

POLICY BRIEF COMMON TEMPLATE

RESEARCH INFRASTRUCTURES

INTRODUCTION: PROJECT TITLE AND PROJECT OBJECTIVES

CALL: **HORIZON-INFRA-2023-SERV-01-03**

TOPIC: *Research infrastructure services advancing frontier knowledge: co-fund pilots with pan-European RIs and/or national RIs*

PROJECT: **NEutrons and PHotons Elevating Worldwide Science**. <http://www.beamtime.eu>

NEutrons and PHotons Elevating Worldwide Science (NEPHEWS) project is a unique cross-cutting intensive collaboration between two major RI consortia: League of European Accelerator based Photon Sources (LEAPS), the League of European advanced Neutron Sources (LENS) and the respective representative European User Organisations: the European Synchrotron and Free Electron Laser User Organisation (ESUO) and the European Neutron Scattering Association (ENSA). NEPHEWS not only provides trans-national access (TNA) but is working towards a transformational change in advocating sustainable *nationally* funded TNA programmes for access to external photon and neutron (PaN) RI thus serving the European users and the *national* user community's interests and ambitions. The extent and scope of the co-funded RI collaboration within NEPHEWS is itself unique, while the project represented a paradigm shift in terms of being instigated by the "Users".

- **Objective 1: Curiosity-driven Trans-National Access provision:** The primary purpose is to provide TNA to the PaN open RI in NEPHEWS. The stated final target is **38,290** hrs of TNA funded access. This enables "wider, simplified, more efficient access to the best research infrastructures available to researchers to conduct curiosity-driven research, irrespective of location". TNA is an **activity with strong European added value, not usually supported by national funding bodies**. There will be a special emphasis on users from Widening countries, countries without RI, inclusive of Ukraine to democratise access and supports.
- **Objective 2: Lowering of barriers to access:** Geographic and financial barriers are addressed by TNA. NEPHEWS includes the intention to lower knowledge and information barriers to participation for new and non-expert users and ESRs. This is addressed through virtual training events, on-site training ESR visits and participation in twinning experiments. Many supports will be targeted at eight countries selected from the priority countries above.
- **Objective 3: Twinning for scientific sustainability:** In total 135 new users, new user groups, scientists new to these techniques or established non-expert users will participate in twinning experiments at these RIs with hosting expert user groups. This fosters collaboration, increasing skills and knowledge of twinning guests substantially decreasing their barrier to entry to these RI in the future. Twinning cultures will be embedded across the NEPHEWS RI, with an especial emphasis on the priority and targeted countries, inclusive of Ukraine and an African initiative.
- **Objective 4: Advocate for Sustainable National Access Mechanisms:** To advocate for national policy initiatives that will increase access, or lower financial barriers to access, for users within multiple countries across Europe. The emphasis will be to firstly engage in those targeted Widening countries or countries without facilities and their national funding agencies (NFAs) to at a minimum fund costs of extra-national access for their national users of PaN RI. This is combined with their national user communities via ESUO and ENSA representatives employing a data driven approach extolling the benefits of access to these external RI for the user communities, and the ROI in terms of science, access, output and opportunities.

POLICY IMPLICATIONS AND RECOMMENDATIONS

Access to RIs: Several key results are already contributing to broader and more effective access to research infrastructures services made available to a wider user community as explained.

The key TNA result to date (Objective 1) is that NEPHEWS has already provided 64% of the anticipated user time to 40% of anticipated user visits, exceeding the 40% threshold at this point as per the GA. This delivery was achieved primarily through the strength of the awarded scientific proposals, fully deserving of allocated beamtime, coupled with efficiencies and savings in budgets. There is an initial disproportionation towards synchrotron users due to a few neutron facilities operations and TNA programmes delayed to 2025. NEPHEWS is on track to deliver TNA to the expected number of users by the projects end, while almost certainly exceeding the total user time.

NEPHEWS also contributes to **broader and more effective access** to RI by lowering the barriers to access, and with the specific aim of supporting users and user communities of Widening countries, EU14 countries, EU-associated countries and countries without such PaN RI facilities, inclusive of users from Ukraine and from Africa. TNA provision helps eliminate geographic and financial barriers to accessing RI otherwise experienced by many users. NEPHEWS was further to select eight targeted countries in which to perform community outreach, and to proactively help in user community building by supporting access among other policy related measures (Objective 4).

Eight priority targeted countries were selected by a rigorous evaluation process from many more applications and these are: Estonia, Finland, Greece, Portugal, Romania, Serbia, and Ukraine.

To that end a key result of the TNA that has been distributed thus far is that **25% of the time has been allocated to users affiliated in these targeted countries**, and **another 9% to users whose nationality is of these countries, but whose affiliation is elsewhere**, giving a total of 34% of the allocated TNA being either a national of, or a researcher in, the eight targeted countries. *Notably users with affiliations in Ukraine or nationals of Ukraine affiliated elsewhere represent 9% of the users supported by TNA thus far.* Extending to other Widening countries, and inclusive of non-facility countries (countries without Pan RI), which are the next lower priority levels for distribution of TNA, we can report that in summary 54% of the allocated user visits were distributed among the programmes priority groups during the first reporting period. Physics and Materials Sciences investigations as a scientific domain accounted for 70% of the visits.

Lowering barriers (Objective 2) incorporates virtual training events, where more than 249 active participants were in the first training event. Training included introductory background theory, through to state of the art example measurements; descriptions of the PaN landscape in Europe and importance of these RI; a comprehensive introduction to experiments generating FAIR data, practice and principles; description of twinning programmes; training in writing beamtime proposals; and user case studies of experiments from conception, design, application, allocation, beamtime, analysis, manuscript preparation and publication, these being presented by users from ESUO and ENSA, a User-to-User approach embedded in NEPHEWS. Further, ESR allocations at NEPHEW RI has exclusively gone to applicants affiliated within the eight targeted countries. These actions contribute to the expected outcomes of “a new generation of researchers trained to optimally exploit all the essential tools for their research”; “cross-disciplinary fertilisations and a wider sharing of information, knowledge and technologies across scientific fields fostered by closer interactions between researchers active in and around research infrastructures”; and in educating and “implementing FAIR data principles, of the continuous flow of data collected or produced by research infrastructures”.

Objective 3 twins of scientists new to these PaN based techniques or established non-expert users as **twinning guests joining with host expert user groups** to participate in twinning experiments at these RI. This twinning practice has propagated throughout NEPHEWS RI with a planned total of 135 twinning experiments. To date, 80 prospective twinning guests have been registered with the coordinators project website, 70 have been matched up and 30 twinning experiments completed, 21 from targeted countries. Already a beamtime proposal from a twinning guest of ASTRID is accepted, similarly for an ESR hosted by SOLARIS. The experiences of many of these shared as success stories on the [project website](#) and [partners websites](#). Further, eight twinning places for experienced researchers at junior faculty level from Africa are to be allocated later in 2025 elevating this practice further, all becoming **seeds** for future user groups.

Objective 4 tasks NEPHEWS in contributing to a more user-centred discussion of the impact and benefit of scientific research at PaN RI for *national* user communities and the future national policies that may best allow these communities to access, exploit and bring benefits of access for their scientific investigations to their institutions. For many scientific topics publications involving PaN facility measurements have an enhanced field-weighted citation impact. This advancement of frontier knowledge for curiosity driven research complements areas targeted by challenge driven research, builds user communities, competencies, and critical masses of researchers exploiting these RI benefiting national scientific output, and becoming potential drivers for economic impact.

NEPHEWS primary ambition is to further the European users and the multiple individual national user community's **interest in a transformational change that would result in sustainable nationally funded trans-national access (TNA) programmes**. This begins by supporting the ambitions of the user communities within the targeted countries in NEPHEWS. They are being supported via data-driven arguments employing User metrics, Usage data and user publication data, mapping and sizing communities and showing growth potential to NFAs. Data includes expatriate scientists from those nations, who are current PaN users affiliated elsewhere in the ERA, where their inclusion can give a complete and holistic view of each nations scientific human capital. The simplest national supports are to eliminate the geographic and financial barriers to RI, supporting at a minimum the travel and subsistence for user groups access through *national* funding. The ROI is substantial when one considers scientific impact and the operational costs of the provision of beamtime at Open PaN RI facilities greatly outweighing T&S costs, as the beamtime is offered freely, being allocated to the best scientific proposals. The existence of sustained national access funding encourages established scientific users to return home, giving a brain-gain effect. Other higher levels of national support for PaN facilities should be proposed and considered inclusive of direct investment in RI, and advocating future co-funded / co-programmed approaches anticipated after future Horizon Europe calls (HORIZON-INFRA-2025-01-DEV-05).

NEPHEWS will prepare a policy white paper, advocating on the merits and benefits of nationally funded, sustained user access, where this policy roadmap will in the post-NEPHEWS future continue to be supported and developed by ESUO, ENSA and the PaN RI themselves. The elements of this white paper **will be dynamically evolving** during the second reporting period of NEPHEWS **as engagements with national funding agencies in conjunction with the targeted national communities develop and mature** and in light of the further developing EC, EU and ESFRI initiatives occur. This policy brief only foreshadows of some of the aspects of this output.

This policy dialogues activated in the coming critical phase will have external involvement of representatives of LEAPS and LENS facilities in support of the national user communities, together with ESUO, ENSA and SOLARIS. Recent publications by [LEAPS](#) and [LENS](#) on the impact of these world class RI on science and industry will be exploited in these supported interactions.

The impact after the end of the project will be sustained. Advocacy will be continued by ESUO and ENSA and their constituent national user communities spanning 32 countries within the ERA. LEAPS and LENS will aid in this. The propagation of twinning culture to all participating RI facilities will help embed this practice, and continue to lower barriers for future generations of new users. Twinning beneficiaries will be future seeds for user groups in addition to the supported ESRs visiting NEPHEWS RI. These collective measures will help reduce the knowledge and potential energy barriers in accessing these RI, having a scientific societal impact echoing into the future.

In terms of our recommendations for further impact – the majority of the stated HE and FP10 recommendations from the second [ESFRI Stakeholders Forum Meetup report](#) apply, these already informing more recent HE Infrastructures WPs. Longer-term more continuous funding thematic programming approach for TNA instead of fragmented approaches are essential. In the absence of continuity of TNA many gains for Widening user communities will be at risk. Clearly, **the addition of co-funding and collaboration with national funding must be part of the answer**, and NEPHEWS objectives and methodologies have anticipated this, working from the user community level upwards, (hybrid directed bottom-up). Ultimately, TNA is a requirement for RI to democratising access across the ERA. Finally, LEAPS and LENS RI are in fact key to Europes Technological Sovereignty as was discussed at the recent Open Panel Discussion at the ESFRI Forum – [“The Role of Research Infrastructures for Technological Sovereignty of the European Union”](#) – at the time of the ESFRI Forum on June 11, Krakow, located near the site of SOLARIS the NEPHEWS coordinator. **Europe must collectively foster the next generation of their users.**

Access to, and exploitation of these LEAPS and LENS RI/TI are essential for securing European Technological Sovereignty and require the best researchers, scientists, users and technological entrepreneurs from across all of Europe.

International co-operation of research infrastructures. NEPHEWS is cooperating with three key RI facilities in third countries. The first partner of these is the ISIS neutron and muon facility operated by UKRI in Oxford in the UK and is providing 24 twinning opportunities in the NEPHEWS program; the second partner is the SINQ neutron and muon facility operated by PSI in Villigen, Switzerland, and it too is providing 24 twinning opportunities in the NEPHEWS program, Funding for ISIS and SINQ is derived from their internal national fundings which allowed for participation in Horizon Europe projects initiated during their countries absence from that programme. Thirdly, the international SESAME synchrotron in Jordan is an associate partner, and colleagues of this RI have been advising on NEPHEWS strategy and participating in our engagement with African scientists. The latter strategies in support of African scientists have co-promoted NEPHEWS via info-day events and scientific workshops that have highlighted access to existing European facilities and have done so in conjunction with and parallel to the African Light Source project with the intention of fostering nascent user communities in Africa. These actions have been led by the ESRF and HZB with participation of those from TCD, ESUO and SESAME. This has also facilitated future international cooperation with SESAME through promotion of a proposed African beamline at SESAME. An exemplar is the recent investment of Turkey in developing the TXPES beamline at SESAME; while in addition the SUNSTONE project allows for the development of SESAME as a training centre for African and EMEA scientists. Increased cooperation between TARLA and SESAME bodes well for the former in establishing their user office and access programs. This spider net of parallel developments is crucial to such international cooperation and NEPHEWS has indirectly helped facilitate some of these actions.

NEPHEWS has already had a significant beneficial impact in **Employment and skills in research infrastructures**, most specifically applicable to SOLARIS in enhancing their capacity, increasing skills, and recruitment of staff. This arising due to its coordination of this project which promises to be the first of many by this RI located in a Widening country.
