Interreg CENTRAL EUROPE

Co-funded by the European Union

Health Labs4Value

Germany: Technical Solution upscaled thanks to the Pilot experience

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1. Executive summary

This report presents five innovative technical solutions developed through the HealthLab4Value pilot projects in different countries, each addressing specific healthcare challenges while demonstrating the transformative potential of international cooperation in advancing patient care and healthcare system efficiency.

The five technical solutions documented represent jointly developed responses to diverse healthcare needs, with each solution emerging from cross-border collaboration involving organizations from at least two countries.

Each solution has delivered significant measurable improvements across three critical dimensions. Patient-centered outcomes demonstrate tangible benefits to patient experience, satisfaction, and quality of care. Outcomes on healthcare providers have been more efficient care delivery and better resource utilization. Beyond direct patient and provider benefits, these solutions have generated positive systemic impacts for caregivers, administrators, and the broader healthcare ecosystem, demonstrating their potential for transformative system-wide change.

The sustainability of these solutions has been carefully planned through comprehensive strategies. Each project has identified and mitigated key threats to long-term success while establishing clear governance structures for ongoing operations. These sustainability frameworks ensure that the benefits achieved during pilot phases will continue and expand over time.

The scaling potential of these solutions is significant, with concrete pathways identified for different forms of upscaling. Each solution presents specific short-term, medium-term, and long-term scaling objectives supported by detailed resource requirements covering human resources and partnerships, operational changes, technical adaptations, and financial strategies.

The collective impact of these five technical solutions extends beyond individual healthcare innovations to demonstrate a replicable model for international collaboration in healthcare technology development.

This report serves as both documentation of successful healthcare innovation and a roadmap for future collaborative technical solution development, offering concrete evidence that internationally developed, patient-focused healthcare technologies can achieve measurable success while providing clear pathways for broader implementation and lasting impact on healthcare systems worldwide.

2. The technical solution based on the pilot experience

2.1. Brief overview on the background and context of the technical solution

The pilot activities, conducted by University Hospital Carl Gustav Carus Dresden (UKD) and Carus Consilium Saxony (CCS), aimed to support older adults in maintaining independence and a quality of life at home. The technical solution, ActiveTEP, was developed to provide guidance and orientation before and after hip replacement surgery, focusing on everyday training and knowledge transfer.

Following the methodological framework of Health Labs4Value, the pilot involved patients and relevant stakeholders early in the design process. This co-creative approach ensured that the digital solution aligned with the actual needs, concerns and living situations of its target users.

Throughout the pilot, feedback from senior patients and healthcare professionals led to iterative improvements in content, language, and usability. This confirmed the value of real-world testing environments and user-centred development in producing meaningful, applicable solutions.

2.2. Detailed description of the technical solution and its uptake

The digital solution supported by UKD and CCS within the Health Labs4Value project is ActiveTEP: an app designed to support patients undergoing hip replacement surgery. It addresses the critical recovery and self-management phase at home, aiming to reduce complications, promote mobility and strengthen patient autonomy during the perioperative period. With approximately 200,000 hip replacement procedures performed each year in Germany, ActiveTEP provides timely and scalable digital support that complements traditional rehabilitation services.

The prototype includes four key modules: evidence-based knowledge transfer structured along the care pathway; a three-level exercise programme developed with a local rehabilitation centre; a pain and wellbeing diary; and personalised reminders. It is designed for use both before and after surgery, over a period of six months, to enhance patient orientation and motivation.

Homepage:

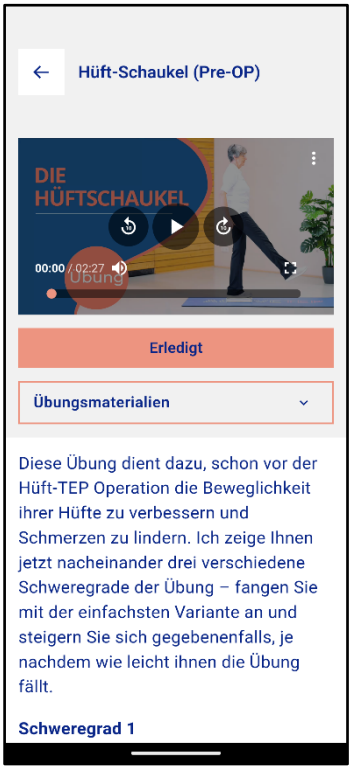
- ➔ During registration, patients enter their name, personal goals (here: going hiking again) and priorities they want to focus on during their healing process
- ➔ The homepage allows fast access to all features of the app and highlights daily tasks

Knowledge modules:

- ➔ Knowledge modules are subdivided into pre / around / and after surgery
- ➔ Every module is designed modular, to not overstimulate patients

Training:

- ➔ Training consists of differing evidence-based tasks every day
- ➔ Tasks are described within a video, as well as text, with possible variations to adapt to personal abilities



Diary:

- ➔ The diary allows tracking of general wellbeing, daily movement, pain intensity and personal notes
- ➔ Healthcare providers participating in the program, will be able to export those date for personalised healing path planning

The ActiveTEP solution is not solely a digital application; rather, it is the outcome of a systematic co-creation process that has been thoroughly tested and validated. This collaborative approach has resulted in the enhancement of a person-centered care pathway specifically designed for hip replacement patients. The Living Lab approach applied by UKD and CCS followed a structured, step-by-step methodology designed to ensure replicability and transferability across settings:

Step 1 – The establishment of the quadruple helix structure: A national co-creation team was established, consisting of patients, clinicians, rehabilitation experts, developers, economic experts and academic researchers from the local health region. This ensured the integration of multiple perspectives and alignment with local health priorities.

Step 2 – Needs assessment and context analysis: Utilising interviews and focus group meetings with quadruple helix stakeholders, the emphasis was placed on supporting the needs of the senior generation. In the course of a thorough search for possible solutions, ActiveTEP was introduced as an idea in its early stages.

Step 3 – Co-design and prototype development: The first prototype of ActiveTEP was the subject of discussion during the initial Open Innovation Camp, where participants collaboratively refined the direction of content and functionality. This collaborative step drew inspiration and methodological input from international partner Living Labs, who shared their approaches to user onboarding and testing environments during multiple project meetings and workshops.

Step 4 – Pilot testing and iterative improvement: Throughout several months, a structured testing process was conducted with a senior patient testgroup across multiple workshops. Patient-reported measures (PREMs, PROMs) and usability frameworks (SUS, TAM) were utilised to guide the adaptation cycles. International partners were involved in feedback rounds to ensure comparability and transnational learning.

While the focus at the beginning of the testing phase was on simple usability, more precise outputs could be generated towards the end. Concrete changes were implemented based on the gathered feedback, such as simplifying the diary scale, renaming navigation labels and optimising video load times. The app design received widespread praise, with 96% of participants finding the tool helpful after surgery and 94% finding it helpful before surgery. Testers indicated full acceptance if the app was recommended by a healthcare provider, supported by high standardized rating results (SUS: 85/100; TAM: 4.94/5).

The joint development process included multiple rounds of feedback from international Health Labs4Value partners, which were discussed in virtual and on-site meetings. Although the technical development was led by the German start-up DORA GmbH and the project team, partners from other countries contributed their insights on usability and transferability.

Following the pilot, the solution entered an early market rollout in May 2025. It is currently available via DORA GmbH in German app stores and will undergo testing in clinical studies supported by multiple German clinics. Broader uptake is planned through partnerships with orthopaedic clinics and efforts to achieve DiGA certification for health insurance coverage. Additionally, expanding the medical field from hip replacements to knee and/or shoulder replacements is highly feasible.

2.3. Measurable results

The pre-test phase of ActiveTEP aimed to gather insights in order to support user-centred development. Rather than measuring final outcomes, the aim was to improve the app based on real-life user experience and feedback.

Standardised evaluation tools, including PREMs, PROMs, the System Usability Scale (SUS) and the Technology Acceptance Model (TAM), were applied before and after interaction with the prototype. Although no KPIs had been set in advance, consistent data collection revealed improvements in key areas. The SUS score reached 85/100, while the TAM results averaged 4.94/5, indicating high usability and acceptance.

Patient feedback confirmed the perceived benefits of the app. Among patients who had already undergone hip replacement surgery, 96% found the app helpful during rehabilitation and 94% found it useful for pre-surgical preparation. Users especially valued the clarity of the information provided, the visual design, and the combination of knowledge and training features. Many users described the content as more accessible than other resources they had encountered previously.

Although the pre-test phase did not measure the impact on staff workflows, participating medical providers identified features such as the pain and activity diary and knowledge modules as promising tools to support clinical decision-making. The effects of these features are currently being evaluated in a multicentre pilot study across several German clinics.

The app also meets the needs of caregivers by enabling patients to be more independent. Although caregivers only represented a small proportion of the test group, this feature is expected to reduce their informational and emotional burden.

Beyond individual users, ActiveTEP contributes to broader goals such as digital inclusion, health literacy and data-informed care. The project helps older adults to adopt digital health tools and opens up new possibilities for personalised, scalable rehabilitation support.

Some participants expressed interest in additional customisation and onboarding features, which will be considered in future development. The positive reception of the solution confirms its relevance and establishes a solid basis for its further implementation and expansion.

3. Sustainability of the solution

3.1. Sustainability Strategy

Efforts have been made to ensure sufficient capacity for the maintenance and support of the ActiveTEP solution. The App is owned by the start-up DORA GmbH, which recently grew by four part-time employees to continuously support the solution. Additionally, more clinics are closely integrated into the process as key stakeholders to ensure ongoing collaboration and support.

Technical maintenance of the ActiveTEP solution is handled by Bornholdt Lee GmbH in Hamburg. A dedicated support email address (support@activetep.de) has been set up, and

online appointments are available every two weeks to address individual questions and provide support. These measures ensure that technical requirements are met and support services are provided. To complement the digital app, a printed ActiveTEP handbook was developed as part of the transfer strategy to reach patients with limited digital literacy, ensuring inclusivity and acceptance across all age groups.

The funding for the ongoing operations of ActiveTEP is secured through various sources, including funds from business angels, potential funds from MBG, and a grant from the Federal Ministry for Economic Affairs and Climate Action (BMWK) under the Innovation Voucher Programme (IGP) with a market maturity subsidy of 55%. These diverse funding sources aim to ensure the long-term implementation and further development of the solution. The long-term transfer is sustained by the Living Lab network, which will continue to test and validate new modules, ensuring a self-sustaining innovation ecosystem rather than reliance on one-time project funding.

The ongoing value for end-users is demonstrated through the ActiveTEP study, whose protocol is available. The value has been illustrated through a systematic literature review. Mechanisms for continuous user feedback have also been implemented to ensure that the solution meets user needs and is regularly updated.

The establishment of continuous feedback loops between DORA GmbH, clinical partners, and patients has now been incorporated into the formal sustainability structure, particularly in the context of a major study conducted across multiple local clinics. These loops ensure that both the application and the underlying co-creation process evolve alongside clinical practice, incorporating patient and professional feedback.

The major threats to the sustainability of the ActiveTEP solution have been identified, and strategies have been developed to address them. Potential financial shortfalls in clinics are to be offset through collaboration with health insurance companies and a self-payer solution. The limited digital affinity of the target group is addressed by introducing the ActiveTEP book as a second pillar to bridge the digital gap.

Through collaboration with Dora GmbH and the involvement of key stakeholders such as clinics, it is ensured that the ActiveTEP solution is implemented sustainably and successfully. The comprehensive strategy for organisational, technical, and financial sustainability, as well as ensuring user acceptance and value, guarantees that the solution will provide long-term benefits to the healthcare sector.

3.2. Key lessons learned

The ActiveTEP app, the first German health app designed to support total hip replacement surgery, was developed as part of the Health Labs4Value project. The app recently received CE certification as a Class I medical device, confirming its safety, functionality and data protection compliance. This certification now allows the app to be widely used in everyday medical care. A key insight gained from the project concerns the importance

of patient-centred approaches. The active involvement of patients in the development and testing phases made it clear that adapting the app to individual needs and ensuring user-friendliness are crucial for user satisfaction. The app supports patients not only during their hospital stay, but also in preparation and follow-up care, which reduces the workload of medical staff and empowers patients to take responsibility for their own care. Another important aspect is continuous user feedback, which enables iterative improvements and ensures that the app meets the needs and expectations of users. The certification not only documents the technical maturity of the app, but also its suitability for everyday use in a medical environment. A large-scale practical study is planned for the coming months at several German hospitals to integrate the app into everyday hospital life. In the long term, the app will be expanded to include other joint diseases such as knee and shoulder endoprosthetics. The CE certification of the ActiveTEP app is considered a flagship project for the successful transfer of research into practice and demonstrates how regional innovation spirit and European cooperation in healthcare can be successful. The insights gained will influence future improvements, including the integration of advanced features and expansion to other medical areas. Through partnerships with healthcare providers and technology companies, the solution will be further scaled to expand the reach and effectiveness of ActiveTEP.

4. Upscaling of the Technical Solution

4.1. General goal and strategy for upscaling

The ActiveTEP solution, which currently focuses on supporting patients before and after total hip replacement surgery, has the potential to be adapted for broader application to extend the benefits of digital health support to other medical areas and thus reach more patients.

The main adaptation of the ActiveTEP solution would be to extend its functionalities to other types of orthopaedic surgery, in particular knee, shoulder and spinal surgery. This expansion would make it possible to support a larger group of patients who have similar needs in terms of preparation, aftercare and rehabilitation. By adapting the content and functions of the app to the specific requirements of these surgeries, the solution could cover a broader spectrum of patient needs and become a standard tool in orthopaedic care. This would not only improve patients' quality of life, but also increase the efficiency and effectiveness of medical care.

To achieve this goal, a detailed analysis of the market and the needs of patients undergoing knee, shoulder or spinal surgery is crucial. This analysis would help to understand the specific requirements and challenges associated with these surgeries. Based on the market analysis, the content and functions of the ActiveTEP app must be adapted to meet the specific needs of patients undergoing knee, shoulder or spinal surgery. This could include the development of new modules or the adaptation of existing

content. Collaboration with additional clinics, healthcare providers and technology partners will be crucial to provide the necessary infrastructure and expertise for scaling up. These partnerships can also help promote the acceptance and integration of the solution in various medical facilities. Compliance with regulatory requirements and obtaining the necessary certifications for the app's expanded areas of application are crucial to ensuring the safety and effectiveness of the solution. Pilot studies in selected clinics will allow the effectiveness and user-friendliness of the adapted solution to be evaluated. Feedback from patients and medical staff will be used to make further improvements.

4.2. Concrete goals and measures for upscaling

The ActiveTEP solution demonstrates significant potential for scalability and flexibility, making it adaptable to various healthcare settings and regions. This adaptability is crucial for its successful deployment across different contexts and environments.

Geographic Upscaling: ActiveTEP is designed to be adaptable to different geographic regions and regulatory frameworks. Currently, efforts are underway to internationalise the solution, with a specific focus on establishing a cooperation with Austria. This geographic expansion will allow ActiveTEP to reach a broader audience and adapt to different healthcare environments and regulatory requirements.

Quantitative Upscaling: The solution aims to increase its user base by targeting additional patient groups undergoing various types of orthopaedic surgeries. By expanding its applicability to knee, shoulder, and spinal surgeries, ActiveTEP can support a larger volume of users, thereby increasing its impact and reach within the healthcare sector.

Institutional Upscaling: ActiveTEP involves the expansion of internal capacities and structures by engaging new stakeholders and sectors. Collaboration with additional clinics, healthcare providers, and technology partners is essential for scaling the solution. These partnerships provide the necessary infrastructure and expertise to integrate ActiveTEP into diverse medical settings effectively.

Functional Upscaling: The solution is continuously evolving with plans to add new features and services. For instance, future developments include providing patients with alerts if they deviate from the standard pain progression post-operation. Additionally, connecting with complementary technologies and platforms will enhance the functionality and user experience of ActiveTEP.

In summary, ActiveTEP's design and development strategy includes all four dimensions of upscaling. By pursuing geographic expansion, increasing its user base, involving new stakeholders, and adding innovative features, ActiveTEP is well-positioned to become a versatile and widely-adopted tool in the digital healthcare landscape.

4.3. Resource Requirements for upscaling

To successfully upscale ActiveTEP, various resources and adjustments are required. These include financial investments, strategic partnerships, and technical adaptations.

Financial resources are crucial for upscaling ActiveTEP. Strategic partnerships with companies that have professional distribution networks are particularly valuable. For example, medi and Bauerfeind are leading German manufacturers of medical aids and orthopaedic products, internationally renowned for their high-quality products that support rehabilitation, pain relief, and mobility. Such partnerships can help increase market access and establish the solution in various regions. Additionally, collaboration with local experts in target regions is important to adapt the solution to regional requirements and regulations.

Operational changes are necessary to integrate ActiveTEP into new environments. This includes standardising processes and adjusting workflows to efficiently integrate the digital solution into existing healthcare systems. Technical improvements are also required to ensure the scalability of the app. This involves further developing the app's functionalities and ensuring compatibility with various healthcare systems and platforms.

Overall, upscaling ActiveTEP requires a comprehensive strategy that includes financial investments, strategic partnerships, and technical adjustments. By focusing on these areas, ActiveTEP can achieve broader acceptance and make a significant impact on digital healthcare.

5. Conclusions

The ActiveTEP solution, a digital health application designed to support patients undergoing hip replacement surgery, has achieved significant milestones, including CE certification as a Class I medical device. This certification underscores its compliance with high European standards for safety, functionality, and data protection, paving the way for its integration into routine medical care.

In the short term, ActiveTEP is focused on establishing its presence in the healthcare market. Key initiatives include market introduction and partnership development. With its recent availability on app stores, ActiveTEP is set to be introduced into clinical practice through pilot studies across multiple German clinics. These studies aim to integrate the app into everyday clinical routines and refine its content based on user feedback. Strategic partnerships with companies, which are renowned for their medical aids and orthopaedic products, are crucial. These partnerships will leverage professional distribution networks to enhance market penetration and facilitate broader adoption.

For the mid-term, ActiveTEP aims to expand its application to other types of orthopaedic surgeries, such as knee, shoulder, and spinal operations. This expansion involves

functional enhancements and geographic expansion. Plans include adding features like alerts for deviations from standard post-operative recovery paths, enhancing user engagement and outcomes. Efforts are underway to adapt ActiveTEP for international markets, starting with collaborations in Austria. This involves tailoring the app to meet different regulatory and healthcare environments.

In the long term, ActiveTEP envisions becoming a standard tool in orthopaedic care across various regions. This vision includes broadening the application scope and sustainable integration. Extending the app's functionalities to cover a wider range of medical conditions and surgeries will increase its utility and impact in the healthcare sector. Ensuring ActiveTEP is embedded within healthcare systems globally, supported by continuous updates and adaptations to evolving medical practices and technologies, is also a key goal.

The outlook for ActiveTEP is promising, as it is poised to transform digital healthcare by providing a scalable, flexible solution that meets diverse patient needs. Its success hinges on continuous innovation, strategic partnerships, and an unwavering commitment to improving patient care. However, the journey ahead involves navigating regulatory landscapes, securing ongoing financial support, and fostering collaborations that can drive technological and operational advancements. Addressing these challenges will be key to realising ActiveTEP's full potential in revolutionising patient-centred care. By focusing on these strategic areas, ActiveTEP is set to make a significant impact on digital healthcare, enhancing patient outcomes and streamlining healthcare delivery.