EARTO Position Paper on Research and Innovation in Rehabilitation as Integral Component of Disease-Related Research Programmes

6 February 2026

Introduction

Rehabilitation, as defined by the World Health Organisation (WHO)[1], refers to a set of interventions designed to optimise functioning and reduce disability in individuals with health conditions in interaction with their environment. It is a crucial component of healthcare systems, enabling patients to recover from illnesses and injuries, return to daily activities, and improve their quality of life. Globally, one in three people may benefit from rehabilitation[2], yet services remain underfunded and overstretched. While survival from many conditions has improved thanks to advances in medical care, morbidity and long-term disability continue to grow. The resulting gap between the rising demand for rehabilitation and limited health and social care resources risks deepening inequalities and producing significant socioeconomic consequences.

The WHO's Rehabilitation 2030 Call to Action[3] highlights this urgent global need. Rehabilitation technologies, including digital tools, robotics, artificial intelligence, exoskeletons, sensors, and mobile applications, offer a pathway to optimising efficiency and extending the reach of services. These technologies can support clinicians in diagnosis, patient stratification, therapy delivery, and long-term monitoring while empowering patients and carers to participate more actively in their rehabilitation.

The Horizon 2020 programme, and its successor, Horizon Europe, have funded research projects in rehabilitation technologies, such as the use of robots for physical rehabilitation (RETRAINER project[4]), and the evaluation of the effectiveness of virtual reality in cognitive rehabilitation (vCARE project[5]). The European Brain Initiative has also funded research on the use of virtual reality and augmented reality technologies in the rehabilitation of patients with brain injuries. Nevertheless, despite progress under EU framework programmes, rehabilitation has remained under-prioritised. Out of 112 Horizon Europe Health calls between 2021 and 2025, only few explicitly referenced rehabilitation, albeit the Work Programme 2025 of the Health Cluster[6] addresses habilitation and rehabilitation for disabilities under the Destination "Staying healthy in a rapidly changing society", which have not been funded under the Horizon Europe Health Cluster until then. Recognising rehabilitation as a strategic priority in EU RD&I policies, including the upcoming FP10 framework programme, is therefore essential.

The European Active and Assisted Living (AAL) Joint Programme, running from 2008–2020, also generated valuable insights for rehabilitation. Focused on ICT-based solutions to support ageing well at home, in the community, and at work, AAL projects developed tools and services that overlap with rehabilitation needs, including telehealth, assistive robotics, and user-centred digital platforms. Many of these solutions addressed functional decline, independent living, and long-term care, i.e. areas closely connected to rehabilitation pathways. The experience of AAL demonstrates both the potential of technology-enabled rehabilitation and the importance of sustained, dedicated support within EU research and innovation policy[7]. The lessons of AAL are directly relevant for rehabilitation, showing the need for dedicated support in FP10.

Beyond the health domain, rehabilitation should be recognised as an economic and social investment. Effective rehabilitation contributes to healthy ageing, reduces dependency on long-term care, and enables citizens to remain active in the workforce and engaged in their communities. These outcomes are directly aligned with EU strategic priorities such as addressing demographic change and ensuring the sustainability of social protection systems.

In the upcoming FP10 negotiations, this creates a timely opportunity to re-balance investments across the health sector by ensuring that rehabilitation is not positioned in competition with disease-specific priorities but embedded as an integral component of the full continuum of patient care. Rehabilitation should be incorporated alongside prediction, prevention, personalised treatment, and patient participation across all major disease areas and clinical interventions — including oncology, infectious diseases, chronic conditions, and surgical pathways — with dedicated resources to support its systematic integration into research and innovation programmes.

[1] https://www.who.int/news-room/fact-sheets/detail/rehabilitation
[2] https://www.who.int/initiatives/rehabilitation-2030.
[3] https://www.who.int/publications/m/item/rehabilitation-2030-a-call-for-action.
[4] Reaching and grasping training based on robotic hybrid assistance for neurological patients.
[5] Virtual Coaching Activities for rehabilitation in elderly.
[6] Horizon Europe WP2025 Health.pdf.
[7] https://digital-strategy.ec.europa.eu/en/library/evaluation-active-and-assisted-living-programme-aal2.

Rehabilitation is also central to the United Nations' 2030 Sustainable Development Goals (SDGs), in particular SDG 3 on ensuring healthy lives and promoting well-being for all. Explicitly, the 'Universal Health Coverage' (Target 3.8) includes access to rehabilitation services, placing rehabilitation alongside prevention, treatment, and palliative care. This also encompasses women's health needs across the reproductive life course, including postpartum rehabilitation where clinically indicated, linking SDG 3 with SDG 5 (Gender Equality), including Target 5.6 on sexual and reproductive health and rights. Rehabilitation further contributes to 'Decent Work & Economic Growth' by enabling people to return to or remain in the workforce, and to 'Reduced Inequalities' by addressing disparities in access to health (SDG 8, SDG 10).

Strategic area definition

Rehabilitation technologies should be recognised as a strategic area in EU health and industrial RD&I strategies, including FP10. They encompass smart devices and robotics for physical and cognitive rehabilitation, digital platforms for assessment, monitoring, and remote therapy, as well as modular and scalable solutions adaptable to different conditions and care settings. Strategically, rehabilitation technologies are enablers of health system sustainability and equity, while also supporting Europe's industrial leadership in health technologies.

Key considerations

EARTO experts identify three overarching considerations that underline the need for a stronger focus on rehabilitation technologies in EU policy frameworks.

1. Rehabilitation fits squarely with healthcare and societal needs. Demand is increasing due to demographic changes, rising prevalence of chronic diseases, improved survivorship after serious diagnoses, growing mental health needs, climate change-related risks, and casualties from conflict. Rehabilitation needs are also increasing as a result of armed conflicts, including the war in Ukraine, which has created significant demand for trauma care, prosthetics, and long-term rehabilitation services, that includes psychological rehabilitation. Rehabilitation technologies therefore have a dual-use dimension: many innovations in prosthetics, robotics, and trauma recovery are relevant both for civilian health systems and for defence-related recovery needs. Rehabilitation is thus essential to strengthen health system resilience, enable active participation in the workforce for economic growth and prosperity, and support social equity.

2. Rehabilitation technologies have significant cross-sectoral innovation impact. They rely on and contribute to advances in artificial intelligence, robotics, model-based approaches (including digital twins and in silico simulation), virtual and augmented reality, as well as advanced, medical-grade materials and sensor technologies suitable for long-term human contact. Investments in this field not only benefit rehabilitation but also generate spill-over effects across digital health, medical technology, and assistive industries, reinforcing Europe's competitiveness in healthtech markets and supporting SMEs and start-ups.

3. Systemic barriers hinder the development, validation, and implementation of rehabilitation technologies.
Challenges arise during design (insufficient user involvement, limited integration, vulnerable populations overlooked, and inadequate Public and Patient Involvement), validation (lack of large-scale clinical trials, insufficient cost-effectiveness studies), and implementation (cybersecurity concerns, training gaps, problems integrating solutions into existing ecosystems, reimbursement and procurement obstacles, regulatory complexity). Without addressing these barriers in a coordinated way, rehabilitation innovations risk being fragmented, under-used, or inequitable.

Recommendations

EARTO proposes six recommendations to advance rehabilitation research, development, and innovation in Europe. These recommendations build directly on the challenges identified in the previous sections and point to areas where European research and innovation policy can make a decisive difference. While rehabilitation technologies also have clear dual-use applications in defence and crisis contexts, the focus of this position paper is firmly on their role in EU health research and innovation policy and their inclusion as a priority in FP10. They are not meant as isolated measures, but as mutually reinforcing steps that together strengthen the full value chain: from building skills and capacities, to creating supportive ecosystems, generating robust evidence, improving procurement and regulation, and ensuring technological solutions are scalable and adaptable.

1. Strengthen the innovation ecosystem

Rehabilitation technologies are developing in a fragmented innovation landscape. Funding gaps, weak collaboration between healthcare providers and industry, and limited incentives for early adopters hinder their ability to scale. Start-ups and SMEs face particular barriers to market entry, and innovation efforts often remain isolated or underfunded. Without a stronger and more connected ecosystem, many promising technologies risk stalling before they can reach patients or generate health system impact. To strengthen the rehabilitation innovation ecosystem in Europe, we recommend the following policy actions:

- **Foster collaboration across sectors:** Strengthen partnerships between healthcare providers, RTOs, and industry to accelerate the development, validation, and deployment of rehabilitation technologies. This tackles fragmentation by building joint innovation platforms where start-ups can trial solutions directly in clinical environments.
- **Promote procurement-driven innovation:** Encourage early adoption of innovative technologies by committing funding from EU, regional governments, or insurers to support uptake of emerging solutions. This addresses the funding gap between promising prototypes and scaled implementation, for example by enabling hospitals to pilot new telerehabilitation platforms.

2. Support large-scale, long-term R&I

Evidence for rehabilitation technologies remains weak, as most are validated only through small and short-term studies that fail to support scaling. This erodes trust among clinicians, commissioners, and insurers, delaying or even preventing adoption. Quick prototyping without sustained validation fuels "boom-and-bust" innovation cycles, undermining patient trust and weakening Europe's industrial competitiveness in health technologies. FP10 should therefore include rehabilitation pilots at a scale comparable to the large-scale pilots (LSPs) supported in Horizon 2020. Providing multi-country testbeds for innovation, LSPs such as IoT platforms[8] or data sharing in healthcare[9] were funded to provide answers to societal challenges and support digital innovation and policymaking across different areas. In response, we recommend the following steps:

- **Fund multi-stage studies:** Support long-term, multi-site projects that combine clinical validation with implementation research to generate reliable evidence for scaling rehabilitation technologies. This addresses the lack of robust data that currently prevents wider adoption by health systems and payers.
- **Balance innovation with sustainability:** Ensure that funding frameworks balance the need for rapid prototyping with sustained validation to prevent short-lived innovation cycles. This mitigates the risk of technologies being abandoned after initial hype by ensuring steady pathways to market readiness.
- **Integrate rehabilitation systematically into disease-focused research:** Require that future EU-funded research programs on major diseases include dedicated rehabilitation research components—alongside diagnostics, therapeutics, and prevention. This embeds rehabilitation into the full care pathway and enables the development of predictive, personalised, and condition-specific rehabilitation approaches that can be scaled across Europe.

3. Enable modular and customizable solutions

Rehabilitation needs are highly diverse, demanding personalised solutions that reflect different diagnoses, conditions, and care settings. Yet producing bespoke technologies for each patient is neither feasible nor sustainable. Without modular and adaptable approaches, innovation risks being too rigid for real-world complexity or too costly for widespread use. To facilitate innovative solutions, we recommend that:

- **Enable personalisation through software:** Allow adaptation of modular platforms for individual patients through customisable software options, ensuring responsiveness to diverse clinical needs. This addresses the difficulty of meeting patient-specific requirements while maintaining industrial feasibility.
- **Promote shared building blocks:** Support development of modular hardware and software components that can be applied across different clinical areas, ensuring cost efficiency and scalability. This tackles the challenge of affordability by creating components that can serve multiple conditions without full redesign.

4. Align regulatory framework with innovation

Regulatory complexity is a major barrier to the development and uptake of rehabilitation technologies. The requirements of the Medical Devices Regulation (MDR) are often unclear, costly, and disproportionately burdensome—especially for SMEs and low-risk technologies. At the same time, a lack of regulatory flexibility slows the introduction of novel solutions and undermines user and provider trust. Ongoing debates around revising the Medical Devices Regulation (MDR) and the In Vitro Diagnostics Regulation (IVDR) offer an opportunity to create clearer and proportionate pathways for low-risk rehabilitation technologies. This challenge calls for an approach that combines scalability with adaptability. To achieve this balance, we recommend the following:

- **Foster early stakeholder engagement:** Involve users, clinicians, researchers, and industry stakeholders in regulatory processes to ensure that requirements are both safe and practical for real-world implementation. This tackles the disconnect between innovation and regulation by ensuring rules are aligned with real-world clinical practice.
- **Enable proportionate regulation:** Promote a more nuanced approach that balances risk with potential benefits, particularly for low-risk rehabilitation technologies. This addresses the current situation where SMEs struggle with the same regulatory burden as high-risk device producers, slowing innovation unnecessarily. Explicit recognition of model-based approaches, including in silico validation, could support

[8] Internet of Things Large Scale Pilots – Towards an Interconnected Society.
[9] The Internet of Things in European healthcare.

proportionate regulation by enabling evidence generation without default reliance on lengthy clinical trials, reducing compliance costs for SMEs while maintaining safety and efficacy.

5. Build capacity and skills

A central challenge in rehabilitation technology development is the shortage of skills and capacities among developers, procurers, and researchers to design and validate solutions that truly reflect user needs and clinical realities. Vulnerable populations are often overlooked, leading to low adoption rates and technologies that fail in practice. Moreover, evaluations remain largely confined to small-scale pilots, leaving a critical gap in the robust clinical and cost-effectiveness data that policymakers, commissioners, and insurers require for uptake. These gaps in skills and evaluation frameworks show the need for a stronger European response. Addressing these gaps should become part of the European Skills Agenda, with instruments such as EIT Health and Erasmus+ explicitly supporting curricula and training modules for technology-enabled rehabilitation:

- **Mainstream digital delivery models:** Support the integration of telerehabilitation and other digital approaches into mainstream health services to expand access and optimise resource use. This helps cope with service shortages by enabling remote and continuous patient engagement.
- **Upskill the ecosystem:** Provide targeted training programmes for technology developers, procurers, and researchers to improve understanding of user needs, usability, and clinical integration. This addresses the shortage of skills that currently limits the creation of technologies adapted to real-world rehabilitation pathways.
- **Embed rigorous evaluation standards:** Ensure that new rehabilitation technologies are assessed using robust methodologies for clinical and cost-effectiveness, moving beyond small-scale pilot projects. This tackles the current evidence gap that prevents commissioners and insurers from supporting widespread adoption.

6. Establish evidence-based procurement guidelines

Procurement of rehabilitation technologies remains inconsistent and often opportunistic, with little reliance on evidence. Hospitals, municipalities, insurers, and even patients struggle to assess maturity levels and clinical effectiveness. This results in wasted resources, inequitable access across regions, and limited uptake by already stretched health systems. Market instruments such as pre-commercial procurement (PCP) and public procurement of innovation (PPI) provide proven models to foster evidence-based adoption—but are rarely applied in the rehabilitation field. To improve the efficiency, transparency, and impact of rehabilitation procurement across Europe, we recommend the following actions:

- **Increase transparency for stakeholders:** Provide accessible information on technology readiness levels, clinical trial outcomes, and economic impact to support informed decision-making. This addresses the lack of clarity faced by hospitals and insurers when deciding which technologies to fund or reimburse.
- **Develop EU-level guidelines:** Create procurement frameworks grounded in clinical and cost-effectiveness evidence to guide purchasers, insurers, and commissioners. This tackles the current inconsistency in procurement by providing a common benchmark for evaluating technologies.

Closing

Rehabilitation has long been underfunded and under-prioritised in EU health RD&I strategies. By implementing these six recommendations, rehabilitation technologies can be positioned as a strategic priority in FP10 and beyond. This will strengthen European health systems, reduce inequalities, and support the competitiveness of the healthtech sector. Rehabilitation must be recognised not as a peripheral issue, but as a core pillar of EU health research policy, with R&I related to rehabilitation considered an integral component of all disease-related research programmes — including the development of predictive and personalised rehabilitation approaches tailored to individual patients and clinical conditions. Embedding rehabilitation into FP10 would align EU action with global commitments under the United Nations SDGs. It would also enhance Europe's strategic autonomy in health technologies and deliver measurable benefits for citizens, health systems, and economies

RTOs, as translational research actors, connect scientific and technological excellence with industrial capacity and healthcare system needs. By bridging these domains, they ensure that rehabilitation innovation contributes fully to FP10 objectives of impact, resilience, and competitiveness. Positioning rehabilitation as a strategic pillar of EU health R&I will ensure that Europe delivers on its ambitions for inclusive, sustainable, and future-proof healthcare systems.

EARTO remains ready to provide additional input on the above-mentioned considerations and topics and to further discuss the implications of this input for the healthcare industry, RTOs and the complete health RD&I ecosystem with all involved stakeholders.

EARTO - European Association of Research and Technology Organisations
Founded in 1999, EARTO promotes RTOs and represents their interest in Europe. EARTO network counts over 350 RTOs in more than 32 countries. EARTO members represent 228,000 highly-skilled researchers and engineers managing a wide range of innovation infrastructures.

RTOs - Research and Technology Organisations
From the lab to your everyday life. RTOs innovate to improve your health and well-being, your safety and security, your mobility and connectivity. RTOs' technologies cover all scientific fields. Their work ranges from basic research to new products and services' development. RTOs are non-profit organisations whose core mission is to produce, combine and bridge various types of knowledge, skills and infrastructures to deliver a range of research and development activities in collaboration with public and industrial partners of all sizes. These activities aim to result in technological and social innovations and system solutions that contribute to and mutually reinforce their economic, societal and policy impacts.

EARTO Working Group Healthcare: *the WG is composed of 100 experts coming from 38 RTOs in 19 European countries. This WG is looking at the implementation of the EU RD&I Framework Programmes (Horizon Europe) addressing the healthcare sector, and especially medical technology, pharmaceuticals, biotech. Its members are conducting technological research for biomedical and medical applications, both for large companies and SMEs. They strongly support the emergence and the growth of spin offs in healthcare technologies. This WG is also looking at how RTOs can be involved in and benefit from projects under the European Digital Programme as well as the EU4Health programme, and also about the specific role of RTOs in Institutionalised Partnerships such as the Innovative Health Initiative.*

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