exercise will help identify existing platforms, services and de facto standards already in use, providing a basis for harmonisation.

A follow-up online meeting of the FAIR network will then be organised to discuss the findings. In parallel, efforts will continue to improve website content to ensure full alignment with open science requirements for data and metadata.

6.4 Conclusion

Task 4.5 has laid the foundations for a coherent and sustainable approach to data management across the Lasers4EU network. The establishment of the FAIR network, the publication of the first version of the Lasers4EU Data Management Plan, and the launch of the FAIR helpdesk represent significant progress towards aligning facility practices with Horizon Europe standards and embedding the FAIR principles in daily research workflows. These measures already provide tangible support to facilities and users, while also creating the structures necessary for long-term harmonisation.

The forthcoming activities, including the refinement of the DMP template, the organisation of Data Management Day and the implementation of case studies, will further consolidate this progress. Together, these efforts will not only improve the quality, transparency and reproducibility of research data, but also strengthen collaboration within the consortium and with external networks. Task 4.5 therefore makes a direct contribution to advancing open science and to positioning Lasers4EU as a model for integrated and FAIR-aligned research infrastructures within the European Research Area.