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a project by e- DREAM

IMPRESS PCP

TENDER FACTSHEET

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o The IMPRESS PCP Call for Tenders

The IMPRESS PCP Call for Tenders invites all interested Parties to present their Bids to develop an innovative interoperable platform based on correlative, adaptable and transferable cartridges with a standardized interface that could be implemented on TEMs from different microscope manufacturers and other analytical instruments, and could be adapted by users to meet their needs and obtain innovative solutions.

Learn more: Tender Document 1 (TD1) Call for Tenders – Preface (page 3)

o The Pre-Commercial Procurement (PCP)

IMPRESS aims to procure Research & Development (R&D) Services through a Pre-Commercial Procurement (PCP) composed of 3 phases.

The solutions will be delivered at Technology Readiness Level (TRL) 8.

Contractors should commercialise their new solution at a maximum of 4 years after the end of the PCP.

Procurers involved in the PCP:

- Forschungszentrum Jülich, Germany (Lead Procurer)
- Area di Ricerca Scientifica e Tecnologica di Trieste (AREA), Italy
- Consiglio Nazionale delle Ricerche (CNR), Italy
- Extreme Light Infrastructure (ELI) ERIC, Czech Republic
- Fundacio Institut Catala de Nanociencia i Nanotecnologia (ICN2), Spain
- Leibniz Institut für Festkörper und Werkstoffforschung Dresden EV (IFW), Germany
- Universiteit Antwerpen (UAntwerp), Belgium

Learn more: Tender Document 1 (TD1) Call for Tenders – Section 1 (page 7)

o PCP phases and expected outcomes

Phase 1. Solution design

During this Phase, the Contractors will be asked to describe the solution providing the complete architecture and design of the solution and verifying the technical, economic and organisational feasibility of their solution based on the requirements for the interoperable platform from all the members of the Public Buyers Group (PBG).

The expected duration of this phase will be 3.5 months.

Expected outcomes

- Design the solution and define the approach to be taken to develop it.
- Demonstrate the technical, financial and commercial feasibility of the proposed concept and approach to meet the challenge.
- Obtain a good understanding of the needs of the different systems, to be able to perform field testing activities at each site in Phase 3.
- Identify any potential safety risks and develop a plan to mitigate them in the next phases and in a future commercialisation of the solution to the market.

The IMPRESS project has received funding from HORIZON EUROPE framework program for research and innovation under grant agreement n. 101094299.

Phase 2. Prototype implementation

This Phase concerns the development of the first prototypes of the solutions, which will be tested at FZ Jülich. Qualified Contractors will develop prototypes based on the design documents delivered in the previous Phase and test their solutions on TEMs at the Lead Procurer's premises under controlled conditions.

The expected duration of this phase will be 7.5 months.

Expected outcomes

- Test the prototypes at the premises of FZ Jülich.
- Verify the must have hardware and software requirements in real conditions.
- Verify the should have functionalities.
- Prepare the prototypes for validation in different laboratories in phase 3.

Phase 3. Validation and demonstration of the solutions

This Phase will deal with the validation and demonstration of the selected solutions in all the testing sites. The quality and maturity of the solutions will be assessed at the procurers' site.

The expected duration of this phase will be 8 months.

Expected outcomes

- Testing of up to eight prototypes in all the testing sites.

Learn more: Tender Document 1 (TD1) Call for Tenders – Section 2 (page 14)

o Must have hardware requirements

Bids must comply with 3 must have hardware requirements:

1. Mandatory standardised interface applied to all prototypes. The interface should include up to 6 functionalities, with a minimum of 2 functionalities.
2. Mandatory interoperability with main TEM column manufacturers based upon market share in the EU.
3. Mandatory adaptation of the cartridge prototypes (as defined in PCP use case 5, Annex 2 of the Tender Document 1, page 101).

Evidence

- By the start of Phase 2, each prototype must have an interface for at least 2 functionalities.
- By the end of Phase 2, each prototype must have an interface for 6 functionalities.
- By the start of Phase 2, each prototype must be interoperable between at least 2 columns (at least the one with the smallest available space).
- By the end of Phase 2, each prototype must be interoperable between 5 columns.
- By the start of Phase 3, the cartridge prototypes can be adapted if needed.
- By the end of Phase 3, there should be up to 8 cartridges (8 prototypes).

Learn more: Tender Document 1 (TD1) Call for Tenders – Section 3 (page 44)

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o Must have software requirements

Bids must comply with 8 must have software requirements:

1. Access to all functionalities (e.g. set/read/measure temperature) through a complete portable application programming interface (API).
2. The API definition (headers and function stubs) should be open source without contamination clauses, in order to allow unrestricted and open source software by users or Third Parties.
3. The API and device operation should be clearly and fully documented.
4. The license for the API documentation should allow redistribution and commercial use in the sense of the Creative Commons License family. It should ideally allow the creation and distribution of derivative works.
5. The back-end implementation of the functionality exposed by the API can be closed source. However, the API should ensure unrestricted control of the back-end implementation.
6. All components should include a basic control interface that allows relevant functionality tests, setting of parameters and control of the component for simple, manual experimental use, e.g. a simple graphical user interface (GUI).
7. The implementation of the basic control interface should be open source.
8. The basic control interface should be clearly and fully documented.

Evidence

- By the start of Phase 2, achieve 100% access to all functionalities.
- By the start of Phase 2, define open source licence without contamination clauses.
- By the end of Phase 2, achieve 100% of the API and device operation documented.
- By the end of Phase 2, achieve 100% of Creative Commons licence compliance.
- By the start of Phase 2, access to the back-end implementation should be ensured.
- By the start of Phase 2, all components should include a basic control interface (GUI).
- By the start of Phase 2, all components should include a basic control interface (GUI) under open-source licences.
- By the end of Phase 2, achieve 100% of the API and device operation documented.

Learn more: Tender Document 1 (TD1) Call for Tenders – Section 3 (page 44)

o Should have functionalities

The general R&D objective is to provide an interoperable platform with a full or partial set of prioritized functionalities.

The concept of an interoperable platform describes multi-functional hardware components, which are based on standardized interfaces to holders and aperture rods for microscopes from different column manufacturers and are based on a cartridge-in-cartridge design.

The interoperable platform should be compatible with suitcases that allow sample transfer between different preparation, characterisation and/or storage stations in desirable environments (e.g. temperature or atmosphere).

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The interoperable platform should be compatible with fully automated and programmable instrument control systems. All physical parameters (e.g. electrical bias, current, temperature, gas flow) should be independently addressable via software.

Prioritized functionalities

Contractors should design, fabricate, install, test, support and maintain a set of functionalities of the interoperable platform, including but not limited to the following items (at least two of which should be from items 1 to 5):

1. Compatibility of the sample atmosphere in the interoperable platform between deep UHV and ambient pressure, including associated requirements such as baking, sealing and vacuum transfer, based on the technical details.
2. Compatibility of the sample temperature in the interoperable platform between ultra low and elevated temperatures, providing high precision, fine increments and high reproducibility based on the technical details.
3. Availability of electrical feedthroughs, with a target of >50 contacts that can be used to supply high current and high voltage, as well as to perform high precision and high frequency measurements, based on the technical details.
4. Internally-controlled motion using miniaturized motors of 1) the sample (with up to 5 axis movement and in-plane rotation), 2) up to two movable micro-probe(s) (with 3 axis movement) and 3) other components such as optical mirrors (with 2 axis movement) in the interoperable platform, based on the technical details.
5. Isolated pipelines for gases and liquids (at least four), in order to provide controlled flow rates through channels of chosen dimension based on the technical details.
6. Access to the sample in the interoperable platform for laser injection and light collection using fiber optics or free space propagation based on the technical details.
7. Access to all functionalities (e.g. set/read/measure temperature) through a complete portable application programming interface (API).
8. The API definition (headers and function stubs) should be open source without contamination clauses, in order to allow unrestricted interfacing with closed source and open source software by the user or Third Parties. An MIT License is an example of a License that fulfils this requirement.
9. The API and device operation should be clearly and fully documented.
10. The License for the API documentation should allow redistribution and commercial use in the sense of the Creative Commons License family. It should ideally allow creation and distribution of derivative works.
11. The back-end implementation of the functionality exposed by the API can be closed source. However, the API should ensure unrestricted control of the back-end implementation.
12. All components should include a basic control interface that allows relevant functionality tests, setting of parameters and control of the component for simple, manual experimental use, e.g. a simple graphical user interface (GUI).
13. The implementation of the basic control interface should be open source.
14. The basic control interface should be clearly and fully documented.

All of the above functionalities should be reproducible in different electron microscope instruments.

Learn more: Tender Document 1 (TD1) Call for Tenders – Annex 2, Use case 1 (page 89)

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o Test sites

Test sites in Phase 3 will include:

A. All procurers' laboratories

1. ER-C, FZ Jülich GmbH – Jülich, Germany
2. Area Science Park, Area di Ricerca Scientifica e Tecnologica di Trieste – Trieste, Italy
3. CNR-IMM, Consiglio Nazionale delle Ricerche – Bologna, Italy
4. Universiteit Antwerpen – Antwerp, Belgium
5. Fundacio Institut Català de Nanociència i Nanotecnología – Barcelona, Spain
6. Leibniz Institut für Festkorper und Werkstoffforschung Dresden EV – Dresden, Germany
7. Extreme Light Infrastructure ERIC – Dolni Brezany, Czech Republic

B. Other IMPRESS experimental laboratories

1. Centre National de la Recherche Scientifique – Orsay, France
2. Universiteit Maastricht – Maastricht, The Netherlands

The validation and demonstration will be also performed involving the participating Research Infrastructures within the framework of the IMPRESS project: Central European Research Infrastructure Consortium ERIC, Euro-Bioimaging ERIC, Consorcio para la Construcción, Equipamiento y Explotación del Laboratorio de Luz de Sincrotrón (ALBA), Société civile Synchrotron SOLEIL, Extreme Light Infrastructure ERIC.

The prototypes will be distributed to different test sites to first check for their compatibility and then perform the scientific experiments.

The conditions and specific set-up of each testing site will be defined in due time.

Learn more: Tender Document 1 (TD1) Call for Tenders – Section 2 (page 14)

Disclaimer: This document is solely published for the purpose of summarising the key aspects of IMPRESS PCP but has no binding effect. Please note that only the official information contained in the tender documents is legally binding. Technology providers are responsible to ensure that their bids are fully compliant with the provisions of the tender documents.

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