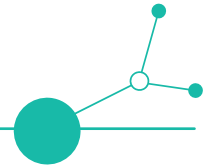


A3.2 - Innovation plan for long-term care facilities for older people

PP9 - EGTC



Version 1

04 2025



Regional Innovation plan [Eastern Slovakia (SK04)]

1) Define and describe purpose for the innovation

Define a systematic innovation approach aligned with strategic goals and long-term success. Clearly outline the plan's intent to guide decisions, resource allocation, and stakeholder engagement. Please, consider the motivation for innovation and two frames of the innovation - ideal and realistic solution.

Purpose:

This innovation plan focuses on the development and systematic improvement of the mental, emotional, and cognitive health and abilities of the clients at the Via Lux senior care facility through virtual reality (VR) technology. The pilot implementation demonstrated a positive impact of VR on clients' mental and emotional well-being. However, it also revealed the need for more localized content, better technical support, and continuous staff involvement. The strategic goal is to integrate VR as a regular part of care, support cognitive, motor, and social functions of seniors, and increase the facility's innovation potential. The plan aims to guide decision-making, resource allocation, and the involvement of all relevant stakeholders.

Motivation:

The pilot VR test at Via Lux confirmed that clients respond positively to natural, cultural, and relaxing environments. At the same time, it highlighted the need for content personalization, the presence of an instructor during the VR experience, and greater interactivity. The aim of the innovation is to expand the use of VR in the areas of reminiscence, movement, and social interaction while building on the experience gained and the preparedness of the staff.

Ideal Solution:

This envisions a fully integrated VR system within the daily routine of the facility. The content is localized (e.g., virtual walks in Košice, the Slovak mountains, pilgrimage sites) and personalized according to the interests of clients - for example, created based on their life stories (so-called reminiscence therapy).

The facility has a trained "VR specialist" - a staff member or active volunteer responsible for technical support and leading VR experiences. The system also integrates sensors (e.g., biofeedback, pulse, stress responses), which allow the experience to be adapted to the client's current condition.

VR is used not only for relaxation but also for improving mobility, balance, and fine motor skills (e.g., through VR tai-chi or interactive exercises). Social VR activities enable clients to share experiences with family or other clients, thereby strengthening social inclusion. All activities are systematically evaluated through feedback from clients and staff, ensuring continuous development and adaptation of the system.

Realistic Solution:

The facility already has a team of staff members who actively participated in the pilot phase and have practical experience with the use of VR in elderly care. All staff who worked with VR technology were also involved in collecting feedback during testing and are familiar with its basic functions and practical application. Additionally, a designated person in the facility coordinates the use of the VR solution and ensures its smooth integration into the daily routine.

2) Considered factors before a Innovation plan design

Review and integrate regional (and, if relevant, national) digital transformation policies, strategies, and guidelines. Focus on identifying regional priorities for LTC digital transformation, evaluating investment levels in care innovation, and recognizing the key elements for digital transformation as defined by policymakers. Evaluate impact on ecosystem, consider legal regulations and the need of processes transformation. Also identified bottlenecks and challenges.

Ecosystem Impact:

The implementation of VR technology is designed to seamlessly integrate into the existing digital infrastructure of the facility without requiring major interventions. The system operates autonomously and does not need to be connected to internal databases or medical systems, thereby minimizing operational risks. The introduction of VR extends the facility's digital portfolio with an innovative tool aimed at supporting mental health, client activation, and social connection. The solution is also conceived to be transferable, meaning it can be applied in other facilities with similar technological conditions.

Legal Regulations:

All applicable legal regulations regarding personal data protection and human dignity are strictly followed. Clients are involved exclusively on a voluntary basis, with full consideration of their health and psychological condition. All processes are designed to ensure data protection, minimize potential risks, and respect each participant's individuality.

Existing Technology Infrastructure:

The facility already has the basic technical setup required for launching the pilot VR solution - including access to power outlets, a dedicated enclosed space, and Wi-Fi connectivity. However, for long-term and full-scale use, the Wi-Fi signal may need to be strengthened or optimized in the VR activity room. It may also be beneficial to create an ergonomically suitable space with secure seating and sufficient light isolation. The VR equipment used is stand-alone, requiring no integration with other internal systems, which reduces technical demands and enhances safety.

Budgetary Constraints:

The selected innovation model emphasizes financial sustainability. The initial investment in VR equipment and necessary accessories is a one-time expense in the low thousands of euros. Utilizing available free or open-source content helps minimize additional costs. Operating the VR solution does not increase staff workload and is managed using the facility's existing capacities. If needed, the solution can be expanded gradually based on available budget resources.

Resident Needs and Preferences & Staff Experience

Virtual reality is designed as an experiential tool directly for the facility's clients, who actively use the VR headset and controllers. The content is selected based on their interests, mental state, and individual preferences - ranging from relaxing scenes to stimulating experiences. Staff members play a key role in preparing the setup, coordinating sessions, and monitoring client reactions through an external device (e.g., a tablet). Given the varying levels of digital readiness among staff, implementation includes hands-on training focused on technical assistance, basic troubleshooting, and client support. The technology is introduced in a way that does not exceed the staff's routine capacities while offering them a meaningful sense of involvement.

Process Transformation:

Introducing VR technology does not require significant changes to daily routines or staffing capacities. It serves as a complementary tool that naturally fits within existing leisure or individual

client activities. The transformation primarily involves expanding the range of engagement options with clients rather than altering fundamental processes. Successful integration depends on an open-minded approach from staff, proper planning, and basic training. The change is implemented gradually, with attention to feedback from all stakeholders.

Identified Bottlenecks and Challenges:

Key challenges associated with implementing VR include the need to improve staff digital skills, ensuring technical readiness of the infrastructure (e.g., stable Wi-Fi signal or appropriate physical space), and respecting clients' health and cognitive limitations. From a budgetary perspective, it is essential to use available resources efficiently. While VR does not interfere with clinical processes, regular use requires basic maintenance and organization. The risk management framework accounts for the possibility that not all clients will respond positively to VR, so alternative and adaptive strategies are prepared for both clients and staff.

3) Explore various levels of digitization, determine level of digitalization

Select the appropriate digital maturity level for your innovation—from Basic Digitization to Full Digital Transformation—and indicate the corresponding EU Technology Readiness Level (TRL).

Describe your choice in terms of:

- *Technology Adoption: Implementation of digital tools across the organization.*
- *Process Integration: How digital technologies are embedded in core workflows.*
- *Data Utilization: Use of data for decision-making and operational improvement.*
- *Innovation Capability: The organization's ability to drive digital innovation.*
- *Cultural Shift: The extent to which digital skills and mindsets are integrated into the culture.*

Digitization/Digitalization level:

The implementation of VR technology represents an initial yet strategic level of digitalization, intentionally enriching the clients' daily routine with meaningful digital experiences. This is not about automating routine tasks, but about deploying an innovative digital tool to support mental health, relaxation, and cognitive activation. The solution is being piloted in real-life conditions of the facility, in line with TRL-6, emphasizing safety, ease of use, and low operational integration demands.

Technology Adoption:

The selected VR system is designed to be as user-friendly as possible and does not require advanced digital skills. Clients use VR headsets and controllers under the guidance of staff who undergo hands-on training. The focus is on building staff confidence in handling the technology and understanding its benefits for improving clients' quality of life. Technology adoption is supported by positive feedback from pilot sessions and the ability to select content tailored to individual needs.

Process Integration:

The implementation of VR is designed as a complementary activity that does not interfere with the facility's clinical or administrative systems. Integration into the daily schedule is smooth and respects the facility's established routines. Activities are planned flexibly - either as individual or group sessions - and are coordinated based on current staff capacities and client interest.

Data Utilization:

Data collection is limited to non-invasive observation of client reactions via an external display (e.g., tablet), without storing sensitive personal data. For the purpose of evaluating the innovation's added value, qualitative outputs (observations, verbal responses, feedback) are

recorded to help improve the content and deployment method. An internal questionnaire is also used, completed by staff after each VR session. This tool collects structured information about the session flow, perceived impact, and training effectiveness from the staff's perspective. The technology currently does not use automated analytics, but lays the groundwork for future data collection aimed at personalized experiences.

Innovation Capability:

The introduction of VR technology is a first step toward digital innovation in the area of psychosocial support for clients. The project explores how technology can enhance quality of life without imposing major operational burdens. The experience gained through this implementation forms the foundation for future expansion of digital tools, including interactive platforms and cognitive training.

Cultural Shift:

The introduction of VR is accompanied by open internal communication and staff involvement in testing and content selection. A positive perception of technology is promoted - as a tool for human connection rather than a replacement. The goal is to build trust in digital solutions and strengthen the willingness to experiment with innovations that have a real impact on clients' everyday lives.

4) Define and describe objectives (with dependencies and indicators) for the innovation (related to the purpose)

Set clear, SMART (specific, measurable, achievable, relevant, and time-bound—that) goals targeting outcomes like enhanced product features, improved client satisfaction, or cost reduction. Include defined KPIs and success criteria to track progress and resolve any conflicting aims early.

1. Enhancing Clients' Mental Health and Well-being through VR Experiences:

- Goal: Ensure that at least 80% of facility clients participate in a minimum of one VR experience per month over a 12-month period, focused on relaxation, memory stimulation, or cultural exploration.
- Indicator(s): Number of VR sessions per client per month; subjective well-being rating after the experience (scale 1-5); qualitative feedback.
- Priority (select): Must-have (short-term)
- Risk & Mitigation: Content adapted based on client responses; replacement or update of unsuitable VR scenes.

2. Assessing the Impact of VR on Clients' Cognitive and Emotional Reactions:

- Goal: Develop and implement a simple qualitative tool (e.g., observation sheets, verbal feedback, questionnaires) to monitor clients' emotional and behavioral responses after VR experiences.
- Indicator(s): Documented reactions (e.g., smiles, engagement, verbal feedback) in at least 60% of clients within 9 months; number of recorded responses analyzed in regular reports.
- Priority (select): Should-have (medium-term)
- Risk & Mitigation: Validation of data collection tools and methodology; consultations with a psychologist or geriatric care expert.

3. Building Facility Capacity for Long-term Integration of Digital Experiences:

- Goal: Design a model for permanent integration of VR activities into the facility's schedule and establish a foundation for further digital innovations (e.g., combining VR with physical or reminiscence therapies).
- Indicator(s): Created schedule for VR activities; proposal for additional areas of digital tool usage (within 12 months); satisfaction of clients and staff with VR as part of standard activities.
- Priority (select): Could-have (long-term)
- Risk & Mitigation: Ongoing feedback and schedule adjustments based on staff capacity and client needs.

5) Define and describe development requirements and processes for the innovation

Describe the process for planning, designing, and deploying the innovation. Define clear milestones and scope, ensuring that digital innovations are smoothly integrated into existing workflows. Evaluate technology needs, assign key roles with specific responsibilities, and incorporate diverse stakeholder perspectives to preempt challenges. Define how the innovation will be realized, whether you want to use in-house development or you plan to use external developers.

General description:

The development and implementation of VR technology at the Via Lux facility is a systematic process based on gradual testing and progressive integration into daily care routines. The aim is for VR technology to serve as a tool for cognitive stimulation, relaxation, and prevention of staff burnout. The development occurs in cycles that allow for regular feedback evaluation and continuous optimization.

Roles and Responsibilities:

- **Management:**
Responsible for the strategic management of VR implementation. Approves the development plan and milestones, ensures staff engagement, and oversees alignment with the needs of target groups.
- **Care Staff:**
Continuously test VR solutions and provide qualitative feedback on content appropriateness, clarity, and effectiveness. Their experiences form the basis for selecting VR scenarios and adapting their use to clients' daily schedules.
- **IT Staff:**
Ensure technical infrastructure (Wi-Fi, updates, troubleshooting) and provide support during pilot deployment.
- **Developers:**
An external development partner (VR software provider) carries out the technical integration of the devices, provides training, and collaborates on the creation of customized VR content based on facility feedback.

Project Coordination:

Project coordination is carried out by Via Carpatia EGTC, responsible for the overall coordination of the innovation, data and feedback collection, output preparation, and stakeholder engagement. Implementation will be conducted through regular project meetings (at least quarterly) where testing results, proposed adjustments, and goal reviews will be presented. The collaboration is based on the principles of co-creation.

Implementation Control Approach:

The implementation of the VR solution proceeds in short phases, each accompanied by testing real user reactions (clients and staff). This iterative approach allows for rapid responses to user needs, such as content changes, session duration adjustments, or simplified controls. Ongoing checks include user experience assessments and device functionality reviews, ensuring smooth and effective VR technology deployment.

Cooperation on innovation

The implementation of VR solutions for seniors at Via Lux is carried out in close collaboration between all involved parties: facility management, VR-operating staff, IT support, and the external VR content provider. Regular project meetings (at least twice a year) serve to:

- Present results from VR sessions
- Evaluate feedback from clients and staff
- Propose adjustments to VR scenarios and processes
- Redefine priorities based on current needs

This co-creation approach ensures that each modification is based on real experience and fosters team engagement.

Evaluation and Delivery Milestones:

Key performance milestones will be assessed in the 6th, 12th, and 15th months. Critical indicators include:

- **Smooth Operation of VR:**
 - *Target:* 95% of VR sessions run without technical issues.
- **Fast Feedback Processing:**
 - *Target:* All questionnaires from clients and staff evaluated within 30 days, with changes proposed as needed.
- **Staff Proficiency in Operating VR Technology:**
 - *Target:* 80% of caregivers can independently run a session without assistance.

Implementation Evaluation and Testing:

In addition to regular usability testing (ease of use, headset deployment, menu navigation, and session start), the following are conducted:

- **Integration Tests in a Simulated Facility Environment** (scalability, Wi-Fi stability, VR headset battery life)
- **Field Testing** during real VR sessions with clients to verify safety and comfort
- **Feedback Analysis** from questionnaires and interviews for immediate adjustments

Allowable Rollback Criteria:

To mitigate risks, quality thresholds are defined. If:

- **VR Set Failure Rate > 5% of Sessions:**

If more than 5% of all VR sessions end with a technical error (e.g., frozen image, sound dropout, controller tracking loss), a rollback to the previous version of the software or configuration without such issues will follow.

- **Client Satisfaction < 3/5:**

If satisfaction (measured by post-session questionnaires) drops below an average of 3 out of 5 points, it indicates that the new version of the content or feature negatively affected the experience. A rollback will reinstate the earlier content bundle or settings with better ratings.

Technology Selection and Flexibility:

We primarily use standalone VR headsets with locally stored content. However, the solution's architecture enables:

- Quick replacement of VR applications
- Addition of cloud services for session sharing
- Integration of new sensors (e.g., biofeedback) without redesigning the core system

This ensures the ability to respond to new technical opportunities and evolving client needs.

Reference Documents and Agreements:

All related project documentation, including development plans, meeting minutes, testing reports, and stakeholder agreements, will be compiled and maintained in a centralized repository. While specific document links are not yet defined, this repository will serve as the reference point for ensuring transparency, consistency, and accountability throughout the project lifecycle.

6) Define and describe implementation requirements and plan for the innovation

Deploy the innovation in manageable phases—from testing and pilot projects with care teams to a full-scale launch and review. Define goals, timelines, and resource allocations for each phase, and track progress using metrics like time-to-implementation, staff adoption rates, and cost efficiency.

General description:

The deployment of the VR solution at the Via Lux facility will take place in three managed phases over a period of 24 months. Three implementation streams will run in parallel, focusing on (1) preparation and localization of VR content, (2) capacity building of staff, and (3) technical infrastructure including stability monitoring. Each phase includes clearly defined milestones, responsibilities, and measurable indicators to enable agile responses to feedback and continuous improvement of the user experience.

Implementation Branches**1. VR Content and Localization (Stream 1):**

- Objective: Prepare thematic VR scenarios tailored for seniors (reminiscence, relaxation, travel in Slovakia).
- Milestone 1 (Month 3): Selection of 10 pilot scenarios completed.
- Milestone 2 (Month 6): 100% localization (language, cultural elements) completed.

2. Training and Staff Capacities (Stream 2):

- Objective: Equip caregivers with the skills to independently lead sessions and solve common technical issues.
- Milestone 3 (Month 9): Development of a training module.
- Milestone 4 (Month 12): First internal training for 7 caregivers.

3. Technical Infrastructure & Monitoring (Stream 3):

- Objective: Ensure stable Wi-Fi coverage, charging stations, and tools for monitoring the quality of VR sessions.
- Milestone 5 (Month 15): Installation of broadcasting access points.
- Milestone 6 (Month 24): Setup of protocols for recording outages and collecting feedback.

Phases Overview

- **Phase 1 (Months 0-3): Initial VR Deployment and Content Localization**
- Milestone 1: Selection and localization of the first 10 VR scenarios for seniors (Košice, reminiscence, relaxation).
 - Branche 1 (Content): Complete translation and cultural adaptation of scenarios.
 - Branche 2 (Technical): Install and test 5 VR headsets, verify Wi-Fi stability in the designated room.
 - Branche 3 (Training): Conduct initial training for 7 VR caregivers - headset operation and basic client support.
- Indicator: 10 functional localized scenarios; 95% of sessions run without technical issues; 7 caregivers successfully manage basic operation.
- **Phase 2 (Months 3-12): Pilot VR Sessions, Feedback, and Iterative Improvements**
- Milestone 2 (Month 6): Conduct at least 30 VR sessions with clients; collect questionnaires from caregivers and seniors.
 - Branche 1: Optimize scenarios based on feedback (minimum 3 content updates).
 - Branche 2: Implement session recording protocol and monitor technical incidents.
 - Branche 3: Provide additional caregiver training for common issue resolution.
- Indicator: ≥ 30 sessions; $\geq 80\%$ positive feedback; $\leq 5\%$ technical errors.
- Milestone 3 (Month 9): Begin testing multiplayer or shared VR mode with 4 clients.
 - Branche 1: Prepare and test social scenarios.
 - Branche 2: Verify network connection and latency.

- Branche 3: Train caregivers to lead group sessions.
- Indicator: At least 3 successful pilot group sessions; feedback $\geq 4/5$.
- Milestone 4 (Month 12): Expand number of caregivers to 14 and introduce biofeedback sensors in 10 sessions.
 - Branche 1: Add biofeedback integration to selected scenarios.
 - Branche 2: Verify technical integration of sensors with the VR system.
 - Branche 3: Train caregivers to interpret biofeedback data.
- Indicator: 14 caregivers; biofeedback activated in ≥ 10 sessions; improved content personalization.
- **Phase 3 (Months 12-24): Scaling, Stabilization, and Long-Term Integration**
- Milestone 5 (Month 15): VR activities integrated into the weekly program for all clients (minimum 2 sessions/week).
 - Branche 1: Update scenario repertoire based on client preferences.
 - Branche 2: Ensure maintenance and renewal of VR devices.
 - Branche 3: Conduct advanced workshops for caregivers on new features (multiplayer, biofeedback).
- Indicator: ≥ 2 sessions/week per client; satisfaction $\geq 4/5$.
- Milestone 6 (Month 24): Completion of certified training program for 100% of caregivers; internal report on cognitive and social impact on clients.
 - Branche 1: Finalize methodology for assessing long-term VR benefits.
 - Branche 2: Implement an automated system for collecting qualitative and quantitative data (questionnaires, biofeedback).
 - Branche 3: Conduct evaluation workshops with staff and clients' families.
- Indicator: 100% caregivers certified; documented improvement in cognitive or emotional indicators in $\geq 70\%$ of clients.

Risk and Change Management Integration:

- **Regular Risk Review:** Monthly evaluation of major issues (technical, network, engagement) with simple remediation steps proposed.
- **Rapid Rollback:** If more than 5% of sessions fail, revert to the previous functional software version.
- **Simple Change Approval:** Proposed changes are approved in a fast-track team meeting once per quarter.
- **Support and Training:** Supplementary training and immediate technical assistance provided as needed.

7) Define and describe reflection (testing, validation, verification) requirements and plan for the innovation

Regularly assess the process to address challenges such as technical issues, resistance, or resource limits. Schedule checkpoints to review progress and, based on clear criteria like unmet KPIs or negative feedback, decide when to adjust or revisit earlier steps.

Reflection - Testing, Validation, Verification:

The reflection phase is closely linked to the implementation of VR and ensures that each step adds value without compromising system stability or safety. Throughout the entire project lifecycle, testing and validation are carried out according to the following principles:

- **Built-in checkpoints at milestones** (months 6, 9, 12, 15, and 24) connect implementation activities with verification tasks.
- **Continuous feedback** from clients, VR-responsible staff, and the IT team is collected through questionnaires and incident logs immediately after each VR session.
- **Predefined rollback criteria** (e.g., < 70% client satisfaction, > 5% technical errors) trigger immediate corrective actions—rollback to a previous version of the content or configuration.

Unit Testing:

Unit testing, conducted in the early stages (phases 1 and 2), focuses on individual components to ensure they function as intended:

- **VR headset functionality:** Verifying that the headset properly displays visuals and responds to controllers across all selected scenarios.
- **Application stability:** Each VR application launches and runs without crashes or significant lag during a typical session.
- **Reliable charging and startup:** The headset starts up correctly when connected to power and is ready for use.

Integration Testing:

As the project advances into later stages (from mid-phase 2 to phase 3), integration testing assesses system performance in realistic conditions, ensuring that all components work together harmoniously:

- **Simulated real-environment session:** Verifying that both the headset and the caregiver's tablet remain connected throughout the session without signal drops.
- **Social interaction testing:** Group sessions with four clients proceed smoothly, with no controller conflicts and seamless switching between user views.

- **Biofeedback integration:** Heart rate and stress sensors accurately record and display data during sessions without delay.

Continuous Integration with Implementation:

Reflection is not a standalone phase but is embedded in the implementation process. Each phase includes built-in testing and validation checkpoints:

- **Milestone checkpoints:** Each milestone (e.g., biofeedback testing in month 12 or validation of group sessions in month 9) includes a clearly defined validation task. These verifications ensure the system meets expectations before progressing.
- **Recurring feedback loops:** In every implementation phase, the team briefly reviews the progress and proposes necessary adjustments. This feedback is immediately applied in the next VR deployment, ensuring ongoing improvement without unnecessary formalities.

8) Define and describe delivery and sustainability requirements and plan for the innovation

Ensure the innovation is viable and scalable by planning for ongoing development, maintenance, and regular evaluations. Use both tangible outcomes (e.g., improved data use and reduced workload) and intangible benefits (e.g., increased client satisfaction) to guide future enhancements.

Delivery requirements and rules:

- **Ongoing VR content updates**
 - Regularly expand and refresh thematic scenarios based on client feedback (relaxation, reminiscence, cultural).
 - Deploy smaller content packages without interrupting operations to maintain a variety of experiences.
- **Technical maintenance**
 - Provide basic support for VR headsets and tablets: functionality checks before each weekly activity cycle.
 - Address common malfunctions (e.g., controller pairing, network issues) using a simple “cause-correction-verification” protocol.
- **Staff training and support**
 - Short refresher workshops for caregivers.
 - Access to concise manuals and video tutorials available on-site.

Sustainability requirements:

- **Modular content structure**
 - VR scenarios are organized into standalone packages that can be added or changed without affecting the core system.
 - Enables flexible expansion (new topics, biofeedback module) without infrastructure overhaul.
- **Iterative performance evaluation**
 - Every 6 months, assess key indicators:
 - o VR usage (sessions per client)

- o Client satisfaction (average rating $\geq 4/5$)
- o Efficiency of VR-operating staff ($\geq 80\%$ of caregivers operate independently)
- Results guide further content and process improvements.
- **Maintenance protocols**
 - Simple checklists for regular hardware inspections (headset condition, charging stations, Wi-Fi).
 - Logs of service interventions and response times to identify recurring issues.
- **Capacity building and innovation culture**
 - Strengthening of the internal team of VR ambassadors who share know-how with new colleagues.
 - Support for small internal ideas to expand VR use (e.g., therapy, education) through mini-grants or idea competitions.

With this approach, we ensure that the VR solution is not only deliverable but also sustainable - technically reliable, content-rich, and institutionally embedded within the Via Lux facility.

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