ICONHIC 2026
4th International Conference on Natural Hazards & Infrastructure
29 June – 2 July 2026, Chania, Greece

Exploring the scientific and societal reach of the ERIES project

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ABSTRACT

The Engineering Research Infrastructures for European Synergies (ERIES) project was funded by the European Union between 2022-2026 and provided transnational access to leading experimental facilities in structural, seismic, wind, and geotechnical engineering. By integrating and expanding on the successful outcomes of past projects such as SERIES and SERA, ERIES enabled researchers to conduct frontier, curiosity-driven studies to reduce losses and disruptions caused by natural hazards, manage associated risks, and develop innovative solutions that contribute to a greener, safer, and more sustainable society. This paper presents an analysis of the potential scientific, societal, and regulatory impacts of ERIES, based on insights gathered through a dedicated survey of project participants and facility users. The survey captured perspectives on the fundamental and specific scientific contributions, general research relevance, societal benefits, and potential influences on future guidelines and standards, including building codes, such as the Eurocode. Preliminary results underscore ERIES' perceived role as a catalyst for cross-disciplinary collaboration, expanding access to unique experimental infrastructures while supporting the development of next-generation engineering solutions. Beyond advancing scientific knowledge, the findings suggest that ERIES fosters stronger links between academia and industry, and helps bridge the gap to policymakers, thereby enhancing Europe's capacity to mitigate natural hazard risks and shape future engineering standards.

Keywords: research infrastructures, experimental facilities, risk mitigation, natural hazards

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INTRODUCTION

The ERIES (Engineering Research Infrastructures for European Synergies, www.eries.eu) project was a European initiative funded by the EU between 2022-2026 that offered transnational access to user groups in leading experimental infrastructures across Europe and selected facilities in North America, thus promoting knowledge exchange between different countries, fostering collaboration and also providing access to leading to facilities to research groups that would not ordinarily have such capabilities in their original institution. It targeted cutting-edge research and advancing frontier knowledge in several engineering fields. These included advanced research facilities for earthquake, wind, and geotechnical engineering, as well as distributed testing studies in experimental facilities located in different countries. It built on the outcomes of other past EU-funded projects stretching back to the early 1990s (Table 1), which offered similar transnational access capabilities. The ERIES project broadened capabilities toward multi-risk assessment and mitigation and develops advanced experimental methodologies, standards, and distributed hybrid simulation frameworks enabling coordinated testing across laboratories. ERIES also aimed to support authoritative guidance for governmental and civil protection authorities, industry stakeholders, and Eurocode development committees, promotes greener and more sustainable engineering solutions within a climate-risk context, incorporates considerations related to economic losses, functionality, and downtime, and encourages multi-disciplinary approaches aimed at reducing losses and improving the structural resilience of society to seismic, wind, and geotechnical hazards.

Table 1. Overview of past EU-funded transnational access projects related to ERIES

Period	Project	Title	Funding Programme
1993-1996	PREC8	Pre-normative Research in Support of Eurocode 8	FP3-HCM
1993-1996	ECOEST	European consortium of earthquake shaking tables	FP4-HCMP
1996-1999	ECOEST 2	European consortium of earthquake shaking tables	FP4-TMR
1997-1999	ICONS	Innovative seismic design concepts for new and existing structures	FP4-TMR
2001-2005	SPEAR	Seismic performance assessment & rehabilitation	FP5-GROWTH
2004-2007	LESSLOSS	Risk Mitigation for Earthquakes and Landslides	FP6-SUSTDEV
2009-2012	SAFER	Services and Applications for Emergency Response	FP7-SPACE
2009-2013	SERIES	Seismic Engineering Research Infrastructures for European Synergies	FP7-INFRA
2010-2014	NERA	Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation	FP7-INFRASTRUCTURES
2017-2020	SERA	Seismology and Earthquake Engineering Research Infrastructure Alliance for Europe	H2020-INFRA
2022-2026	ERIES	Engineering Research Infrastructures for European Synergies	HORIZON-INFRA

This paper examines the potential scientific, societal and regulatory impacts of ERIES using data from a survey of project participants and facility users as the project enters its final months. It aims to serve as a first step in developing a white paper to be published and distributed to different stakeholders to highlight these above impacts. The paper first describes the background of the project, the surveys and the methodology with which internal project participants were quizzed, describing the aims and objectives of the questions posed. Finally, the preliminary results obtained in addition to the possible implications and potential are presented and discussed.

ERIES EXPECTED OUTCOMES AND SCOPE

In line with the Horizon Europe call "INFRA-2021-SERV-01-07: Research infrastructure services advancing frontier knowledge", the ERIES project was conceived to broaden, simplify, and optimise access to experimental research infrastructures for a diverse user community, enabling curiosity-driven and frontier research regardless of geographic location. Through coordinated transnational access, shared protocols, and facility-to-facility integration, ERIES aimed to enable leading-edge scientific work that leverages complementary capabilities across multiple research infrastructures (RIs). The project also contributed to the harmonisation of RI services in Europe by promoting interoperable experimental methods, hybrid simulation frameworks, and standardised data processes, thereby increasing overall utilisation rates and scientific efficiency. Figure 1 illustrates the geographical reach of the project and highlights the transnational nature of the project and ability to bring different research groups together and collaborate internationally. The blue dots represent the locations of the available RIs and the red dots represent the location of each user groups members' home institution, with the links indicating where their transnational access to participate in the ERIES research programme.

ERIES contributed to training the next generation of researchers by providing exposure to advanced experimental platforms, distributed simulation environments, and multi-disciplinary research practices. It further promoted cross-disciplinary fertilisation by linking earthquake, wind, and geotechnical engineering communities and by facilitating knowledge exchange among academia, industry, and regulatory stakeholders. In parallel, ERIES supported improved data management practices consistent with FAIR principles (Wilkinson et al., 2016), strengthening the long-term value, traceability, and reuse of experimental data generated within research infrastructure networks.

Figure 1. Illustration of the international nature of the research collaborations fostered within ERIES

Figure 2 summarises user engagement and community reach achieved through ERIES transnational access activities. A total of 69 user projects were supported, representing active and high-impact collaborative research efforts. Participation involved 446 researchers, drawn from 128 research institutes across 38 countries, indicating extensive international connectivity and broad institutional representation. The user base included 56 nationalities, demonstrating strong geographic diversity, while 47% of participants were early-career researchers, reflecting the project's contribution to training and capacity building within the next-generation of scientists. In addition, 45 industry partners engaged with the programme, highlighting ERIES' role in linking research infrastructures with industrial stakeholders and fostering knowledge transfer between scientific and applied domains. Collectively, these outcomes demonstrate the project's ability to mobilise a wide, multi-disciplinary, and international user community while strengthening academia-industry interaction.

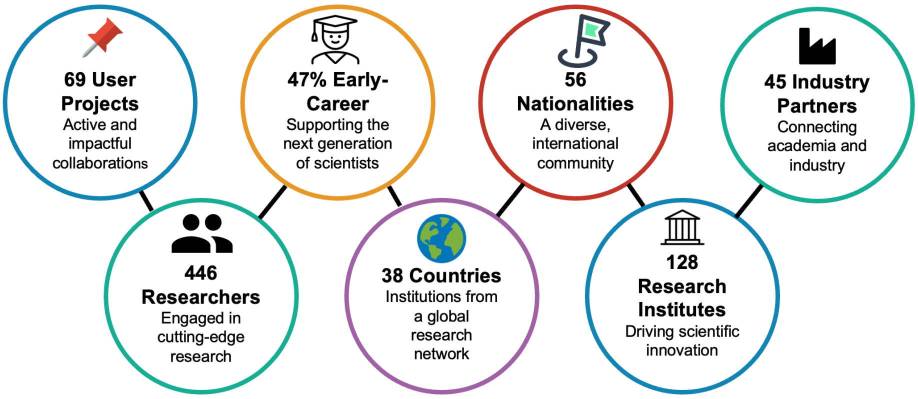

Figure 2. Overview of the engagement and reach of the ERIES project from different perspectives

METHODOLOGY FOR IMPACT ASSESSMENT

The impact assessment of the project has been so far gauged in two phases. The first was via a live interactive session with over 60 user groups members during the 2025 ERIES International Workshop (O'Reilly & Calvi, 2025) hosted in Lisbon, Portugal. These questions were poll-based where participants had several options to choose from, with a couple of moments to decide on their answer before moving on to the next question. Questions were relatively limited and served to first understand the familiarity of the users with issues of policy and impact, in addition to how they feel it relates to their work. The format of the poll provided a fun and engaging setting via a Mentimeter setup, which maximised the interaction with respect to more traditional pen and paper methods. The questions included the following:

- How familiar with policy impact documentation are you? [Sliding scale from 1 - 9]
- How do you feel about policy impact? [Options]
- In terms of TRL (Technology Readiness Level), how advanced is your project? [Sliding scale from 1 - 9]
- Who is the primary audience for the specific scientific impact of your project's results? [Options]
- Which of the following best describes the type of fundamental scientific impact your project is likely to have? [Options]
- Which of the following broader societal areas could potentially be impacted by your project's results? [Options]
- Which of the following best describes the nature of the potential societal impact? [Options]
- Considering the potential societal impacts identified, which specific policy area(s) might your research findings be relevant to? [Options]
- At which level of policy-making might your research findings be most relevant? [Options]
- Which type of policy actor might be most interested in evidence from your project? [Options]
- At what point in the policy cycle might your research findings be most timely or useful? [Options]
- Which of the following challenges do you foresee in communicating your project's findings to a policymaker audience? [Options]

- Which of the following potential next steps might you consider to increase the likelihood of your research having policy impact? [Options]
- If one of these steps was pursued for ERIES, how much would you like to be involved in it? [Scale]

The second method, which was communicated during the same workshop, was emailed via a Google Form questionnaire and circulated to all user group members via email. This allowed the participants the adequate time to reflect and answer their options and find the relevant information or references if needed. It aimed to gather perspectives on how participants viewed the scientific impact of their research, the potential societal impact and regulatory policy. These questions were posed as follows:

- **Scientific impact:** Please explain what the fundamental scientific impact of the project's results will be to the research community. Provide two version (max 2-3 lines each) as follows:
    - **Specific scientific impact:** This explains the <u>precise</u> scientific impact of the project's results. It should be comprehensible to peers working in this specific area of research.
    - **General scientific impact:** This explains the <u>general</u> scientific impact of the project's results. It should be comprehensible to researchers working in this field but not necessarily on this area of research.
- **Societal impact:** Please explain (max 2-3 lines) what the broader impact of the project's results will be to society. This should be comprehensible to someone with a completely non-technical background.
- **Guidelines impact:** Please refer to the specific part of the building code(s) that will be most impacted by your research results (e.g., Eurocode 2 – Part 1, Section 2.1, etc.)

RESULTS

Live poll-based survey

The survey collected responses from approximately 60 participants. The initial questions served as ice-breakers, since most participants had not previously used Mentimeter, with over half indicating they had never heard of it. Respondents were geographically distributed across Europe, with the highest concentration appearing in Italy. Coffee was preferred over tea, beach relaxation was preferred to mountains, and there was a slight preference for being early-birds over night-owls. A strong majority predicted Inter Milan to win the 2024–2025 UEFA Champions League, which probably reflected the audience's nationality rather than logic, considering the resounding 5-0 defeat of the Italian side by Paris Saint-Germain later that week.

Participants exhibited low familiarity with policy impact documentation, with the average self-assessment close to the low end of the scale. Most respondents expressed that they felt policy impact was important but it felt distant from their daily research work. A smaller group reported some engagement and interest in understanding policy impact better, while only a minority indicated that they actively shaped their research with policy in mind. In terms of scientific impact, most projects were expected to be relevant to the broader research field rather than only serving niche sub-communities. Participants believed their work would primarily contribute through the provision of new experimental data or valuable datasets, all of which are available on the project's dedicated Data Access Portal: https://www.dataaccessportal.eu/. Others listed impacts included methodological improvements, experimental validation of past research, opening new research avenues, and generating new theoretical developments, all of which are documented through the project's scientific outputs in international conferences and journal publications.

Regarding societal impact, respondents anticipated that their research would most strongly impact safety and security, followed by infrastructure and urban development and environmental protection or sustainability. Participants described the nature of societal impact mainly as providing solutions to known problems, enabling new technologies or applications, and directly benefiting people or communities. Other anticipated effects included cost savings, informing public policy or regulation, and raising awareness.

When asked about policy relevance, safety standards and certification processes appeared as the most relevant policy domains. Industrial strategy, innovation policy, research funding priorities, and environmental regulation were also frequently identified. Participants believed their research findings would be relevant across multiple policy levels, with notable emphasis on European or international policy frameworks rather than local or municipal levels. Participants identified regulatory agencies and standards bodies as the policy actors most likely to be interested in research evidence. Industry associations with policy influence and international organisations were also cited, while government ministries, elected officials, and local authorities appeared less central in respondents' expectations. In relation to the policy cycle, participants viewed their research as most useful during the design of policy options and in long-term strategic planning contexts. Some expected that research evidence could support evaluation of strategies or implementation, although early agenda-setting was rarely mentioned.

Finally, participants foresaw multiple communication challenges when engaging policymakers. These included the high technicality of research outputs, uncertainties or limitations within research findings, and difficulty in translating complex results into clear messages. Respondents also noted that policymakers often require information more rapidly than research cycles allow and that identifying the correct contacts can be difficult. Some mentioned potential conflicts with existing policy views and differing communication channels. Only a small number reported having no anticipated challenges.

Overall, the results indicate that participants clearly recognise the societal and policy relevance of their work but have limited familiarity and direct experience with policy processes. Their expectations lean toward interactions with regulatory and standards-driven policy environments, and they anticipate substantial barriers in translating research findings into accessible and actionable information for those audiences.

Email-based survey

Specific scientific impact

When explaining the precise scientific impact in a way that should be comprehensible to peers working in this specific area of research, participants provided ample details.

A significant portion of responses describe first-of-kind experimental assessments that establish new benchmarks in the field. These include the experimental assessment of impedance functions for pile groups to validate theoretical formulations (Di Laora et al., 2025), full-scale testing of masonry cross vaults with vertical support structures (Calderini et al., 2024), the first shaking table test of a 3D-printed building, and pioneering tests on decoupled infill systems combining in-plane and out-of-plane loads (Gentile et al., 2025; Tubaldi et al., 2025). Several projects represent inaugural investigations in their respective domains, such as the first pseudo-dynamic and cyclic tests on flat slabs constructed with recycled coarse aggregate concrete (Ramos et al., 2025), the first dynamic tests of electrokinetic-chemical soil treatment, and the first full-scale dynamic data on unreinforced masonry gables under differential seismic input (Damiani et al., 2025).

The validation and development of innovative structural solutions constitute another major theme across responses. Multiple projects focus on advancing base isolation technologies (Losanno et al., 2025; Rapone et al., 2025), particularly fibre-reinforced elastomeric isolators, with emphasis on modelling strategies and design criteria. Novel seismic protection devices feature prominently, including bidirectional rotational friction dampers for precast structures, ductile fuses for protecting rack uprights (Tsarpalis et al., 2025), and rubber joints for infill wall protection (Tubaldi et al., 2025). Several projects investigate timber-based and bio-based solutions (Formisano et al., 2025), including timber-aluminium exoskeletons with bio-panels for combined seismic and energy retrofitting, and timber-based retrofit systems for masonry-infilled reinforced concrete buildings (Giongo et al., 2025).

Wind engineering advances address critical gaps in understanding and modelling wind effects on structures. Projects develop new experimental methods for simulating non-synoptic bora wind and downburst winds using large-scale impinging jet-gravity current experiments that reveal buoyancy-driven effects (Canepa et al., 2025). The research quantifies wind effects on nonstandard membrane geometries under atmospheric boundary layer, downburst, and tornado winds. Advanced testing includes aeroelastic wind tunnel tests with modular flexible models that improve understanding of cable dynamics and high-mode wind-induced vibrations. Systematic assessments examine atmospheric boundary layer roughness transition profiles on cladding pressures and turbulent length scale impacts on structural response (Álvarez et al., 2025).

Computational model validation emerges as a unifying objective across many responses. Projects provide benchmark data for computational fluid dynamics teams validating urban dispersion models, including traffic-induced pollutant concentrations with comprehensive uncertainty metrics (Pantusheva et al., 2025). Experimental data support finite element model validation through optical sensors providing precise three-dimensional measurements of large structures (de Almeida & Hoult, 2025). Several projects explicitly focus on validating numerical and analytical models for specific structural systems and loading conditions.

Material innovation features in responses addressing sustainability and circular economy principles. Research examines the performance of recycled coarse aggregate concrete in large-scale flat slab models, bio-based composites in standard curtainwall systems and wood construction under earthquake forces, and composite-reinforced and fibre-reinforced mortars for retrofitting stone masonry piers (Ponte et al., 2025). These investigations quantify drift capacity, strength, and failure modes of innovative material applications.

Methodological innovations introduce new approaches to experimental simulation and damage assessment. Projects develop energy-based evaluation methodologies for experimental tests and introduce new damage limit state definitions in terms of energy (Gentile et al., 2025). Novel experimental methods address previously intractable problems such as realistic simulation of deck pounding on bridge abutments including soil-structure interaction at realistic scale (Gokce et al., 2025). The research advances techniques for assessing dynamic behaviour through distributed hybrid testing approaches and multi-sensor fusion for wind load estimation (Bal et al., 2025; Clavelo et al., 2025).

General scientific impact

The general scientific impact articulated in responses addresses contributions comprehensible to researchers working in broader structural and wind engineering fields without requiring specialised expertise in specific research areas. It was clear that projects collectively advance fundamental understanding, provide essential datasets, and support code development processes.

Direct support for design code development and qualification procedures represents a primary impact category. Multiple responses explicitly state that experimental results can be directly used to support code development and qualification of systems for application to real structures. Projects provide fundamental data for developing loading models consistent with probabilistic requirements of structural loading codes, particularly for wind actions where current codes lack adequate methodologies for certain loading scenarios. The research addresses conservativeness in structural design and uncertainty in loading conditions that inform future revisions of seismic design codes.

Database creation for model calibration and validation constitutes a major contribution across responses, available on the project's dedicated Data Access Portal: https://www.dataaccessportal.eu/. Projects generate comprehensive datasets for calibrating numerical models, validating analytical strength models, and quantifying design uncertainties. These databases cover diverse applications including infill systems, masonry retrofitting, wind loads on various structural configurations, and soil-structure interaction. The provision of open-access data with comprehensive uncertainty quantification addresses critical gaps in validation resources, particularly for urban computational fluid dynamics applications.

Advancement of understanding regarding structural behaviour and interaction phenomena permeates the responses. Research improves knowledge of frame-infill interaction during seismic events, enabling engineers to design safer and more resilient structures using performance-based methods. Projects enhance understanding of turbulent flow interaction with structures, dynamic behavior of bridges with scoured foundations, and soil-structure interaction for various foundation systems. The work bridges gaps between laboratory-scale insights and on-site quality assurance, improving understanding of how theoretical models translate to real-world applications.

Sustainability integration links engineering advancement with environmental responsibility across multiple responses. Projects demonstrate how sustainable and low-disturbance techniques can be applied for seismic retrofit of existing buildings. Research validates use of recycled materials, bio-based composites, and timber-based solutions while maintaining or improving structural performance. The integration of materials science, engineering, and physics promotes sustainable retrofits and resilient design for seismic and climate-vulnerable regions.

Infrastructure safety and resilience assessment methodologies advance through experimental validation and monitoring tool development. Projects support safer infrastructure by developing methods to detect damage and assess vulnerability under dynamic loading conditions. Research improves robustness assessment of critical infrastructure in the face of natural disasters, addressing safety concerns for bridges, transmission lines, telecommunication infrastructure, and power systems. The work contributes to increased safety across diverse infrastructure types through improved load models and design procedures.

Feasibility assessment of emerging technologies provides practical guidance for adoption of innovative solutions. Research demonstrates technical feasibility of using bio-based composites for building construction in earthquake-prone areas, validates low-cost sustainable devices for enhancing resilience in precast structures, and confirms suitability of lightweight structures in seismic areas. These feasibility studies reduce barriers to adoption of innovative approaches by providing evidence-based assessments.

Multi-hazard and interdisciplinary approaches characterise several responses that advance integrated design methodologies. Projects combine seismic and energy performance assessment, integrate structural testing with environmental considerations, and merge analysis, simulation, and testing approaches. This inter-disciplinary integration supports development of holistic design frameworks that address multiple performance objectives simultaneously.

Testing capacity building and methodological advancement expand available tools for structural research. Projects pioneer distributed hybrid testing approaches for modelling dynamic behaviour, advance experimental tools for studying high-mode and multi-modal vibrations, and validate optical sensing technologies for structural health monitoring. These methodological contributions enable more sophisticated investigations by the broader research community.

Societal impact

The perceived societal impact described in responses by the project participants emphasises tangible benefits for non-technical audiences, focusing on safety, economic resilience, sustainability, and quality of life improvements. The articulated impacts demonstrate how specialised research translates into practical benefits for communities and society.

Protection of human life and safety enhancement were the most prevalent theme across responses. Projects consistently emphasise preventing loss of life during earthquakes and extreme weather events through improved building design and retrofitting. Specific safety improvements include preventing infill wall collapse that causes significant casualties, ensuring seismic safety against pallet falls in logistics facilities, and protecting occupants of historic buildings and ordinary structures alike. The research makes buildings safer during earthquakes, protects homes and critical infrastructure in existing communities, and reduces damage that threatens lives. Several responses explicitly quantify impact through prevented deaths and injuries resulting from improved structural performance.

Preservation of cultural heritage and historic buildings emerges as an important societal contribution. Projects address protection of historic monumental buildings from seismic risk, supporting safer communities while preserving architectural heritage. The research helps protect historic buildings from earthquake damage, maintaining cultural identity and heritage resources that contribute to community character and tourism economies.

Economic benefits manifest through reduced financial losses, prevention of disruptions, and cost-effective solutions. Projects prevent significant financial losses from structural failures, minimise economic impacts of natural disasters, and reduce costly repairs through improved design.

Research ensures critical infrastructure remains operational, preventing economic disruptions from failures of telecommunication systems, bridges, and commercial facilities. Cost optimisation through better understanding of loads and structural behaviour leads to design improvements that balance safety with construction economy. Several responses emphasise providing low-cost solutions that make advanced protective technologies accessible beyond high-value structures.

Sustainability and environmental responsibility feature prominently in societal impact statements. Projects support greener construction practices, reduce carbon dioxide emissions through optimised designs and material selection, and promote use of recycled and bio-based materials. Research advances nature-friendly alternatives to classical construction procedures, supporting transition toward more sustainable built environments. The work contributes to United Nations Sustainable Development Goals (2024), particularly Goals 11, 12, and 13 addressing sustainable cities, responsible consumption, and climate action. Multiple responses emphasise reducing environmental impact while maintaining or improving structural performance.

Minimising disruption to building occupants and communities represents a valued outcome. Projects enable seismic retrofit of existing buildings without relocating occupants, reducing social and economic costs of building stock renovation. This approach maintains community stability, avoids displacement hardships, and makes large-scale retrofit programs more feasible. Research supports faster post-disaster recovery through improved resilience, enabling communities to resume normal activities more quickly after events.

Infrastructure resilience improvements protect essential services and economic functions. Projects enhance robustness of critical telecommunication infrastructure, ensuring continued connectivity during and after natural disasters. Research improves safety and longevity of bridges, transmission lines, and other lifeline infrastructure that communities depend upon. Better understanding of loads on infrastructure systems prevents failures that could cascade into broader societal disruptions.

Urban environment quality improvements address liveability and health concerns. Research takes first steps toward mitigating negative effects of urban heat islands, improving resilience and sustainability of urban coastal environments. Projects make public spaces with membrane structures safer through better understanding of wind effects. These contributions support healthier, more liveable urban environments.

Democratisation of protective technologies extends advanced safety measures to broader populations. Projects work toward making seismic isolation feasible for ordinary buildings rather than only critical or high-value structures. This expansion of access to earthquake protection represents a breakthrough toward more equitable safety standards across building types and communities.

Guidelines impact

The survey responses identify specific building codes, standards, and regulatory frameworks that can potentially be targeted for impact, with clear concentration in particular code families and sections. The articulated impacts demonstrate clear potential pathways from research results to design practice through code revisions and new provisions.

Eurocode 8 (EC8) emerges as the dominant target for research impact, with the overwhelming majority of responses citing various parts and sections. EC8 Part 1 (CEN, 2004d) addressing general seismic design rules receives most frequent mention, with specific sections identified including Section 4.3.6 on structural elements, Section 4.2.3, Section 4.3.1 on numerical modelling criteria, Section 4.4.2.5 on resistance of horizontal diaphragms, Section 4.3.5 on non-structural elements, and Section 9. EC8 Part 3 (CEN, 2005) focusing on assessment and retrofitting of buildings receives substantial attention, with projects providing strength models, displacement capacities, and associated uncertainties for retrofitted systems. EC8 Part 5 (CEN, 2004a) addressing foundations and retaining structures is cited by projects investigating soil-structure interaction and foundation systems. Several responses specifically distinguish between first-generation and second-generation EC8, with Part 1-2 (CEN, 2024) of the second generation explicitly mentioned as a target for research integration.

Wind action provisions in Eurocode 1 Part 1-4 (CEN, 2010) represent the second major code impact area. Projects target general provisions in Sections 4 through 6, Annex A containing general definitions and scope, Section 8.4 addressing dynamic response due to wind, Section 7.3, and Annex E.4. Multiple responses indicate research will contribute to development of pressure coefficient data for design codes and improved loading models consistent with probabilistic requirements. Some projects note current gaps in standards coverage, with suggestions for new annexes addressing wind industry-specific activities.

Additional Eurocodes receive targeted attention from specific projects. EN 15129 (CEN, 2018) governing anti-seismic devices is cited by research validating innovative isolation and damping systems. Eurocode 2 (CEN, 2004b) addressing concrete structures and Eurocode 5 (CEN, 2004c) covering timber structures are mentioned by projects investigating respective material systems. Eurocode 3 Part 3-1 (CEN, 2006) Section B.2 is referenced for steel structure applications. Eurocode 0 addressing basis of structural design receives mention in the context of fundamental design principles.

Pre-standard and draft code versions indicate forward-looking impact on code development. Several responses cite prEN 1998-3 Section 11.3.3 and other pre-standard designations, demonstrating active engagement with evolving code frameworks and opportunities to influence provisions before finalisation. National codes supplement European standards in some responses, and the Italian building code (NTC, 2018) is specifically cited with Sections C7.2.6 and C7.4 addressing modelling criteria and concrete constructions. Turkish seismic code and American Concrete Institute code receive mentions, indicating research applicability beyond European regulatory frameworks.

Uncertainty regarding specific code impacts appears in a minority of responses. Several participants indicate uncertainty about which code sections will be impacted, respond with question marks, or defer to colleagues more familiar with European code environments. These responses suggest some projects focus primarily on fundamental research contributions with less direct code development orientation. New standard development emerges as a potential impact area. Some responses note that current standards do not adequately cover certain loading scenarios or structural systems, suggesting research may inform development of new code sections, annexes, or entirely new standards addressing previously unaddressed design situations.

DISCUSSION

Based on the feedback received and described above through the two survey methods, it is evident that participants perceived their research activities as having notable value and potential impact across the contexts discussed. It should be recalled that these questions were addressed to individuals already familiar with the ERIES project, including both project partners and user group members involved in the project’s research activities. As such, the responses reflect the group’s internal perception of the project’s potential technical and societal impact on the wider community. For a more holistic assessment of the project’s overall impact, technical perspectives external to the project, as well as views from the broader society, should also be considered. At the time of writing (January 2026), transnational project activities are still ongoing and have not yet been fully concluded. Approximately 75% of the projects report having completed their laboratory experiments; however, only 36% have completed their projects by making the data fully available online. Furthermore, while 64% of the projects have presented their findings at international conferences, only 20% have published a journal article describing their results. Taken together, these figures indicate that the full dissemination of the ERIES project’s results is still in progress, and that exposure to, and feedback from, external stakeholders remains limited at this stage. Nevertheless, it is important to understand how external actors, such as policymakers, technical code committee members, and the general public, perceive the potential impact of the ERIES project, and whether these perceptions align with those reported above. This objective will remain a key focus during the remaining months of the project and beyond its formal conclusion. Below, several additional points are outlined, along with avenues that will be explored to better address the limitations identified above.

In terms of scientific impact, several approaches can be explored. The first relates to the perceptions of groups external to the ERIES project. The previous sections on potential guideline impacts provide a direct summary of how the research outputs may influence technical guidelines. One possible approach would be to solicit feedback or evaluation from current members of code committees and other relevant panels that were specifically identified. These are primarily European bodies related to the Eurocodes, but similar engagement could also be extended to other regions worldwide. Secondly, the availability of data and publications that disseminate the project's research represents a logical step in tracking scientific impact and interest. To assess this over time, it will be important to monitor metrics such as data page views, downloads, and publication citations, in order to gain insight into the level of scientific interest at a broader scale. Adopting an Open Science approach, by making workshop proceedings open access online and ensuring that the datasets provided are fully FAIR-compliant, has undoubtedly contributed to facilitating this process.

In terms of technology transfer and impact, additional measures can be considered. Given the nature of the ERIES project, in which numerous individual user projects access experimental facilities transnationally to address specific research topics, it is challenging to identify a single global transfer mechanism that is applicable to all projects. Nevertheless, individual research groups are actively encouraged to pursue the valorisation of their work through avenues such as patenting, the creation of start-ups, and the development of dedicated tools or software. To gauge this, participants will be surveyed again towards the end of the project, when their research activities are more mature, and asked how they anticipate their results may be transferable beyond immediate scientific outputs. This will include questions on whether their work is expected to lead to patents, whether there are intentions to form start-up companies, the extent of industry involvement during project development (noting that Figure 2 indicated the participation of 45 small and medium-sized enterprises across the 69 projects conducted), and whether there are plans to engage companies to commercialise the results.

While additional strategies and avenues undoubtedly exist, the options outlined above represent an initial step towards understanding the current situation and identifying actions that can effectively enhance and transfer the ERIES project's impact through continued discussion and collaboration.

SUMMARY

This paper has presented the ERIES project, outlining its objectives, scope, and evolution within the context of past EU-funded transnational research infrastructure initiatives. It aimed to provide some insight into the project's potential scientific, societal, and regulatory impacts.

This was first done through dedicated surveys that aimed to characterise the project participants' perception and level of knowledge with the issue through interactive questionnaire. Results showed that participants recognised the scientific, societal, and policy relevance of their work but reported limited familiarity with policy processes, expecting impact mainly through data-driven scientific outputs and regulatory or standards-oriented policy contexts, while anticipating challenges in communicating complex results to policymakers.

The second approach was to carry out a more detailed survey requesting details on the anticipated scientific impact, both specific and general, in addition to the societal and guidelines impact. Results showed that participants expected strong scientific impact through first-of-kind experimental data, model validation, and methodological advances, broad societal benefits related to safety, resilience, and sustainability, and clear potential for influencing engineering guidelines, particularly Eurocodes, despite some uncertainty regarding direct code uptake for more fundamental research.

To close, some further consideration on the possible limitations of the approach adopted here were discussed, in addition to how this analysis may be improved in the coming months when research findings have matured.

ACKNOWLEDGEMENTS

This work is supported by the Engineering Research Infrastructures for European Synergies (ERIES) project (www.eries.eu), which has received funding from the European Union's Horizon Europe Framework Programme under Grant Agreement No. 101058684. This is ERIES publication number C119. The participation and the time dedicated by all the ERIES user group members who participated in these surveys is also gratefully acknowledged.

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