Interreg CENTRAL EUROPE

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DigiCare4CE

DIGICARE4CE

Monitoring Report – Pilot Action 2

A 2.3 Monitoring & Evaluation Report of the implementation process (Coordinator: PP8 NOELGA)

D.2.3.3 Monitoring Report Pilot Action 2

V2

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A SUMMARY

BACKGROUND AND OBJECTIVE

Pilot Action 2 (PA2) of the DigiCare4CE project focused on testing smart, IoT-based technologies, such as motion and fall detection sensores, tools for cognitive and physical training, smart emergency systems in long-term care (LTC) facilities across five partner countries. The overarching aim was to assess the feasibility, acceptance and implementation process of these digital solutions from the perspectives of end-users and management. This Monitoring Report summarizes findings across all participating pilot sites of pilot action 2, structured according to key evaluation metrics.

RESULTS

The monitoring of Pilot Action 2 revealed several standout insights across five long-term care facilities. User satisfaction was notably high, with most participants rating the technologies between 7 and 10. Particularly well-received were systems that supported cognitive engagement and fall prevention - such as virtual reality tools and smart sensors - which were often praised for enhancing resident interaction and safety. Workflow efficiency emerged as a major benefit, with staff reporting time savings and better structure in daily routines. This was especially evident where technologies required minimal manual input or automated routine tasks. In contrast, recurring false alarms and limited initial training were common barriers to seamless integration, highlighting the need for better calibration and support. Vendor collaboration was generally positive, contributing to smooth implementation processes. However, in some cases, support was channelled through management rather than direct staff-provider interaction, occasionally slowing troubleshooting. Trust in the technology was closely tied to reliability. While many systems were viewed as dependable, even minor technical issues, like delayed responses or glitches, could reduce confidence. Ethical concerns also surfaced in some sites, particularly around fears of depersonalization in care. In summary, despite variability in readiness and technical performance, the pilot projects demonstrated clear potential: **digital tools can improve care quality and staff workflows when effectively supported, calibrated and embedded into existing structures**.

METHOD

Data were collected via two rounds of stakeholder questionnaires, targeting end-users (care staff) and managers. Responses were analysed using AI-supported tools, applying techniques such as sentiment analysis, topic modelling and visualization (e.g. word clouds, boxplots).

CONCLUSION

The monitored implementation of smart and IoT technologies in long-term care facilities showed promising potential to enhance care processes, workflow efficiency and staff satisfaction. While several technical and operational challenges were identified, particularly related to usability, training and alert calibration, the overall feedback suggests a cautious but positive trajectory toward digital transformation. Differences in stakeholder perceptions across sites emphasize the importance of context-sensitive deployment, sustained support and continued engagement of staff throughout the innovation process.

KEYWORDS: DigiCare4CE, InterregCentralEurope, digitalization, digital transformation, Longterm Care, technology implementation

B List of abbreviations

GQM *Goal-Question-Metric*
IQR *interquartile range*
LDA *Latent Dirichlet Allocation*
MTTR *mean time to repair*
NLP *natural language processing*
PA1 *Pilot Action 1*
PA2 *Pilot Action 2*
TF-IDF *Term Frequency-Inverse Document Frequency*
VR *Virtual Reality*

C INTRODUCTION

C1 Background

DEMOGRAPHIC CHANGE

Demographic change is placing increasing pressure on the long-term care (LTC) sector, creating a dual challenge: An aging population is increasing the demand for care services, while the care sector also struggles with a shortage of skilled workers. The perception of care work as unattractive, compounded by factors such as low societal recognition, physically and mentally demanding tasks, shift work and frequent overtime, exacerbates this problem. As a result, the gap between the need for care and the availability of skilled personnel continues to widen, highlighting the urgent need for solutions that enhance productivity without compromising the quality of care.

OPPORTUNITIES AND CHALLENGES OF DIGITALIZATION

Digital transformation holds significant potential to address these challenges, offering opportunities to improve both, care quality and the working conditions of caregivers. By integrating digital tools into daily routines, LTC facilities can ease the burden on staff while enhancing resident outcomes. However, the pace of digitalization in LTC settings remains slow. Despite the increasing media attention surrounding technologies such as care robots and AI applications, the reality is different. Many facilities still rely on paper-based methods to record residents' health data and communication with external healthcare providers often occurs via fax. Moreover, limited access to internet / wi-fi infrastructure further restricts digital progress. The barriers to digital innovation in LTC facilities are multifaceted. Another challenge is the lack of knowledge and digital skills among staff, which is compounded by time constraints and the inability to participate in extensive training programs due to caregiving duties. Organizational factors, such as unclear responsibilities for managing innovation and limited capacity for technological change, further complicate digitalization initiatives. Additionally, financial constraints and resistance to change within organizations, driven by unfamiliarity and skepticism towards new technologies, contribute to slow adoption rates.

THE DigiCare4CE PROJECT – DIGITAL TRANSFORMATION OF LONG-TERM CARE FACILITIES

Recognizing these challenges, the DigiCare4CE project was initiated to promote and support digital transformation in LTC facilities. The project aims to test new technologies across eight pilots in Central Europe, with a focus on identifying practical solutions that potentially enhance care quality and workflow efficiency. Through these pilot actions, DigiCare4CE seeks to generate insights into how digital solutions can be effectively implemented in LTC facilities, fostering broader adoption across the region and contributing to a more sustainable and responsive care system.

The project includes two pilot actions which focused on different aspects of digital transformation in LTC facilities. In **Pilot Action 1 (PA1), "The digital transformation of care management and delivery"**, partners tested digital management and information systems aimed at improving care operations and collaboration with external service providers. Each partner developed a pilot concept ranging from implementing digital documentation platforms to tools which facilitate the sharing of residents' information among care teams, managers and external professionals such as physicians and therapists. The solutions were tested in one or more care facilities in collaboration with the relevant partners, reviewed through a co-creation process and adjusted as necessary based on feedback. In **Pilot Action 2 (PA2), "The datafication of elderly care delivery based on environmental, wearable**

and IoT solutions", partners tested smart devices such as sensors, emergency buttons, mobile applications and virtual reality (VR) therapies. The pilot activities ranged from using monitoring devices for detecting falls and movement to exploring the therapeutic benefits of VR to train cognitive and physical skills in the elderly.

MONITORING AND EVALUATION

A monitoring and evaluation process accompanied these pilot actions to systematically assess the effectiveness, challenges and impact of the implemented digital solutions, ensuring that lessons learned could inform adjustments during the testing phase and contribute to the development of scalable joint solutions or further digitalization projects for LTC facilities in the future.

The following document presents the **monitoring and evaluation report** for pilot action 2. It provides an overview of the results of the implementation process and testing phase of the new technologies, incorporating perspectives from stakeholder groups, including end-users and LTC managers involved in the pilot actions.

C2 Objective Monitoring Report

The Monitoring Report serves as a comprehensive evaluation tool to assess the implementation and impact of the DigiCare4CE pilot actions. Its primary purpose is to ensure transparency, accountability and data-driven decision-making in the digital transformation of long-term care facilities. By systematically analysing the progress of the pilot initiatives, with all in all two rounds of questionnaires, this report identifies the successes and challenges encountered during the implementation of the digital solutions. It aims to highlight factors contributing to effective digital adoption while addressing barriers that may hinder optimal execution.

A key focus of this report is the evaluation of digital innovations from the perspectives of end-users, in our case caregivers and management-level stakeholders, including facility administrators and decision-makers. By collecting data through questionnaires, the report measures the usability, effectiveness and efficiency of the implementation processes and the implemented solutions. The gathered insights support evidence-based decision-making, ensuring that digital transformation strategies align with the needs of care facilities while fostering continuous improvements.

Furthermore, the report facilitates knowledge transfer by documenting best practices and lessons learned, making them accessible to other institutions and stakeholders beyond the project consortium. This approach promotes scalability and encourages the wider adoption of successful digital transformation models in long-term care settings. The overarching goal is to integrate digital innovation into strategic decision-making processes, ensuring long-term sustainability and a structured approach to digital readiness in care facilities.

C3 Metric Definition

The Monitoring Report is based on a structured set of metrics, which were designed to evaluate the success, usability and impact of digital solutions introduced during the pilot actions. These metrics focus on qualitative and quantitative aspects to provide a comprehensive assessment of digital transformation within the participating long-term care facilities.

Table 1 - Graphical overview Metrics

Vendor Support and Collaboration	Data Protection Policy	Resource Allocation & Budgeting	Quality of Implementation Timeline	Cost Efficiency	Mean Time to Repair (MTTR)
Workflow Efficiency	Trust (Data Accuracy and Integrity)	User Satisfaction	Scalability & Future Readiness	Patient Satisfaction Scores	Data Accessibility & Availability
Alignment with Organizational Goals	Task Completion Time	Automated Alerts & Notifications	Sustainability Measures	Adherence to formal Guidelines	System Customization Flexibility
	Community & Family Engagement Metrics	Workforce Satisfaction & Retention	Ethical Considerations	Key recommendations	

Source: Own Illustration

The data collection is carried out through questionnaires, targeting two key stakeholder groups: end-users (care staff) and management (facility administrators and decision-makers). The questionnaires are formulated in the local languages of the pilot sites, including Czech, German, Italian, Polish and Slovak, ensuring accessibility and accurate responses. Once the data is collected, responses undergo a translation back into English to facilitate standardized analysis and a cross-regional comparisons.

Through this monitoring framework, the DigiCare4CE project establishes a systematic approach to assessing digital adoption in elderly care. The insights gained contribute to continuous improvement efforts, support evidence-based decision-making and enhance the innovation capacity of long-term care facilities.

C4 Objective Evaluation Report

The **Monitoring Report** focuses on tracking progress and identifying operational challenges during implementation. While the **Evaluation Report** aims to systematically assess the effectiveness, impact and sustainability of the digital solutions implemented within the DigiCare4CE pilot actions and provides a structured analysis of the outcomes, measuring the long-term benefits and lessons learned from the project.

This report evaluates the **efficiency, usability and scalability** of digital innovations in long-term care facilities by analysing qualitative and quantitative data collected from key stakeholders, including end-users (care staff) and management (facility administrators, decision-makers). The objective is to determine the extent to which the introduced solutions have improved care processes, workflow efficiency, staff satisfaction and residents well-being.

A critical aspect of this evaluation is the assessment of sustainability and future readiness. The report examines whether the solutions can be maintained and expanded beyond the pilot phase, identifying best practices and potential areas for improvement.

Ultimately, the Evaluation Report serves as a guidance tool for policymakers, healthcare providers and technology developers, ensuring that digitalization efforts align with long-term strategic goals and contribute to a more efficient, resident-centred and technology-driven healthcare environment.

D METHODOLOGY

D1 Data Collection

This section outlines the overall methodology employed for data collection and analysis across different pilot actions (PA1, PA2) and target groups, namely end-users and management. The primary objective was to establish a seamless and efficient data collection process, complemented by automated AI-driven analysis. This approach aimed to interpret both textual and numerical responses, extract key themes, assess sentiment and track keyword usage, ultimately providing meaningful insights for evaluation and decision-making.

D1.1 Questionnaire Design Approach

To ensure a structured and systematic approach to data collection, we adopted and customized the Goal-Question-Metric (GQM) framework, a well-established methodology commonly used to enhance and assess software quality. The GQM approach follows a goal-oriented paradigm, wherein specific goals are defined, relevant questions are formulated and measurable metrics are established to evaluate outcomes effectively.

As part of the adaptation process, we first identified and defined the key metrics that are most relevant within the context of this project. These metrics served as the foundation for constructing targeted questions tailored to elicit meaningful responses from stakeholders. Given that the relevance and interpretation of these questions vary depending on the stakeholder's role, we classified participants into distinct groups - end-users and management - to ensure that the collected data accurately reflects the perspectives and experiences of each category.

By structuring the questionnaires in alignment with the GQM framework, we ensured that the data collection process remained focused, comprehensive and aligned with the overarching project objectives. This structured approach not only facilitated the collection of high-quality responses but also enabled the automation of analysis steps through AI, allowing for efficient identification of trends, sentiment variations and thematic patterns across different pilot actions and stakeholder groups.

Table 2 - Metrics of Monitoring questionnaires

Metrics	PA1	PA2	Target Stakeholder
Clarity of Objectives and Goals	x	x	Management; End-users
Leadership and Management Support	x	x	End-users
Staff Training and Engagement	x	x	End-users
User-Friendliness of the System	x	x	End-users
Effective Change Management	x	x	Management
Integration with Existing Systems	x	x	Management
Vendor Support and Collaboration	x	x	Management; End-users

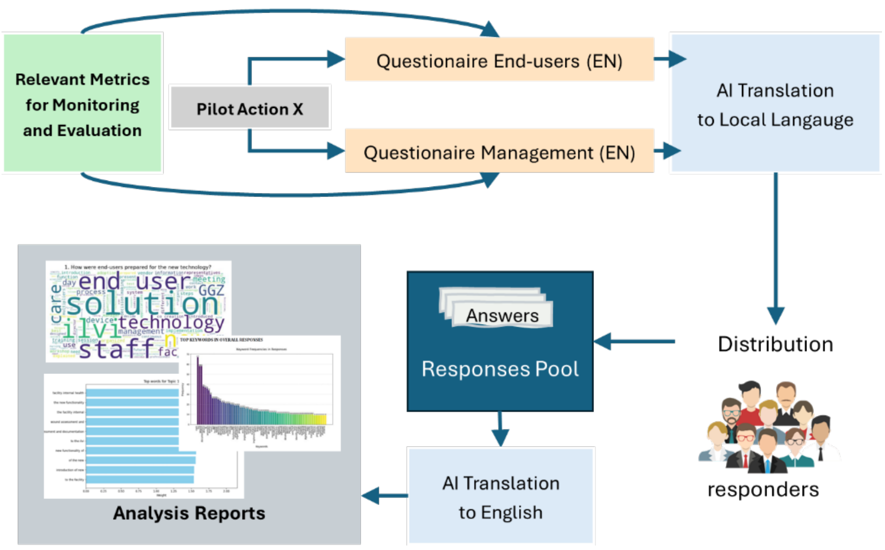
Data Protection Policy	x	x	Management
Data Security and Privacy Compliance	x	x	End-users
Resource Allocation and Budgeting	x	x	Management
Quality of Implementation Timeline	x	x	Management
Cost Efficiency	x	x	Management
System Uptime and Downtime	x	x	End-users
Mean Time to Repair (MTTR):			
User Adoption Rate	x	x	Management
Workflow Efficiency	x	x	End-users
Trust (Data Accuracy and Integrity)	x	x	End-users
User Satisfaction	x	x	End-users
Scalability and Future Readiness	x	x	Management
Resident Satisfaction Scores		x	End-users

Source: Own Illustration

D1.2 Technical Implementation of Data Collection

The technical execution of the data collection process was facilitated through Microsoft Forms, which served as the primary platform for designing and distributing the questionnaires. This tool was chosen for its ease of use, seamless integration with data processing systems and ability to automate response collection.

Table 3 - Graphical overview about the Technical Implementation of Data Collection



Source: Own Illustration

To accommodate the linguistic diversity across different partner countries, the questionnaires were translated into the respective local languages before distribution. This ensured that respondents could provide their answers in their native language, thereby enhancing clarity, reducing potential misunderstandings and improving response accuracy. The translated questionnaires were then disseminated to the target groups, including end-users and management, through predefined communication channels.

Once responses were submitted, they were automatically collected and processed, ensuring a structured and efficient data aggregation workflow. Given that responses were provided in multiple languages, such as Polish, Italian, German etc. - AI-powered translation tools were employed to automatically translate all responses into English. This step was essential for maintaining consistency and enabling a uniform analysis across all datasets, allowing for seamless cross-country comparisons and insights. The integration of AI-driven translation not only minimized manual intervention but also ensured a high degree of accuracy in interpretation. This approach streamlined the subsequent AI-assisted analysis process, which focused on extracting key themes, identifying sentiment trends and analysing keyword usage across different pilot actions and stakeholder groups.

D2 Data analysis

The data analysis process was designed to automate the processing of stakeholders' responses. By implementing this automated system, the need for manual intervention was minimized, allowing for the seamless generation of structured PDF reports. These reports provided key insights through sentiment analysis, topic modeling, keyword extraction and numerical data visualization. In addition to these response files, we used the GQM mapping to map specific questions to broader analytical categories.

The analysis process began with loading and preprocessing the data (as CSV files). Each CSV file was opened and sanitized to remove stray newline characters, unnecessary symbols and irregular formatting. Column headers were standardized to eliminate extra digits or whitespace, ensuring consistency across datasets. Additionally, questions containing predominantly numeric responses, such as satisfaction ratings on a scale from 1 to 10, were automatically categorized separately from open-ended textual responses to facilitate tailored analysis.

To provide an initial overview, the system generated a summary of key findings. This summary included an overall sentiment distribution across textual responses, an average numeric rating (if applicable) and the top five most frequently used keywords derived from a keyword frequency count. Presenting these high-level insights upfront allowed for a quick understanding of major trends before diving into more detailed analyses.

By automating data collection and analysis, this system significantly streamlined the evaluation process, enabling efficient extraction of insights from diverse stakeholder responses. The combination of AI-powered sentiment analysis, keyword extraction, topic modeling and numerical data visualization allowed for a comprehensive understanding of qualitative and quantitative feedback. This structured approach ensured that findings were presented clearly and consistently across different pilot actions, facilitating informed decision-making.

Exploring Recurring Themes Through Topic Modeling

To gain deeper insights into the most frequent themes and patterns present in stakeholder feedback, the analysis process incorporated topic modeling, a machine learning technique designed to automatically identify topics within large sets of textual data. Specifically, the system utilized Latent Dirichlet Allocation (LDA), a widely used algorithm for topic discovery, which helps reveal the hidden thematic structures within text responses.

LDA operates by analyzing word co-occurrence patterns across multiple responses. Rather than simply identifying the most frequently used words, this method clusters words that tend to appear together within the same context, allowing for the extraction of meaningful topics. In this case, the system applied LDA to trigrams, which are sequences of three consecutive words commonly found in the dataset. Using trigrams instead of individual words or bigrams (two-word sequences) improved the accuracy of topic detection by preserving context. For example, while a single word like “quality” may appear in multiple topics, a trigram such as “service quality improvement” provides a more precise indicator of the underlying theme.

Once the LDA model identified topics, the system compiled a list of key terms associated with each topic, along with their relative importance within the dataset. This step was particularly useful in understanding which aspects of the pilot actions were most frequently discussed by stakeholders. For instance, a dominant topic in end-user responses might include words like “ease of use”, “interface design” and “user satisfaction”, suggesting a recurring concern with usability. In contrast, management-level responses might emphasize phrases like “cost efficiency”, “operational impact” and “long-term scalability”, reflecting a different set of priorities.

To ensure clarity, the identified topics and their corresponding key words were summarized in the final report. The report provided an introductory explanation of topic modeling, describing how LDA was used to group related words into coherent themes. Additionally, it included a structured breakdown of these themes, listing the most significant topics along with example words or phrases from the dataset. This visualization helped stakeholders quickly grasp the core discussions within the feedback, making it easier to identify patterns, concerns and areas requiring further attention.

By leveraging LDA-based topic modeling, the analysis moved beyond simple keyword frequency counts and uncovered deeper, latent structures in the text. This approach enabled a more nuanced understanding of stakeholder perspectives, revealing insights that might not have been immediately apparent through traditional analysis methods.

Visualizing Word Usage Patterns Through Word Clouds

To enhance the interpretability of textual responses and provide an intuitive visual representation of frequently used words, the system generated two types of word clouds for each open-ended question. Word clouds are a popular data visualization technique that displays words in varying sizes based on their frequency of occurrence within a dataset. This approach allows for a quick, at-a-glance understanding of dominant terms and concepts emerging from stakeholder feedback.

The first type of visualization, the raw word cloud, included all words appearing in the responses, with the exception of basic stopwords - common words such as “and”, “the”, “is” and “to”, which do not contribute meaningful insights. This raw representation provided a broad overview of word frequency, showing which terms were most commonly mentioned by respondents. However, while useful for initial exploration, raw word clouds sometimes include high-frequency words that, while common, may not be particularly informative.

To address this limitation, the system also generated a refined word cloud, which applied Term Frequency-Inverse Document Frequency (TF-IDF) weighting to prioritize words that were contextually significant rather than merely frequent. TF-IDF is a well-established statistical method used to assess the importance of a word relative to the entire dataset. Words that appear frequently in a single response but are less common across the dataset receive a higher TF-IDF score, making them more prominent in the refined word cloud. This method helps filter out generic terms and highlights key phrases that are more specific and meaningful to the topic at hand.

By combining these two visual approaches, the system provided a general overview (raw word cloud) and a focused, data-driven representation of significant terms (refined word cloud). This dual-layered approach allowed for a richer analysis of stakeholder language patterns, making it easier to identify recurring themes, concerns and areas of emphasis.

Since numeric-based questions contained structured responses (such as satisfaction ratings or Likert-scale answers) rather than free-form text, they were excluded from the word cloud analysis. This ensured that the visualization remained relevant to qualitative feedback rather than being skewed by numerical data.

By leveraging raw and refined word clouds, the system helped to visually grasp key discussion points within the collected responses, making it easier to detect trends, frequently mentioned topics and potential areas for further investigation.

Assessing Emotional Tone Through Sentiment Analysis

To evaluate the emotional tone of stakeholder feedback, the system implemented sentiment analysis, a natural language processing (NLP) technique designed to determine whether a given text expresses a positive, negative or neutral sentiment. This step was particularly useful in gauging the general mood and attitude of respondents toward various aspects of the pilot actions.

The sentiment analysis process was powered by TextBlob, a widely used NLP library that assigns a sentiment polarity score to each textual response. This polarity score ranges from -1 to +1, where negative values indicate negative sentiment, positive values indicate positive sentiment and values close to zero suggest neutral sentiment. To categorize responses, a threshold system was applied: any response with a polarity score above 0.05 was labeled as positive, while those below -0.05 were classified as negative. Responses falling between these thresholds were considered neutral, reflecting an absence of strong sentiment in either direction.

Once sentiment scores were assigned, the results were visualized using bar charts, making it easy to interpret sentiment distribution across different questions. These charts displayed the number of responses classified as positive, neutral or negative for each open-ended question, providing an immediate sense of the prevailing attitudes expressed in the feedback. Additionally, a summary table was included to offer a quick reference, consolidating sentiment classifications across all questions into a structured format.

This analytical approach helped to identify patterns in emotional responses, detect areas where sentiment was particularly strong (either positive or negative) and recognize questions that elicited a more neutral stance from respondents. By systematically quantifying sentiment, the system transformed subjective textual feedback into actionable insights, enabling a clearer understanding of how stakeholders perceived different aspects of the project.

Visualizing Numeric Responses Through Boxplots

To effectively analyze and interpret numeric responses, such as satisfaction ratings or other scaled assessments, the system utilized boxplots to visualize the distribution of responses. Boxplots are a widely used statistical tool that provide a concise summary of key numerical measures, making it easier to identify patterns, trends and outliers within the data.

Each boxplot displayed several critical statistical indicators, including the minimum, maximum and average ratings given by respondents. Additionally, the plots illustrated the interquartile range (IQR), which highlights the spread of the middle 50% of responses, as well as any outliers - responses that were significantly higher or lower than the majority. This visualization helped in understanding how scores were distributed across different stakeholder groups, revealing whether responses were clustered around a central value or showed significant variability.

By using boxplots, the system provided a clear and interpretable representation of satisfaction levels and other quantitative measures. This approach allowed stakeholders to quickly assess how different groups perceived various aspects of the pilot actions, identifying areas of consensus or divergence in opinions. The ability to compare distributions across different respondent categories (e.g. end-users vs. management) further enhanced the depth of analysis, enabling data-driven decision-making based on patterns in numeric feedback.

Keyword Frequency Analysis and Contextual Interpretation

As a final step in the analytical process, the system performed keyword frequency analysis to identify the most commonly used terms across all textual responses. This method provided insights into recurring themes and focal points within stakeholder feedback by quantifying word usage patterns. To ensure that only meaningful words were considered, common stopwords - such as “the”, “and” or “is” - were filtered out, allowing the analysis to focus on key terms that carried significant relevance to the discussion.

The frequency of each remaining keyword was calculated and the results were visualized using bar charts to provide a clear overview of which words appeared most frequently. In addition to the graphical representation, a separate textual listing was generated to highlight words that exceeded a predefined occurrence threshold, such as appearing at least four times within the dataset. This approach helped pinpoint terms that were consistently mentioned across multiple responses, indicating their importance to respondents.

To add further depth to the analysis, the system also extracted example sentences for each high-frequency keyword. These contextual snippets illustrated how stakeholders used specific terms within their feedback, ensuring that words were not only counted but also interpreted within their intended meaning. By combining quantitative keyword frequency analysis with qualitative contextual interpretation, this step provided a well-rounded understanding of the most prominent discussion points and concerns raised by respondents.

E RESULTS

The number of responses of pilot action 2 partners is illustrated in the following table:

Table 4 - Number of questionnaire responses

Project partner		Monitoring Round 1		Monitoring Round 2		In Total	
		End-users	*Management*	*End-users*	*Management*	*End-users*	*Management*
PP2	DIT	0	0	6	2	**6**	**2**
PP3	ISRAA	10	1	12	3	**22**	**4**
PP7	CVUT	1	1	6	2	**7**	**3**
PP8	NOELGA	7	4	10	8	**17**	**12**
PP9	EGTC Monitoring devices and SOS buttons	0	0	6	2	**6**	**2**
PP9	EGTC VR Solution	10	2	4	4	**14**	**6**

Source: own illustration

E1 PP1 - Deggendorf Institute of Technology; Germany

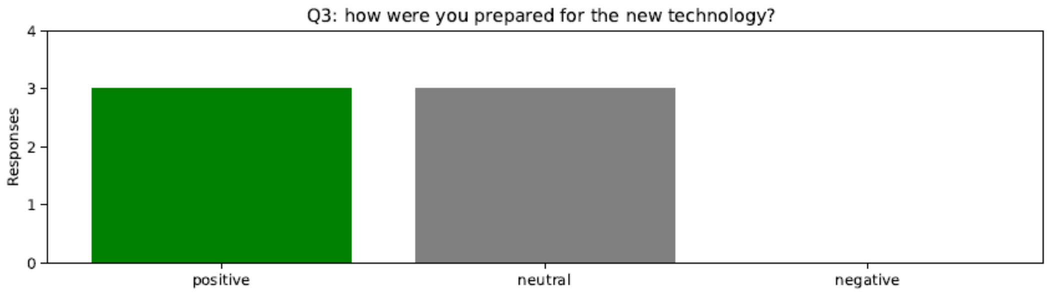
In the care facility of Project Partner 1, the “Hello Mirror” was implemented and tested. This health mirror is an interactive touchscreen device resembling a full-length mirror or a non-reflective display. It offers a range of digital applications for physical and cognitive exercises, such as strength training, memory enhancement and music therapy. Residents can use it independently or with caregiver support. The system requires only a power supply and does not depend on local Wi-Fi infrastructure. While no personal data is collected, usage frequency of each application is recorded for evaluation purposes. The tool also provides targeted exercises for caregivers, supporting occupational health initiatives.

E1.1 End-Users

The analysis of the end-user questionnaires regarding the implementation of the *Hello Mirror* reveals a largely positive overall picture, though several areas for improvement remain. The tool also aligns well with **organizational goals**. Many users described how it supported resident engagement and reduced the effort required to plan and implement group or individual activities. As one participant noted: *“Preparation time was eliminated for group offers or individual care, so there is more time for the residents”*. This reflects a direct contribution to person-centred care and time-efficient workflows.

The **training and preparation process** received a mixture of positive and neutral feedback. Many employees reported being introduced to the system by colleagues or supervisors and appreciated the opportunity to test the technology collaboratively before full implementation. Comments such as *"The colleague and superiors explained the device and tried them together"* and *"Get the introduction and tested by a colleague"* indicate a hands-on, team-based learning approach. However, the neutral ratings and occasional absence of more structured feedback suggest that more formal or comprehensive training materials might further enhance readiness and confidence.

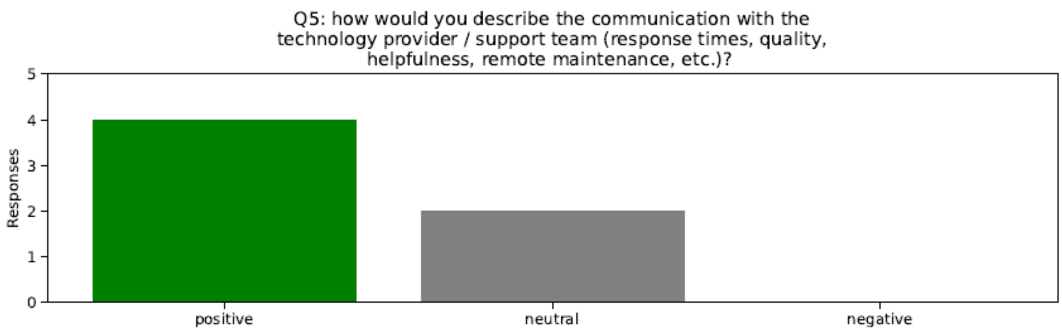
Figure 1 - PP1: Preparation of end-users



Source: Own Illustration

A particular strength of the implementation lies in **vendor support and collaboration.** Respondents who had contact with the provider highlighted the responsiveness and helpfulness of the support team. Statements such as *"Excellent, promptly"* and *"Contact details available on the mirror"* illustrate that vendor support was not only accessible but also perceived as efficient and effective. This level of responsiveness is vital in the early stages of digital tool adoption and significantly contributes to a smooth integration process.

Figure 2 - PP1: Vendor Support



Source: Own Illustration

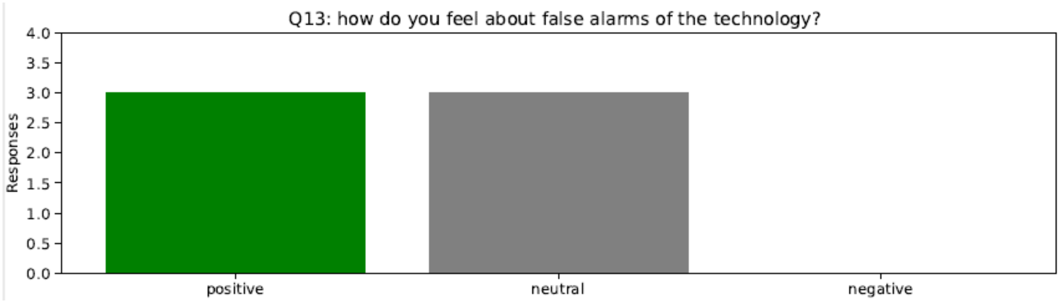
Privacy and data protection, on the other hand, were often perceived as either not relevant or not applicable. Responses like *"Does not apply"*, *"Is not relevant here"*, and *"Not relevant"* were common. This could suggest that the system does not require users to engage with sensitive data directly or that these aspects had already been addressed at an institutional level prior to rollout. However, sentiment analysis revealed a more neutral to slightly negative tone on this topic, implying that further clarification or communication regarding data handling and protection could alleviate uncertainty among staff.

Likewise, topics such as **resource allocation, budgeting, quality of implementation planning, and cost-effectiveness** were not directly addressed in the user responses. The absence of feedback may indicate that these aspects were neither problematic nor a primary concern for the operational staff surveyed. It is likely that these factors were managed at the administrative or project management level and thus fell outside the day-to-day experience of most respondents.

The **technical reliability and system availability** of the Hello Mirror were viewed very positively. No participants reported technical failures or the need for repairs. Typical responses included *"So far no failure"* and *"Did not happen yet"*, suggesting that the system is robust and does not interrupt care routines. This reliability is a critical success factor for any digital tool in healthcare, where continuity of care must be ensured.

However, **technical usability** received more mixed feedback. While many users praised the tool's usefulness and intuitive operation, others raised concerns about delayed touchscreen responses and physical risks associated with cables. Comments like *"Touchscreen often reacts delayed"* and *"Cable is a stumbling block"* suggest that minor hardware issues could hinder seamless integration or even pose safety concerns. Addressing these usability barriers will be essential to ensure sustained adoption and satisfaction.

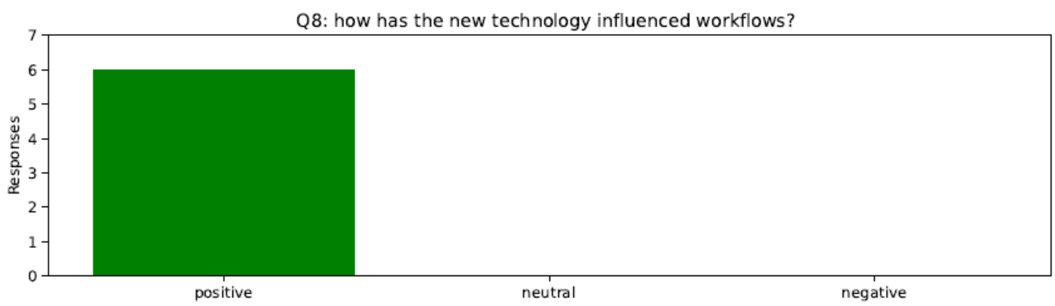
Figure 3 - PP1: False Alarms



Source: Own Illustration

Similarly, the effect of the Hello Mirror on **workflow efficiency** was among the most positively rated aspects of the implementation. Users frequently cited improved flexibility, ease of integration, and time savings. Phrases such as *"Relief and addition, integration mirror for group offers"* and *"Spontaneous activities can be carried out without great preparation"* underscore the practical benefits. Sentiment analysis confirmed this with exclusively positive evaluations (Figure 6), indicating that the tool not only fits well into everyday routines but actively enhances them, particularly in group-based care scenarios.

Figure 4 - PP1: Influence of workflows of end-users

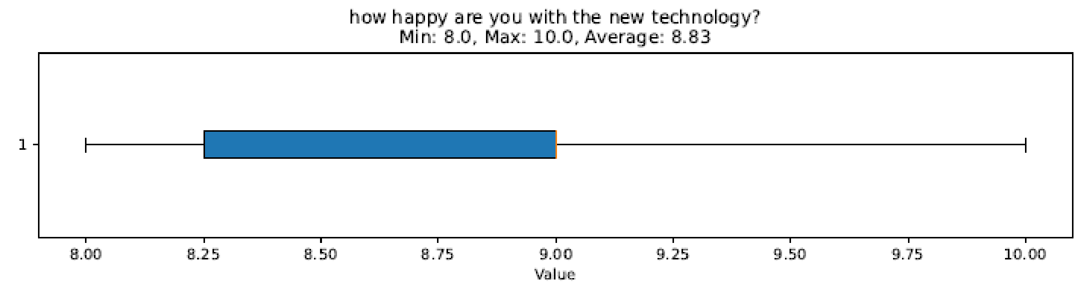


Source: Own Illustration

Despite these challenges, **user trust** in the technology remains high. Several users explicitly described the device as *"trustworthy"*, contributing to overall acceptance. Only one participant referred to it as *"confidential junk"*, a notable outlier. This generally high level of trust indicates that the technology has been well received and is seen as a reliable addition to daily practice.

User satisfaction was also notably high, with numerical scores ranging from 8.00 to 10.00. Descriptive feedback included phrases like *"Very good"*, *"The support is very good"*, and *"I enjoy using it"*. Word cloud analysis (Figure 2) and sentiment distribution charts corroborate this, reflecting strong overall approval and enthusiasm.

Figure 5 - PP1: End-user satisfaction



Source: Own Illustration

Reactions from residents were overwhelmingly positive. Keywords like *"fun"*, *"joy"*, and *"interesting"* appeared frequently, and direct quotes such as *"You have fun, can relax"* and *"The residents react happily and expectantly to the mirror"* illustrate the tool's engaging and entertaining nature. These responses suggest a significant contribution to improving quality of life and emotional well-being for residents.

Figure 6 - PP1: Wordcloud Residents Feedback

Source: Own Illustration

Although **scalability and sustainability** were not explicitly mentioned in the responses, the range of use cases described points toward promising potential for broader deployment. One participant commented: *"Device can be used individually. Structure can be preserved and the device is well integrated into everyday life"*. Such flexibility supports the notion that the system can adapt to different care environments and user needs.

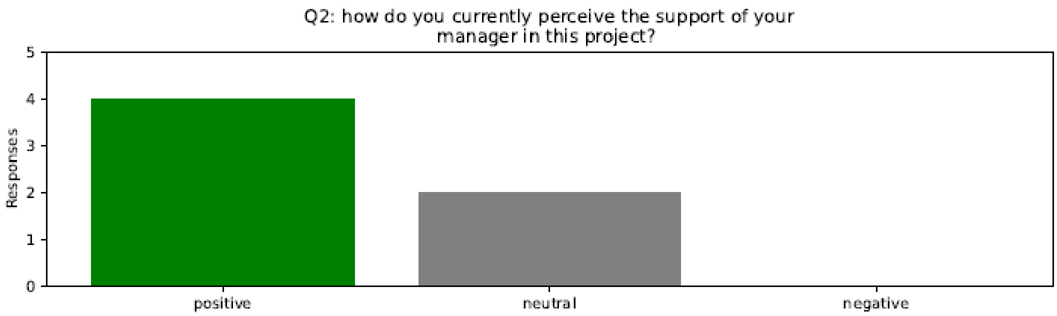
Metrics such as **automated alerts and notifications**, **ethical considerations**, and **formal guideline adherence** were not touched upon by respondents. This likely reflects the non-critical nature of the

Hello Mirror's current use case, which focuses on stimulation and engagement rather than clinical monitoring or decision-making.

However, **system customization and flexibility** were clearly perceived as strengths. The mirror was described as being usable for a variety of scenarios: *"Can be used individually"*, *"Integrated into everyday life"*, and *"Expansion of themed offers"*. Such adaptability ensures the system meets the diverse needs of different care settings and user profiles.

Finally, **management and team support** were major positive factors in the implementation's success. Feedback such as *"Always accessible"* and *"Support is very good"* indicates a strong foundation of leadership and team communication. Sentiment analysis of management support (Figure 4) confirms this, showing predominantly positive perceptions that likely boosted user motivation and acceptance.

Figure 7 - PP1: Support of management



Source: Own Illustration

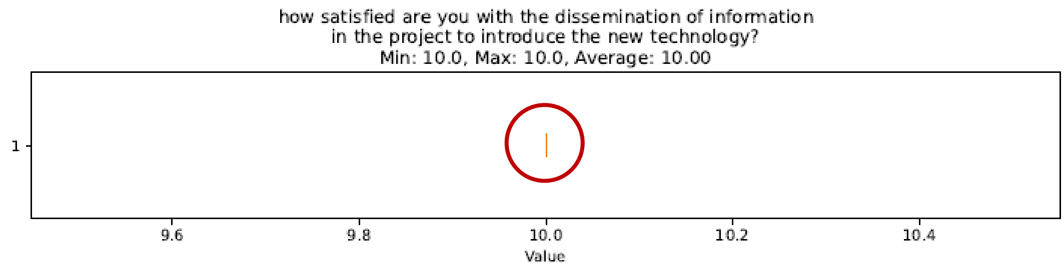
In conclusion, the Hello Mirror was implemented with a high degree of success. It was perceived as **useful, reliable, and enjoyable** by staff and residents. While certain **usability issues** (e.g. touchscreen delays and cable safety) and **communication around data protection** warrant improvement, the system's **positive impact on workflows**, **strong vendor and managerial support**, and **high user and resident satisfaction** suggest that it has substantial potential for continued use and future scaling within long-term care environments.

E1.2 Managers

The implementation of the *Hello Mirror* digital care tool has been met with **generally positive feedback from the management level**, reinforcing the positive sentiments expressed by end-users. The responses reveal a nuanced picture that highlights key successes in the rollout, while also identifying specific areas for improvement—particularly concerning usability, workflow adaptation, and support structures.

From the managerial point of view, the **dissemination of information and clarity of the implementation plan** were rated very positively. Numerical scores for the quality of implementation averaged **10.00**, suggesting that the initial rollout was perceived as smooth, well-organized, and free from major disruptions. Text-based responses did, however, mention that certain adaptations were necessary during the process—one respondent referenced a *"complete project destination change"*, indicating that some flexibility and adjustments were required during the project to ensure the success.

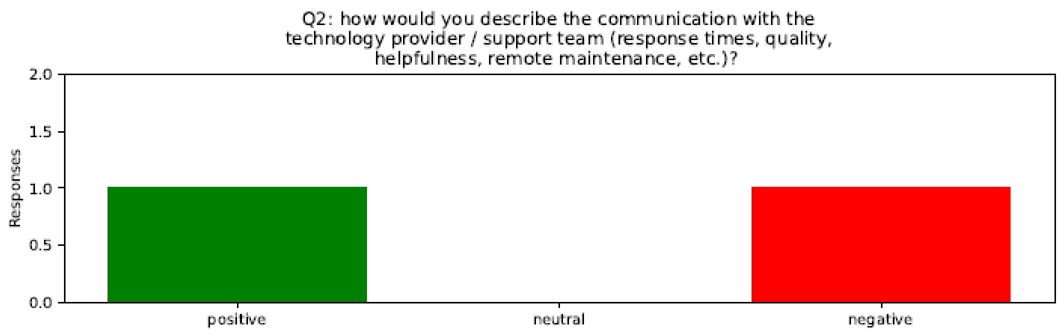
Figure 8 - PP1: Dissemination of information



Source: Own Illustration

Communication with the technology provider and support team was assessed with a more balanced tone. While some respondents had not directly interacted with the vendor *"Unfortunately I can't answer. No contact has been made yet"*—others praised the rapid feedback and responsiveness: *"Problems were processed very promptly - feedback was received very quickly"*. However, the graphical analysis and sentiment data suggest that while **there are positive elements**, the overall evaluation is **largely neutral**. There were subtle indications of weaknesses in **maintenance and support structures**, and optimizing these areas could further enhance satisfaction and ensure smoother long-term operation.

Figure 9 - PP1: Vendor Communication

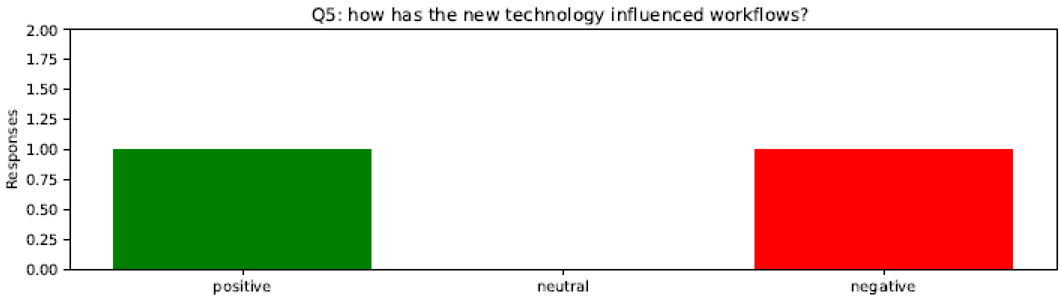


Source: Own Illustration

On the topic of **data protection and security**, the management responses conveyed a strong focus on legal compliance. One participant noted that *"All necessary measures are coordinated"*, while another listed specific mechanism such as *"Secure PC access, password guidelines, intranet use, and regulations on image processing"*. These detailed responses indicate that structured data security protocols were indeed implemented. Nevertheless, the analysis notes that it remains to be seen whether these measures will be considered sufficient as the system matures, especially in light of some remaining uncertainty about data transparency and interpretation—areas critical for sustained trust in data integrity and accuracy.

When asked about **workflow efficiency**, managers provided a mixed but generally constructive evaluation. One respondent noted *"Very good way to expand the support portfolio"*, while another emphasized *"much less preparation and follow-up time"*. These statements point to increased flexibility and reduced workload, aligning with the end-user perception. However, there were also references to **technical challenges and the need for more training**, suggesting that while the system has the potential to improve workflows, **additional staff support is required** to fully realize its benefits (Figure 15 - *Influence on Workflow*).

Figure 10 - PP1: Workflow influence of management

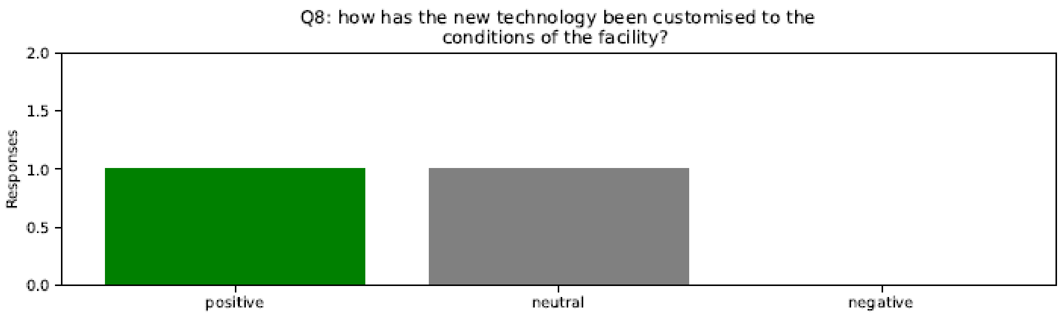


Source: Own Illustration

The system's **reliability and operational stability**, as measured through **Mean Time to Repair**, were highlighted as a notable strength. One manager mentioned that *"errors are remedied on a very short communication path"*, indicating that faults are addressed quickly and efficiently. Another confirmed that while issues are *"certainly annoying"*, they can be bridged. These responses suggest a system that performs reliably in practice, with manageable levels of disruption.

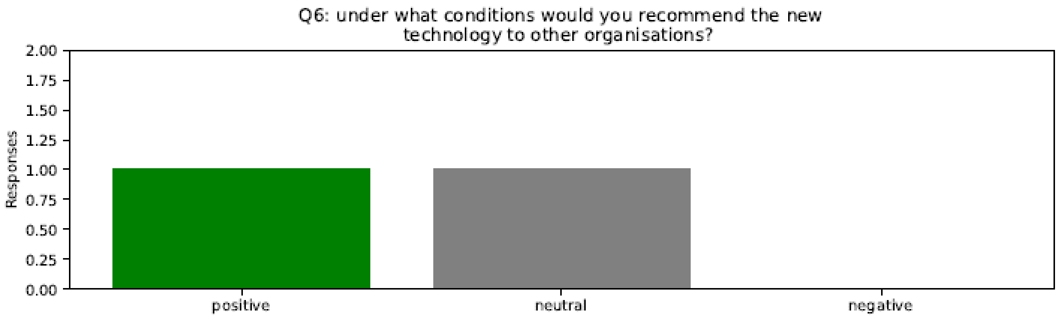
Regarding **system customization to the conditions of the facility**, feedback was largely positive. Managers noted that while no technical modifications were made, the procedural integration was strong: *"Technically not. In terms of procedure"*. Another noted: *"Due to the flexibility of the new technology, it can be integrated well into everyday life"*. These comments affirm that the Hello Mirror can be adapted to existing workflows without extensive technical redesign—highlighting its customization flexibility and future readiness.

Figure 11 - PP1: Customisation



Source: Own Illustration

Figure 12 - PP1: Recommendation to other organisations



Source: Own Illustration

Residents satisfaction was not directly addressed in the management responses, which likely reflects the scope of the questions focusing on project coordination and staff experience. However, this lack of data points to a potential gap in capturing resident perspectives—a relevant consideration for future evaluations.

In terms of **data availability and accessibility**, responses indicate that appropriate mechanisms are in place. References to *intranet access* and *secure login protocols* suggest that staff can access data reliably, which is essential for operational consistency and information flow.

Compliance with formal guidelines and legal requirements, particularly concerning data security, was addressed confidently. Respondents referred to coordinated measures and standard protocols, indicating that regulatory expectations were taken seriously and implemented systematically.

The responses also touched indirectly on **workforce satisfaction and retention**. Although the questionnaire did not explicitly ask about staff morale, the overall tone of the responses implies strong staff approval of the project. However, there were some mentions of usability challenges and adaptation efforts, which underscore the importance of providing ongoing support and training to ensure that staff feel confident and equipped to use the technology effectively.

Sentiment analysis of the management responses reflects a predominantly neutral tone, with 62.5% of comments categorized as neutral, 25.0% as positive, and 12.5% as negative. While these results suggest general acceptance without strong enthusiasm, the low percentage of negative feedback indicates that most concerns were manageable. Notably, areas like system maintenance and false alarms were mentioned as problematic, reinforcing the need for technical refinement to shift neutral evaluations toward more positive sentiment.

In conclusion, from a management perspective, the *Hello Mirror* was implemented successfully and with minimal friction. Key achievements include high-quality planning, legal compliance in data handling, prompt vendor support, and notable improvements in workflow efficiency. The system was found to be adaptable, reliable, and well-aligned with institutional goals, though technical usability and staff training require further attention. While most feedback was neutral, the combination of smooth deployment, flexibility, and operational reliability suggests a strong foundation for long-term success and potential scalability. With strategic refinements—particularly in support infrastructure, usability, and internal communication—the Hello Mirror is positioned to become a valuable, enduring asset in digital care delivery.

E2 PP3 – Institute for older care and sheltered Homes; Italy

This project partner tested “ANCELIA's” intelligent sensors, which enable real-time remote monitoring of multiple residents, giving staff immediate insights into individual conditions. The ANCELIA solution is an integrated care technology composed of several smart components designed to enhance elderly care through automation and data-driven decision-making. At its core is an optical sensor equipped with artificial intelligence, which autonomously monitors various aspects of residents’ well-being—such as fall risk, presence in bed or room, and body posture. Complementing this, the Carer App delivers real-time alerts to caregivers, enabling prompt and targeted interventions when a resident is in need. For managerial oversight, the Manager App compiles comprehensive reports on both resident status and care actions, supporting data-informed administrative decisions.

What makes ANCELIA particularly impactful is its AI-driven adaptability. The system can tailor alerts and monitoring preferences to individual needs, thereby preventing falls and offering valuable behavioral insights. These insights help in delivering personalized care and optimizing the efficiency of caregiving staff. Additionally, it provides retrospective analytics on conditions, alerts, interventions, and response times, ultimately elevating the quality of care.

As part of its implementation, ANCELIA sensors have been installed across 32 beds in the "Nucleo Sole" unit at the Zalivani Institute. This unit specifically serves women with moderate to severe dementia, marking a significant step in integrating intelligent monitoring into dementia care environments.

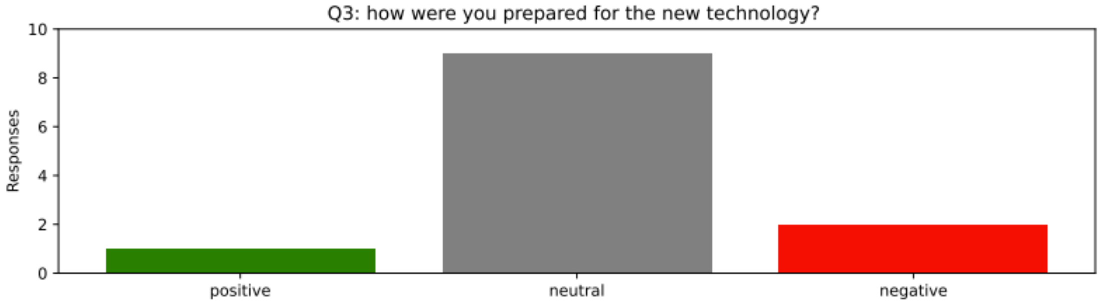
The solution personalizes care by tracking residents’ conditions and habits while providing managers with objective data to assess care quality.

E2.1 End-Users

The implementation of ANCELIA's intelligent sensor system was evaluated based on feedback from end-users. The responses provide key insights into various pre-defined metrics, including vendor support, data protection, workflow efficiency, user satisfaction and trust.

The feedback on **information dissemination** and **training** was mostly positive. Most respondents rated their satisfaction with the dissemination of project-related information above average, indicating that the communication was effective. Users highlighted that training sessions, follow-up meetings and structured courses played a crucial role in preparing them for the new technology. However, some responses indicate that additional training efforts might be required to further improve understanding.

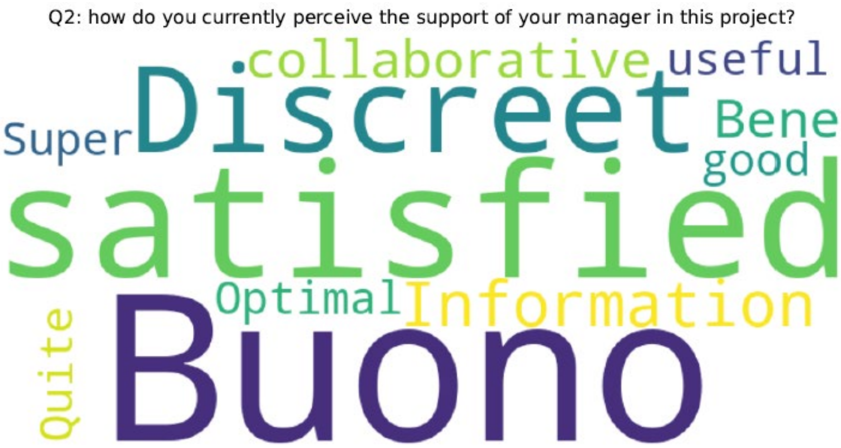
Figure 13 - PP3: Dissemination and Training for end-users



Source: Own Illustration

The perception of **managerial support** varied among respondents, with some describing it as discreet or sufficient, while others found it to be collaborative and informative. This suggests that managerial engagement in the project was not uniform across all staff members. The Wordcloud for the question of the support of their managers shows that "good", "collaborative", "discreet" and "support" as common terms. This suggests that while some staff members found managerial support effective and cooperative, others perceived it as less engaged. The presence of the word "discreet" indicates that some employees felt management's involvement in the project was minimal. This suggests a need for more proactive and visible managerial support to reinforce staff confidence in the implementation process.

Figure 14 - PP3: Management support for end-users



Source: Own Illustration

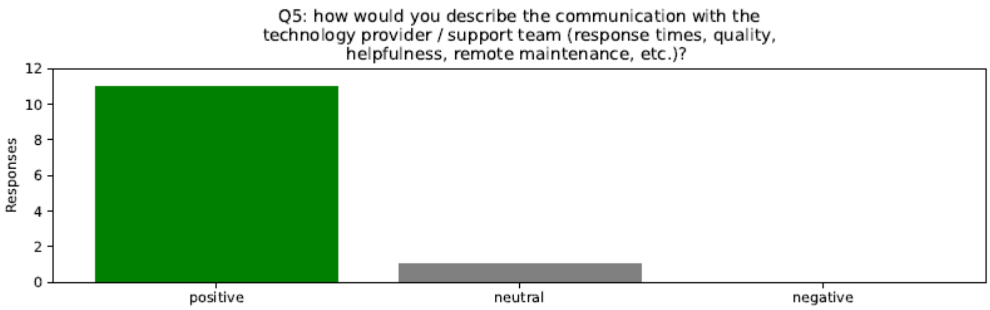
When it comes to **data protection**, there was a range of responses. Some staff members acknowledged the presence of informed consent and legal requirements, while others were uncertain about the measures in place. This discrepancy highlights the need for additional communication and transparency regarding data security policies. Trust in the technology itself was relatively high, with many respondents describing it as trustworthy or having room for improvement.

Most users reported that **technical failures** were rare and when they did occur, they were resolved in a short time. Some noted that issues were fixed as soon as they were reported, indicating an efficient maintenance process. The feedback on false alarms was mixed - while some found them minimal, others suggested improvements to reduce them further.

Some end-users identified **prejudices and adaptation difficulties** as challenges in adopting the technology. A few responses indicated concerns about the concrete applicability of the system in daily work, suggesting that further hands-on experience and adaptation time might be necessary.

On the **vendor support** side, feedback was generally positive, with users emphasizing quick response times, availability and collaboration. This reflects a strong partnership with the technology provider, which is crucial for smooth implementation and adoption. The sentiment breakdown for the communication with the provider / support team was overwhelmingly positive, with 11 positive responses and only 1 neutral response. No negative feedback was recorded. This confirms that the majority of staff found vendor communication effective, professional and timely. The lack of negative responses indicates a high level of satisfaction with the provider's support, which is a critical factor in the smooth implementation of any digital solution.

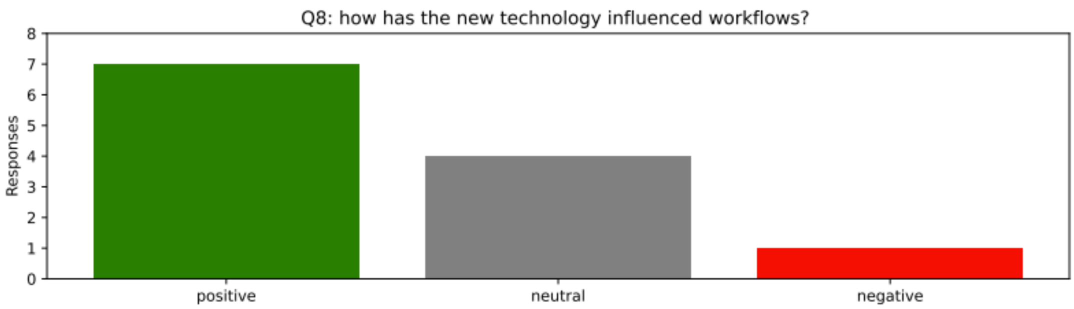
Figure 15 - PP3: Communication with support



Source: Own Illustration

The introduction of the new technology positively influenced **workflow efficiency** for most users. Many respondents mentioned that it helped optimize staff workload, improve safety and support care tasks. However, a small number of users reported no significant changes, which may indicate differences in how the technology is integrated into various job roles.

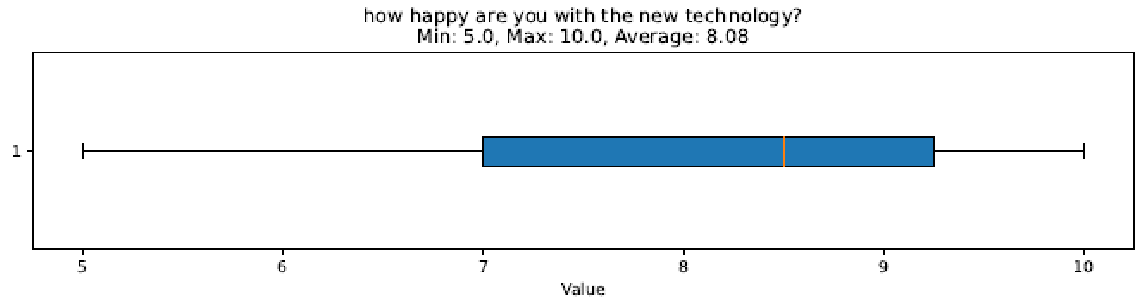
Figure 16 - PP3: Workflow influence of end-users



Source: Own Illustration

User satisfaction with the technology was generally positive, with most respondents giving above-average ratings. The answers ranged between 5 and 10, with an average rating of 8.08. This suggests that the majority of users are satisfied with the technology, with many respondents rating their happiness in the upper range (9-10). The minimum score of 5 indicates that a small number of users were less impressed, but no extreme dissatisfaction was reported. The absence of extreme outliers confirms that even the least satisfied respondents did not completely reject the technology. Instead, their responses likely reflect mild reservations or areas where they believe further refinements are needed.

Figure 17 - PP3: Satisfaction of end-users



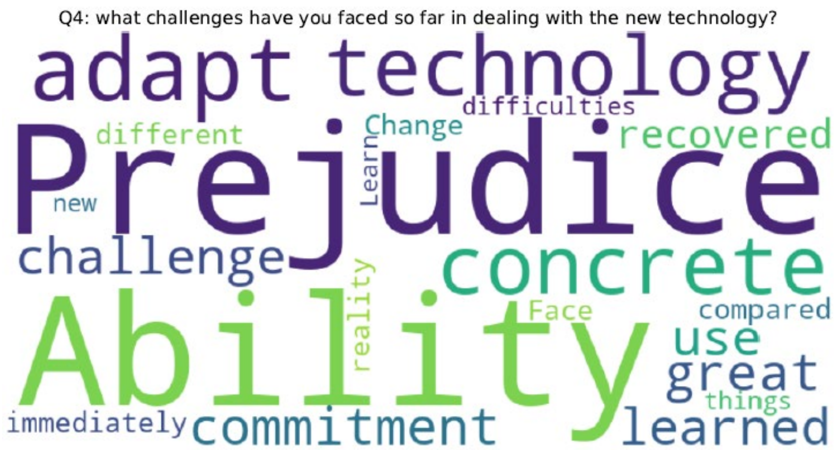
Source: Own Illustration

The **feedback from residents** was mixed, some mentioned quick responses to their needs, while others indicated no particular feedback. This suggests that while the technology enhances staff efficiency, its direct impact on resident perception may need further assessment.

Regarding **data entry**, most responses indicate that it requires only a few minutes, making it a relatively efficient process. However, one response suggested that the task is assigned to specific professionals, which might mean that some staff members do not engage with the data entry process directly.

Regarding the **challenges** of the implementation and the system the answers “adaptation”, “prejudice”, “concrete” and “difficulty” frequently appeared in responses. This highlights that some staff members faced challenges in adapting to the new system, either due to personal reservations, technological unfamiliarity or concerns about practical application. The mention of “concrete” suggests that some employees struggled to see the immediate practical benefits of the system. These findings reinforce the importance of continuous training and support to ease the transition.

Figure 18 - PP3: Challenges of end-users



Source: Own Illustration

One key insight from the overall sentiment analysis is that neutral responses (62.9%) were the most common category. This suggests that many staff members acknowledged the technology’s presence but were either indifferent toward it or still in the process of adapting. This neutrality may indicate a need for further training or demonstrations of the system's full potential to increase engagement.

Key challenges include initial adaptation difficulties, scepticism and concerns about practical application in daily routines. While many respondents reported improved efficiency, a notable portion saw no significant change, indicating that workflow benefits may vary depending on job roles. Additionally, false alarms were a concern, though improvements have reportedly reduced their frequency. To enhance adoption, stronger managerial involvement, targeted training and ongoing vendor support are recommended. Further refinements in alarm accuracy, clearer communication on data protection and workflow optimization will also help maximize benefits. Overall, the technology has had a positive impact, but continued improvements will ensure greater acceptance and long-term success in the care environment. Overall, the technology optimizes care delivery by improving response times, safety and workflow efficiency, but ongoing refinement will further enhance user confidence and effectiveness.

E2.2 Managers

From the view of the managers, the implementation of ANCELIA's intelligent sensor system suggest that the implementation was largely successful, though some areas require further assessment and refinement.

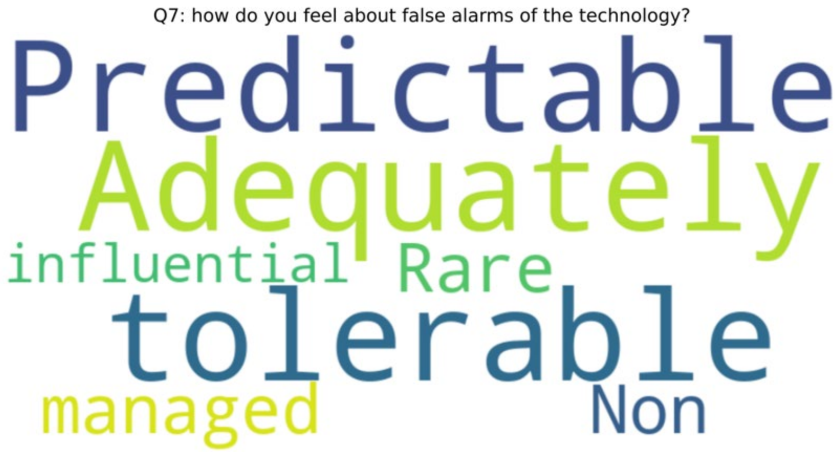
Regarding **vendor support and collaboration**, no explicit feedback was provided on the quality of communication. While this could indicate a smooth integration process without major issues, it also suggests that opportunities for improvement in vendor responsiveness and support might not have been fully explored.

In terms of **data protection**, the facility implemented various measures, including the involvement of the Data Protection Officer, agreements with trade unions and documentation for family members. These steps indicate a strong commitment to compliance, but their practical effectiveness in ensuring data security.

The overall positive perception of **workflow improvements** suggests potential cost efficiencies, particularly in reducing unnecessary interventions and optimizing staff workload. Workflow efficiency was positively impacted, with management highlighting better control over resident conditions and a noticeable reduction in staff noise levels during night shifts. These findings indicate that the technology was successfully integrated into daily operations without disrupting established caregiving routines.

Trust in data accuracy and integrity appears strong, as responses regarding **false alarms** were overwhelmingly positive. The alarms were described as predictable, tolerable and even rare, suggesting that the system operates with a high degree of reliability. The ability to customize alarm settings was particularly appreciated, further reinforcing confidence in the system's functionality.

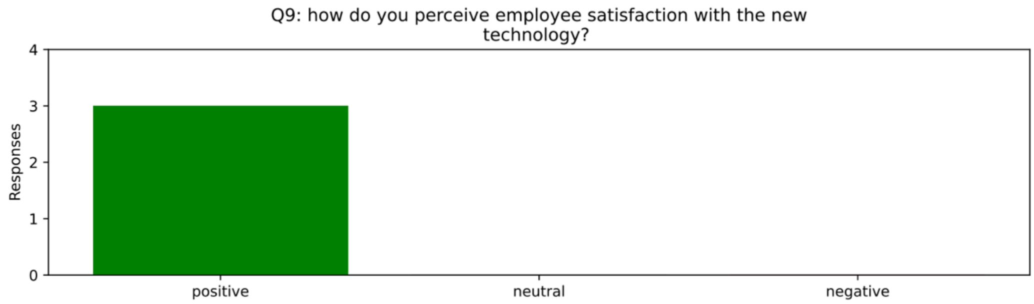
Figure 19 - PP3: False alarms from managers view



Source: Own Illustration

Employee satisfaction with the technology was consistently rated as good or positive, implying a generally favourable reception among staff. However, the lack of detailed feedback leaves questions about whether the system has reduced workload stress or introduced usability challenges.

Figure 20 - PP3: Employee satisfaction from managers view



Source: Own Illustration

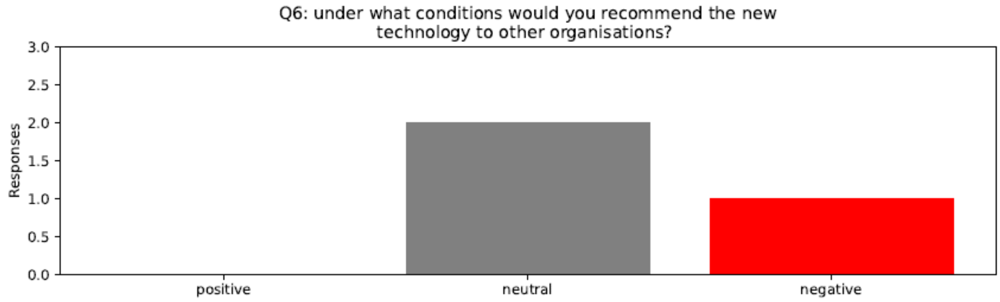
The alignment with **organizational goals** appears strong, as the technology enhances efficiency, monitoring and care delivery. However, some concern was raised about maintaining the balance between automation and the human aspect of caregiving.

Automated alerts and notifications were well received, particularly the ability to customize alarm settings to fit the facility's needs. Periodic fine-tuning of alert parameters based on real-world usage patterns could further optimize their effectiveness.

Ethical considerations were raised regarding the risk of technology replacing human caregiving. This concern highlights the importance of ensuring that digital monitoring enhances rather than diminishes personal interaction between caregivers and residents.

For the question "Under what conditions would you recommend the new technology to other organizations?", the responses varied but leaned toward neutral to slightly negative sentiment. One respondent simply stated "The same", indicating no special conditions for recommendation, which is a neutral response. Another respondent mentioned, "As long as it does not replace the component of assistance", suggesting a concern that technology should not substitute human caregiving - this introduces a cautious, slightly negative undertone. The third response, "Support to operators in ordinary work", is more positive, implying that the technology provides beneficial assistance. The overall sentiment is mixed, reflecting optimism about the system's utility and concerns about its role in caregiving.

Figure 21 - PP3: Facility recommendation



Source: Own Illustration

From a broader perspective, the sentiment analysis across all textual responses showed that 75% were neutral, 20.8% positive and only 4.2% negative. This suggests a generally cautious but slightly optimistic stance from management. The fact that employee satisfaction was fully positive while recommendations for implementation elsewhere were mixed indicates that while the technology is well-accepted internally, external recommendations are given with caveats.

Overall, the implementation of ANCELIA's intelligent sensor system has led to significant improvements in workflow efficiency, staff satisfaction and monitoring reliability. While the technology appears to be well-integrated into the facility's operations, areas such as cost efficiency, scalability and direct resident impact require further evaluation. By addressing these aspects, the organization can maximize the benefits of digital monitoring while ensuring that care remains resident-centred and ethically balanced.

The neutral sentiment across most responses indicates that while there are benefits, there is no overwhelmingly strong endorsement of the system as a transformational solution. The frequent references to customization, alarm settings and workflow adaptations suggest that while the technology has been integrated effectively, it still requires careful management to align with caregiving best practices.

In conclusion, while the implementation has been largely successful in improving operational efficiency and staff satisfaction, the cautious stance on broader recommendations highlights the need for ongoing assessment and optimization.

E3 PP7 - Czech Institute of Informatics, Robotics and Cybernetics of the Czech Technical University in Prague; Czech Republic

In the Czech Institute of Informatics, Robotics and Cybernetics of the Czech Technical University in Prague different tools have been implemented, tested and adopted. The aim of all the pilots was to test and analyse the benefits and complications of deploying technology to increase safety and improve clients' sense of care.

The first system was a sensor subsystem, which was contributed to increased client security by monitoring the state of the environment and the clients in it. This should help to immediately alert staff when something happens.

The second system have been cognitive games, which aimed to keep seniors active. The data could be recorded and used for analysis of possible changes in cognitive abilities. This also should help the staff in assessment of the client´s cognitive state.

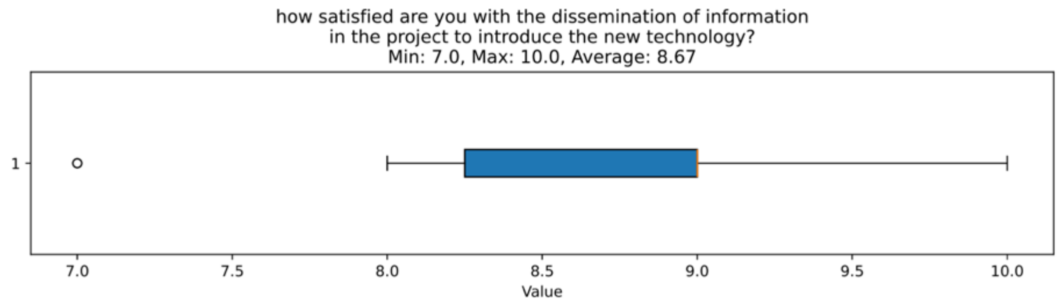
The third system was a petbot to act as an intelligent reminder. It was tested in a day care facility. This solution is not yet on the market but is being tested by potential users. This solution could contribute to a more active behaviour of the clients.

E3.1 End-Users

The implementation of digital technologies aimed to enhance client safety and cognitive engagement while assisting staff in their assessments. Based on the responses from employees involved in the project, various key aspects have emerged, which are analysed below according to predefined evaluation metrics.

The responses indicate a generally positive reception toward the new technologies. When asked about their overall happiness with the technology, ratings ranged from 7 to 10, suggesting a high level of **satisfaction**. The staff acknowledged the added value of cognitive games and the petbot, which provided entertainment and engagement for residents. However, some respondents mentioned minor frustrations related to technical glitches, showing room for improvement in refining the applications.

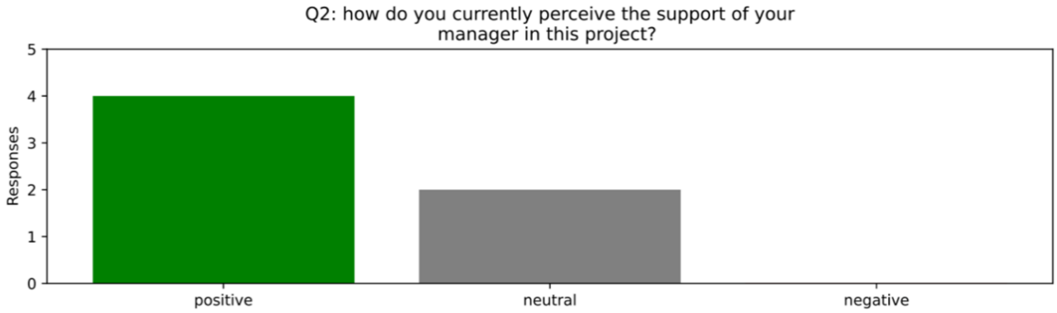
Figure 22 - PP7: Satisfaction of end-users



Source: Own Illustration

The perception of **managerial support** was mostly positive, with comments highlighting an inclination toward innovation and openness to technological advancements. However, a few respondents noted that while the management was supportive, the preparatory phase was insufficient.

Figure 23 - PP7: Support of management



Source: Own Illustration

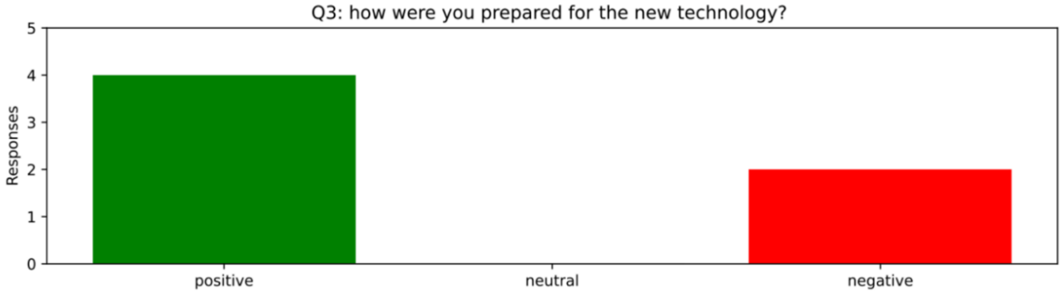
Communication with the **technology provider** was generally rated as satisfactory or very good, with prompt responses from the support team. The users appreciated the responsiveness and helpfulness of the technology provider. Words such as *"very good communication"*, *"creators were responsive"* and *"satisfactory support"* indicate that the provider maintained a high level of engagement with the end-users.

Figure 24 - PP7: Communication with provider

Source: Own Illustration

A significant challenge noted was the limited preparation for using the new technology. Several respondents mentioned that **training** was either minimal or non-existent, with some learning only through practical demonstrations. While certain users felt that the technology was intuitive enough to require little formal training, others expressed the need for more structured guidance to facilitate smoother adoption.

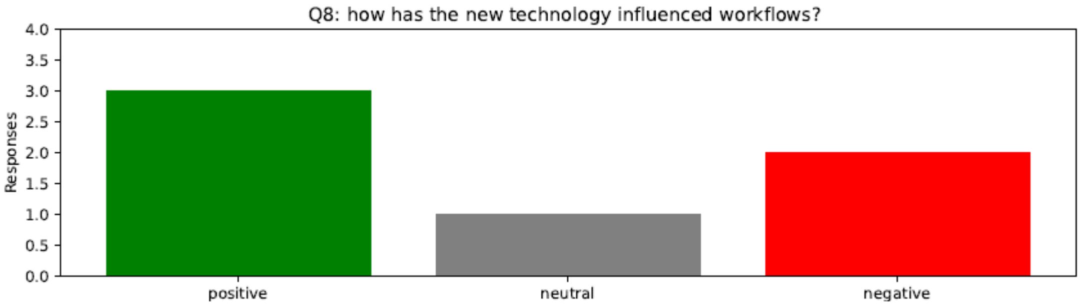
Figure 25 - PP7: Preparation of technology



Source: Own Illustration

One of the major **workflow impacts** was the transition from traditional methods, such as paper-based cognitive exercises, to digital alternatives. While this was generally seen as an improvement, some users noted difficulties in remembering how to operate the new systems. While three respondents provided positive feedback, indicating improvements in efficiency and engagement, two users expressed concerns, highlighting challenges in adapting to the new system. Some users found it difficult to adjust to the new workflow, especially in remembering how to operate the system. There were minor technical issues that hindered smooth adoption. But also the digital transformation allowed more structured and streamlined operations, particularly in cognitive gaming applications.

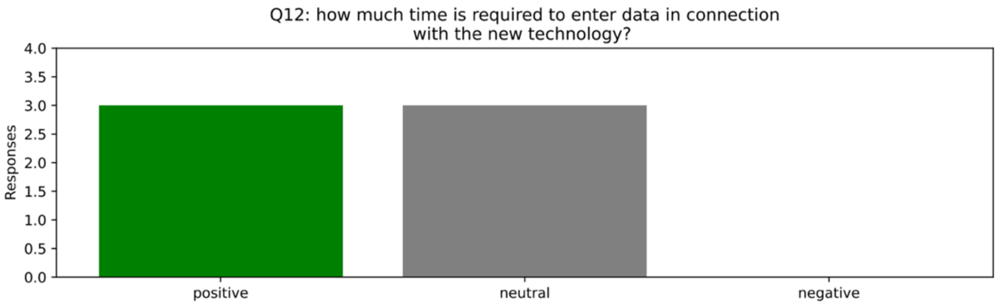
Figure 26 - PP7: Influence on workflow of end-users



Source: Own Illustration

The **Data entry** was not a major concern since the applications, in their experimental stage, did not require substantial input from users. This suggests that automation played a role in reducing administrative workload, a positive factor for workflow efficiency.

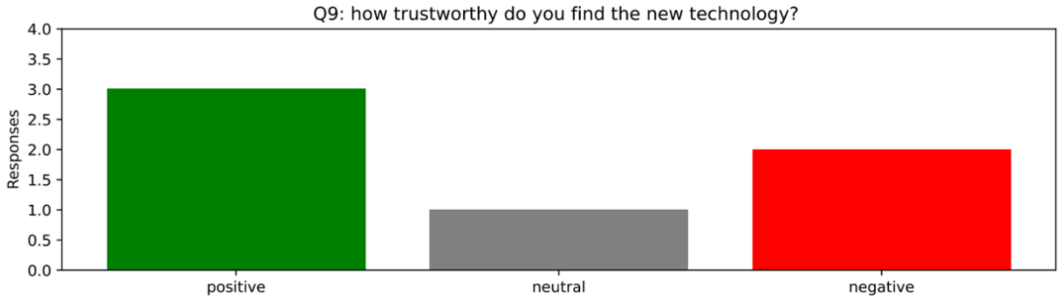
Figure 27 - PP7: Time required to enter data



Source: Own Illustration

The **trustworthiness** of the new technologies received mixed feedback. While some users expressed confidence in the systems, others were unsure of their reliability. The petbot, in particular, was perceived as engaging, but its effectiveness in providing reminders and contributing to active behaviour remained uncertain. Some scepticism regarding the technology's reliability suggests a need for further refinement and increased transparency regarding system functions.

Figure 28 - PP7: Trustworthy from end-users view



Source: Own Illustration

One area lacking sufficient feedback was the time required to **repair the technology after failures**. Many responses left this question unanswered, indicating that either there were no significant malfunctions or that repair processes were not clearly communicated. The main technical challenge cited was the inconsistency of certain application features, reinforcing the need for ongoing development and debugging efforts.

Data protection measures were a concern, as many respondents either did not know what steps were taken or indicated that none were necessary. This suggests a potential gap in awareness regarding data security policies.

Little feedback was available on **false alarms**, making it difficult to assess the reliability of automated alert systems. As these features are crucial for ensuring timely interventions, further evaluation is recommended to determine their accuracy and minimize unnecessary disruptions.

The sentiment analysis of key questions regarding communication, workflow influence and trust in technology reveals important insights into the implementation of digital tools at the Czech Institute of Informatics, Robotics and Cybernetics. Overall, communication with the technology provider was rated very positively, with users appreciating the responsiveness and support received, indicating strong vendor collaboration. However, the impact of the new technology on workflows received mixed feedback. While some users found it beneficial in reducing paperwork and increasing engagement, others faced challenges in adapting to the system and experienced minor technical issues. Similarly, trust in the technology varied, with some users expressing confidence in its reliability, while others remained sceptical about its consistent performance and data security.

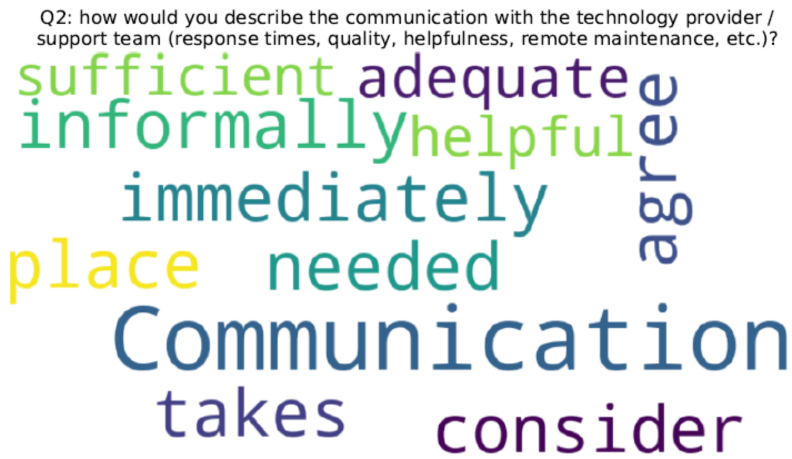
The implementation of digital tools at this facility has shown promising benefits, particularly in improving client engagement and providing additional support for staff. Key strengths include high user satisfaction, strong managerial support and positive vendor collaboration. However, challenges such as limited training, occasional technical issues and uncertainty regarding data protection must be addressed.

E3.2 Managers

The analysis of the management responses regarding the implementation of digital technologies at the Czech Institute of Informatics, Robotics and Cybernetics reveals a complex interplay between expectations, challenges and ongoing adjustments.

The responses indicate an overall satisfactory level of **communication with the technology provider**. The word cloud highlights key terms such as "informally" and "agree immediately", suggesting that communication is occurring on an ad-hoc basis rather than through structured channels. Terms like "adequate" and "sufficient" indicate that, while the communication is functional, it may not be highly proactive or systematically organized. The frequent appearance of the word "cooperation" implies ongoing collaboration between the institution and the technology provider. Overall, the responses suggest that communication is generally perceived as adequate but remains informal and could benefit from a more structured approach to enhance efficiency - particularly as the technology transitions from testing to full implementation.

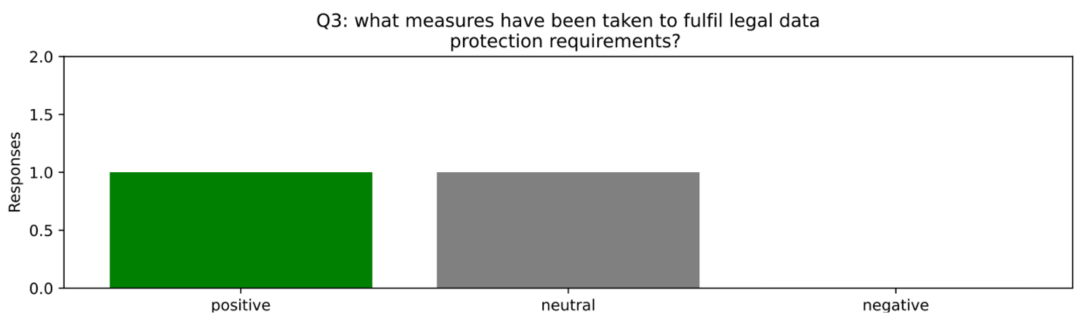
Figure 29 - PP7: Communication with provider / support from managers view



Source: Own Illustration

Legal compliance regarding **data protection** remains a work in progress. One response highlights that different types of technologies are being analysed for compliance, whereas another admits that the question has not yet been fully addressed.

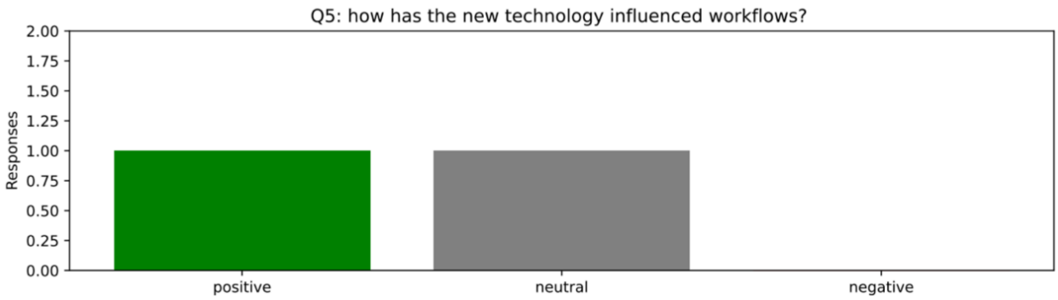
Figure 30 - PP7: Data protection requirements from managers view



Source: Own Illustration

Implementation has required ongoing negotiations, suggesting a flexible yet uncertain timeline. **Workflow integration** remains a challenge as the technology is still in development and staff are primarily involved in testing rather than fully adopting the system. This aligns with the initial expectation that more staff effort would be required during the early stages of deployment.

Figure 31 - PP7: Influence on workflows from managers view



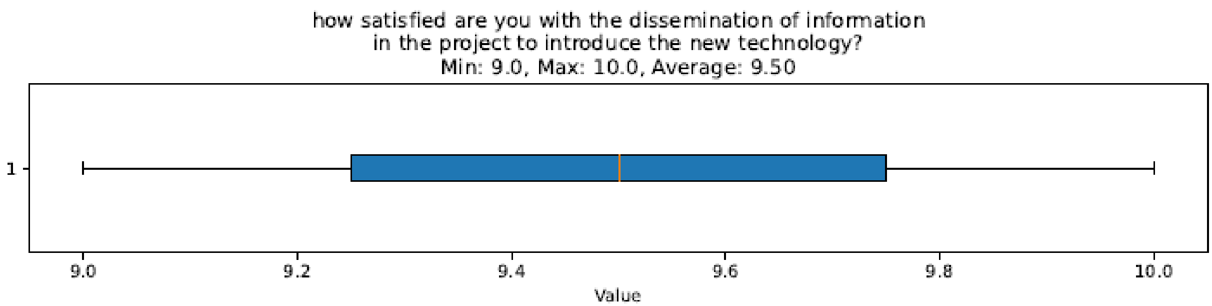
Source: Own Illustration

Customization appears to be an iterative process. Responses indicate active cooperation to tailor the technology to facility-specific needs. This reflects a positive engagement between the institution and technology developers, ensuring that the solutions align with operational requirements.

False alarms remain an area of concern, with management noting that it is an ongoing subject of examination and continuous resolution. This highlights the importance of refining sensor accuracy to build trust among staff and reduce potential inefficiencies caused by unnecessary alerts.

The boxplot for the question "How satisfied are you with the **dissemination of information** in the project?" reveals, that a minimum score of 9.0 and a maximum of 10.0, indicating that all responses were highly positive. The average score of 9.50, reinforcing that respondents felt well-informed about the project. The information dissemination has been well-received, with respondents expressing near-unanimous satisfaction. This suggests effective internal communication about the project's progress and goals, which could contribute to smoother implementation.

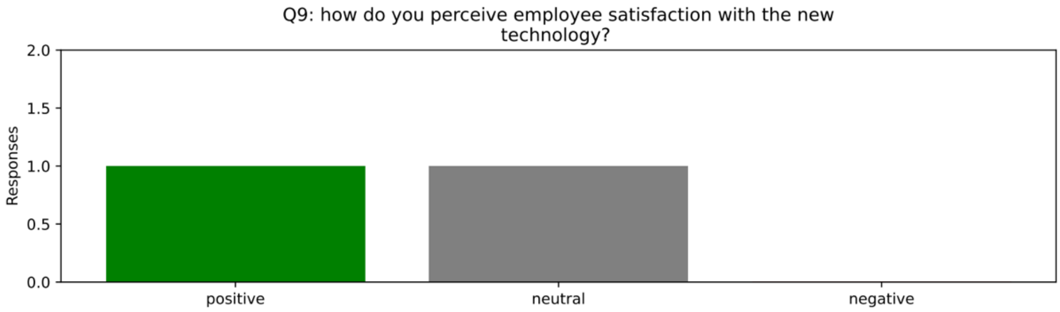
Figure 32 - PP7: Satisfaction of managers



Source: Own Illustration

Employee satisfaction appears to be mixed. One response notes that the staff sees the project as a developmental effort rather than an immediately useful solution. However, another response indicates that employees have been cooperative and open to testing new tools. While this suggests a general willingness to engage, long-term acceptance will likely depend on whether the technology ultimately enhances efficiency rather than adding to their workload.

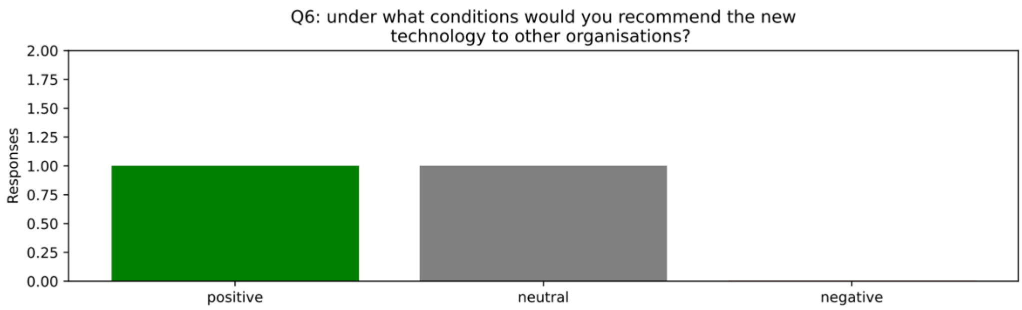
Figure 33 - PP7: Employee satisfaction from managers view



Source: Own Illustration

The responses suggest that the technology is still in an experimental phase, which may limit immediate **scalability**. While there is recognition of its potential benefits, the management acknowledges that continuous refinements are necessary before recommending it to other organizations. This cautious optimism indicates that while the project holds promise, its long-term viability will depend on addressing current challenges.

Figure 34 - PP7: Recommendation from managers view



Source: Own Illustration

The analysis of the management responses provides a comprehensive view of the implementation process, including sentiment trends, keyword frequencies and numeric evaluations. Key findings indicate a generally positive but cautious perspective on the new technology.

The implementation of digital technologies in the Czech pilot project is progressing with cautious optimism. Most responses from management are neutral to positive, highlighting key themes such as helpfulness, cooperation and active involvement. While information dissemination has been highly effective, communication with the technology provider remains largely informal and would benefit from more structured processes. Data protection compliance is still under development, posing a critical challenge that must be addressed. The technology is in a testing phase and while customization is ongoing, its full impact on workflows is not yet clear. False alarms remain a concern and although the staff is cooperative, the system is still seen as a work in progress.

To ensure long-term success, several aspects need focused attention: structured collaboration with vendors, clear implementation strategies, improved sensor reliability, legal data protection compliance and continued employee engagement through training and communication. Overall, the project shows strong potential to enhance resident safety and cognitive support, provided these technical and operational areas are further refined.

E4 PP8 – Health Agency of Lower Austria; Austria

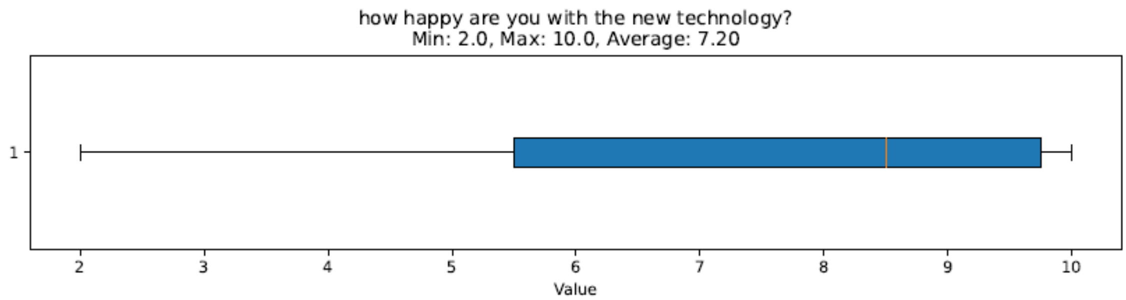
The implemented technology of the Health Agency of Lower Austria is a modular, AI-driven system designed to improve safety and care efficiency in healthcare environments - particularly in fall prevention. At the heart of the solution is a 3D smart sensor that operates using infrared technology. Unlike traditional camera systems, this sensor projects an invisible infrared matrix to detect and analyses movements by capturing depth data, which it converts into spatial coordinates. The embedded artificial intelligence processes this data in real-time, allowing for immediate recognition of critical events such as falls and instantly triggers alerts to the care team.

E4.1 End-Users

The implementation of the digital fall sensors in the healthcare facility has yielded mixed results based on the feedback from end-users. While there are positive aspects, including improved monitoring and a perceived increase in resident safety, several challenges have been highlighted that impact the effectiveness and overall acceptance of the technology.

One of the most significant factors in determining the success of the new system is **user satisfaction**. Responses indicate that while some staff members are happy with the new technology, others have expressed concerns. The box plot analysis shows that the minimum reported score was 2, the maximum was 10 and the average satisfaction rating was 7.2. The relatively high average score suggests that most users are generally satisfied with the technology. However, the presence of outliers with low ratings indicates that some users had negative experiences. A key issue appears to be the level of preparedness and training received before the implementation. Some respondents indicated that the training was “short but sufficient”, while others felt that they were not adequately prepared for using the system effectively. This discrepancy suggests that different roles within the organization may require varying levels of training and that a one-size-fits-all approach might not be effective.

Figure 35 - PP8: Satisfaction of end-users



Source: Own Illustration

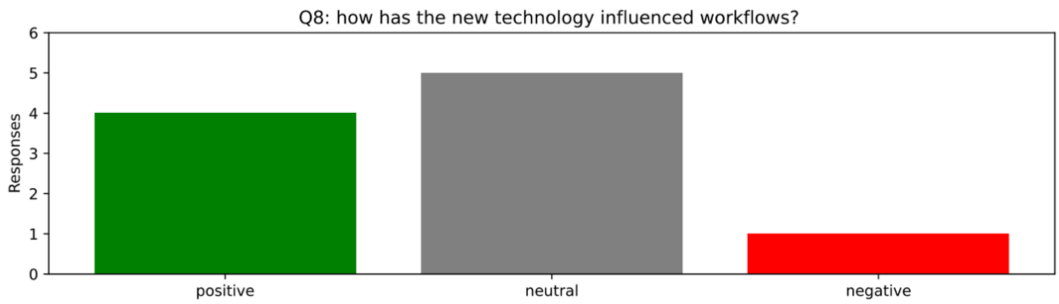
Trust in the system’s accuracy and reliability also plays a crucial role in the staff’s willingness to adopt the new technology. While a few users described the system as “very trustworthy”, others indicated that there were disturbances and that the technology was “not 100% reliable”. This perception of inconsistency could be linked to technical issues such as false alarms or system malfunctions, which were also noted in the responses. False alarms were a recurring concern among respondents, as they can cause unnecessary stress for staff and disrupt workflows.

Figure 36 - PP8: Trust of end-users

Source: Own Illustration

Regarding **workflow efficiency**, the responses suggest that the system has positive and negative impacts. Some respondents acknowledged that the technology "plays a big role" in their daily operations, while others indicated that "there are always disturbances" or that "the settings do not work". This suggests that while the system has the potential to improve workflow by providing real-time alerts and monitoring, it also introduces new challenges that need to be addressed. Customization of the system to better align with the specific needs of the facility could help mitigate these issues and improve user experience.

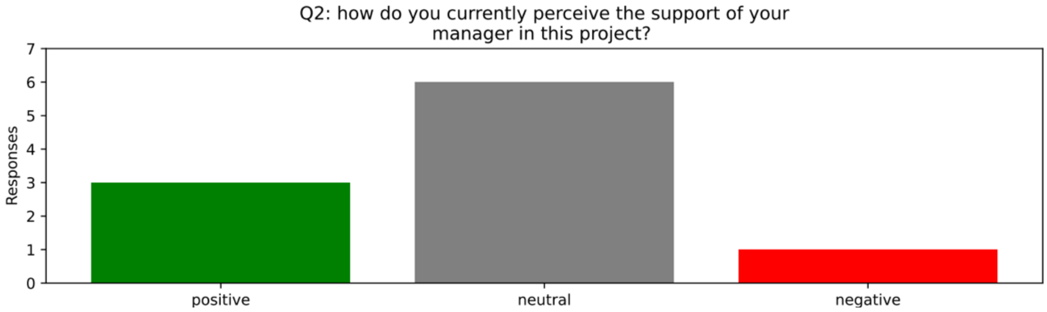
Figure 37 - PP8: Influence on workflow of end-users



Source: Own Illustration

Support from management and the technology provider is another key area where opinions were divided. Some users felt supported by their managers in the implementation of the system, while others did not mention any particular managerial involvement. The responses regarding vendor support and collaboration indicate that communication with the technology provider was inconsistent, because if there have been problems, the management has contacted the provider directly.

Figure 38 - PP8: Support of management

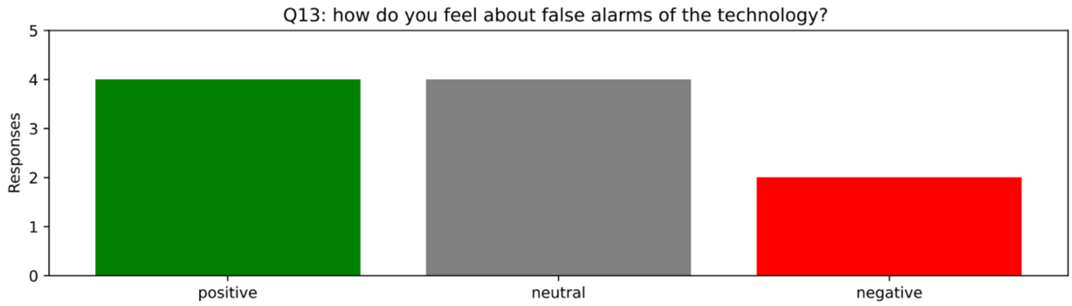


Source: Own Illustration

Data protection and legal compliance were areas where responses were more limited. Some staff members indicated that they had “no experience in this regard”, which suggests that either data protection measures were implemented without significant involvement from end-users or that there was a lack of awareness about these measures. Ensuring that all staff members understand and adhere to data protection policies is essential for maintaining compliance with legal regulations and safeguarding resident information.

Regarding **false alarms**, the sentiment analysis once again shows a split between four positive, four neutral and two negative responses. The equal distribution of positive and neutral responses suggests that while some users find false alarms manageable, others do not see them as a significant issue. However, the two negative responses align with the findings from the keyword analysis, which identified false alarms as a persistent concern. This indicates that while some staff members have adjusted to the alarms or found ways to mitigate their impact, others continue to find them disruptive. This supports the need for system calibration to minimize unnecessary alerts while maintaining resident safety.

Figure 39 - PP8: False Alarms



Source: Own Illustration

Another critical factor is **the mean time to repair** when the system encounters issues. Several respondents indicated that repair times were either too long or that they had no experience with the process. If technical failures take too long to be addressed, this could lead to gaps in resident monitoring and a loss of trust in the system’s reliability.

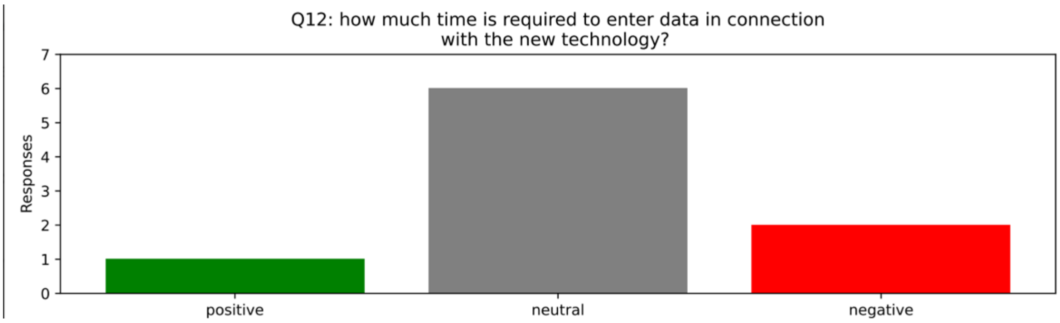
In terms of **resident feedback**, there were only a few responses, but the available information suggests that residents had mixed reactions. While some residents may appreciate the increased safety provided by the technology, the presence of false alarms and system malfunctions could also cause confusion or distress, but effective communication with residents and their families about the purpose and function of the technology helped to improve acceptance and reduce anxiety related to its use.

Figure 40 - PP8: Feedback of residents

Source: Own Illustration

Another important aspect is **the time required for data entry and system interaction**. Some respondents indicated that they had “no experience in this regard”, while others found that data entry took additional time. If the system requires frequent manual input from staff, this could contribute to an increased workload rather than reducing administrative burdens.

Figure 41 - PP8: Time for data entry for end-users

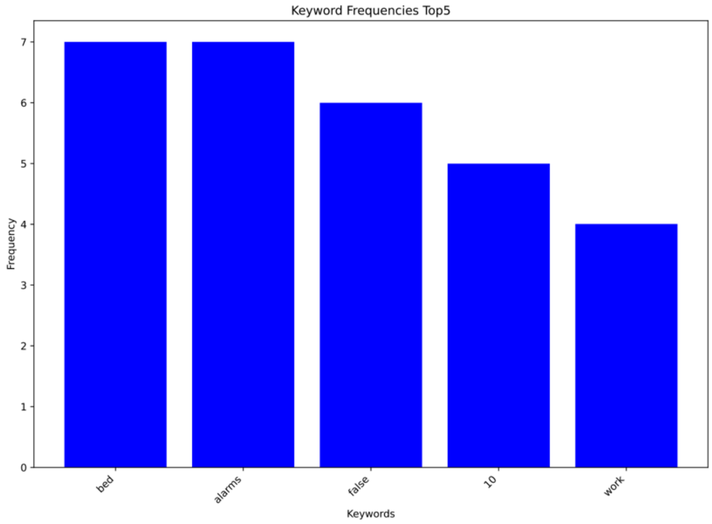


Source: Own Illustration

The graphical analysis of the end-user feedback provides important insights into the implementation of digital fall sensors in the healthcare facility. The **overall sentiment analysis** of all textual responses indicates that most responses were neutral, with 66.4% falling into this category, while 20.9% were positive and 12.7% negative. The predominance of neutral responses suggests that many users neither had strong positive nor negative experiences, which could indicate either a lack of engagement with the system or a perception that it does not impact their work. However, the presence of 12.7% negative responses highlights that certain challenges have led to dissatisfaction among a portion of the users.

The keyword frequency analysis reveals that the most commonly used words in responses were “bed” and “alarms” (both with seven occurrences), followed by “false” (six occurrences) and “work” (four occurrences). The frequent mention of “alarms” and “false” suggests that false alarms are a major concern among users. The word “bed” appearing frequently could indicate that many responses relate to the placement or functionality of the sensors around resident beds. Meanwhile, “work” being a recurring term suggests that the technology’s impact on staff workload was a significant topic in responses.

Figure 42 - PP8: Keywords



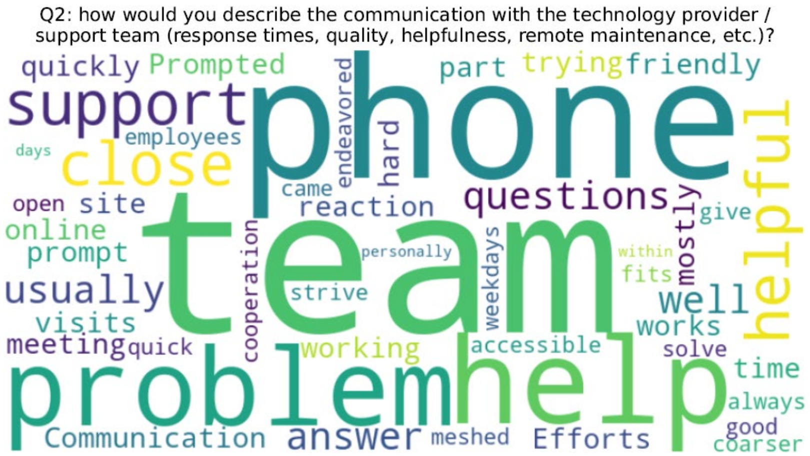
Source: Own Illustration

Overall a central issue identified across multiple analyses is the frequency of false alarms, which not only disrupt workflows but also cause frustration among staff. To mitigate this, the system’s sensitivity should be fine-tuned and users should have greater control over alarm settings to reduce unnecessary alerts. Additionally, trust in the technology is mixed - some users find it reliable, while others remain uncertain. Improving system stability, ensuring quick troubleshooting and providing better guidance on how to interpret alerts can help build user confidence. Other key challenges include workflow interruptions, inconsistent vendor support and delays in maintenance, all of which impact the overall user experience and efficiency. Despite these issues, many staff members recognize the benefits of the technology. By addressing weaknesses in usability, reliability and support, the system can be improved. Targeted optimizations will not only increase acceptance among staff but also enhance care quality and safety for residents. Ultimately, ensuring that users feel confident, well-informed and supported in their daily use of the system is essential for realizing the full potential of this innovative solution.

E4.2 Managers

The analysis of management responses regarding the implementation of digital fall sensors shows, that the management generally reported positive experiences with the technology **provider's support team**, emphasizing prompt responses, helpful interactions and effective communication. Remote maintenance was particularly appreciated and the team was described as hardworking and responsive. However, there were some mentions of challenges, indicating variability in the support experience.

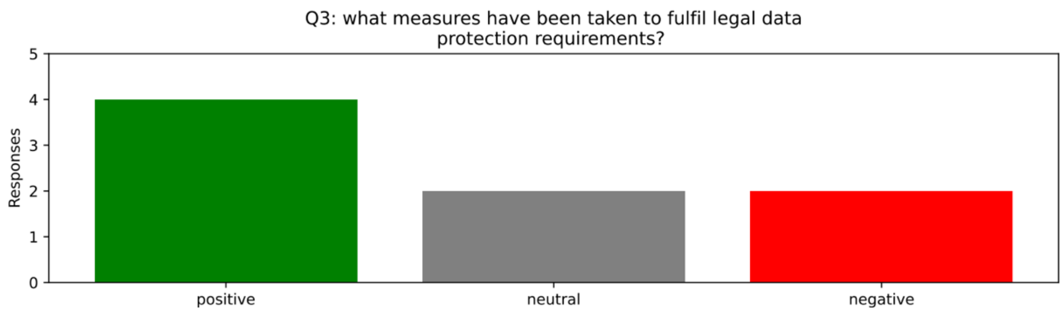
Figure 43 - PP8: Support of technology provider



Source: Own Illustration

Strict measures were implemented to ensure compliance with **data protection regulations**. These included pixelation of images, avoiding identifiable personal data and ensuring comprehensive training for staff. Management highlighted that questions regarding data security were well-addressed, reflecting a strong focus on privacy.

Figure 44 - PP8: Requirements for legal data protection

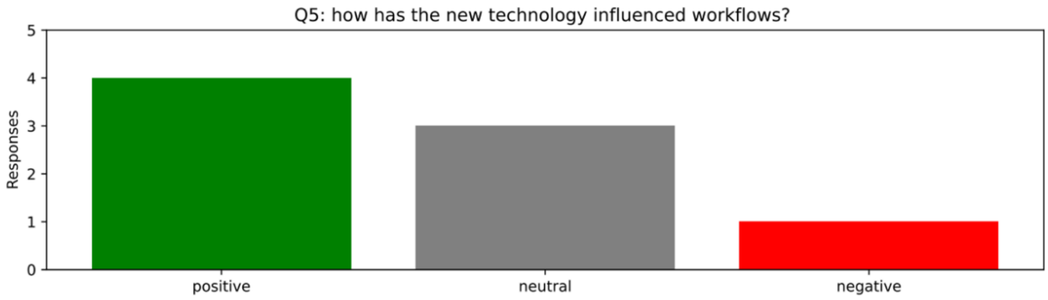


Source: Own Illustration

Responses suggest that implementation largely followed the planned schedule, with only minor **modifications.** Some adaptations included the integration of dashboards and activity plans to improve usability. These changes indicate a flexible approach to implementation, which likely contributed to a smoother transition.

The **impact on workflows** was mixed. While some reported an increase in efficiency and a sense of security among employees, others noted that adapting to the new technology required time resources. In some cases, staff had to adjust their routines and the learning curve was evident. This suggests that while the technology has potential efficiency benefits, initial adaptation challenges should be anticipated.

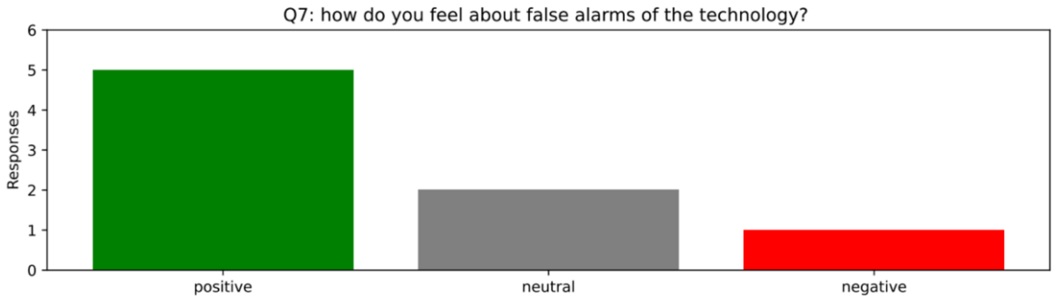
Figure 45 - PP8: Workflow influence of managers



Source: Own Illustration

False alarms were a notable concern. Management acknowledged that error messages occurred frequently, sometimes leading to unnecessary steps in workflow processes. While these alarms were generally addressed promptly, their occurrence may have affected trust in the system's reliability.

Figure 46 - PP8: False alarms



Source: Own Illustration

Customization efforts were reported, but they varied across different facility units. Some responses indicated that the system was integrated with existing infrastructure (such as the bell call system), while others stated that no major customizations were made. Continuous dialogue with the support team suggests ongoing efforts to tailor the technology to facility needs.

While employee satisfaction data was not fully reported, management's perception of **staff acceptance** was mixed. Some noted that employees appreciated the data security provided by the system, while others indicated that adaptation was difficult due to time constraints and initial resistance to change. The willingness of staff to engage in training and accept new processes played a crucial role in determining satisfaction levels.

Management expressed conditional **recommendations** for the technology's adoption in other organizations. Most respondents stated that they would recommend the technology, but only under certain conditions. Several responses indicated that successful implementation depended on factors such as staff willingness, active cooperation and proper onboarding. These conditions highlight the importance of structured introduction processes for ensuring scalability and broader acceptance.

Figure 47 - PP8: Recommendation of technology

Source: Own Illustration

The overall findings from the management survey indicate a largely successful implementation of the digital fall sensors, though some challenges were identified. Sentiment analysis reveals that **37.5%** of responses were positive, **53.1%** neutral and **9.4%** negative, with an average rating of 7.0 across all numeric questions. The most frequently mentioned keywords, such as “time”, “site”, “people”, “recognizable” and “error”, highlight key themes surrounding implementation efforts, vendor support and adaptation challenges.

In conclusion, the survey results suggest that the implementation of the digital fall sensors was well-received, with strong vendor support and clear advantages in terms of security and workflow efficiency. However, certain challenges, such as adaptation difficulties, false alarms and information dissemination gaps, need to be addressed. To optimize future implementations organizations should focus on enhanced training, clear onboarding processes and refining alarm accuracy to reduce unnecessary disruptions. Ensuring that all staff members are adequately informed and comfortable with the system will be crucial in maximizing the benefits of this technology.

Overall, the implementation of the digital fall sensors was largely successful, with strong vendor support and adherence to data protection standards. However, challenges such as false alarms, adaptation difficulties and workflow integration should be addressed to optimize long-term effectiveness and staff satisfaction.

E5 PP9 – European Grouping of Territorial Cooperation Via Carpatia; Slovakia

The project partner PP9 tested two different solutions, on the one hand monitoring devices and SOS buttons and on the other hand a virtual reality solution.

Monitoring devices and SOS buttons: Monitoring devices are installed in the client's room and include motion sensors for fall detection, activity monitoring and immediate alerts in emergency situations. These devices provide real-time data through a mobile app, improving response time and increasing safety during night hours. An innovation with the SOS buttons is the ability to forward notifications after pressing the emergency button as alerts to the mobile app, enabling a quick response from staff. These buttons are installed separately in bathroom/toilet areas, increasing accessibility in critical situations.

Virtual Reality (VR): VR headsets, together with hand controllers and the customized software Cognity Care, were used to provide cognitive training, relaxation, and immersion in environments such as beaches, forests, and underwater worlds. The solution included interactive programs designed to support memory, stimulate motor skills through hand movements, and reduce stress. VR therapy was implemented as an individual activity with clients and aimed to promote mental well-being and slow down cognitive decline.

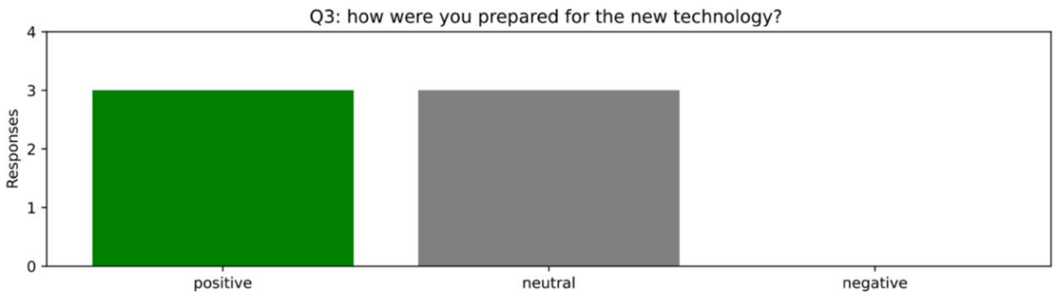
E5.1 End-Users

E5.1.1 Monitoring devices and SOS Buttons

The implementation of the monitoring devices and SOS buttons in the care facility under the EGTC European Grouping of Territorial Cooperation Via Carpatia pilot project has been evaluated based on predefined metrics.

Overall, employees reported a moderate to high level of satisfaction with the **dissemination of information** regarding the new technology. Training appears to have been adequate, with many respondents stating that they were either fully trained or had received necessary introductions before implementation. Some employees mentioned that the training helped them feel prepared.

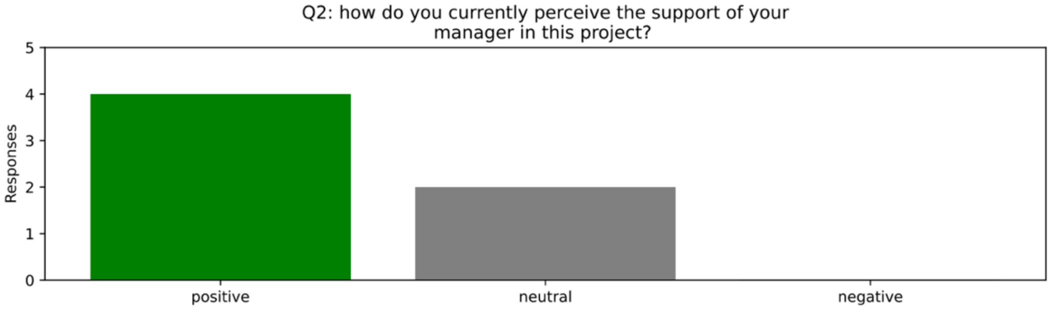
Figure 48 - PP9: Preparation of end-users



Source: Own Illustration

The survey responses indicate that **managerial support** has been relatively strong. Many employees felt that their supervisors were available when needed and responded promptly to challenges. This is a positive indicator for Workforce Satisfaction & Retention, as well as Alignment with Organizational Goals.

Figure 49 - PP9: Support of managers

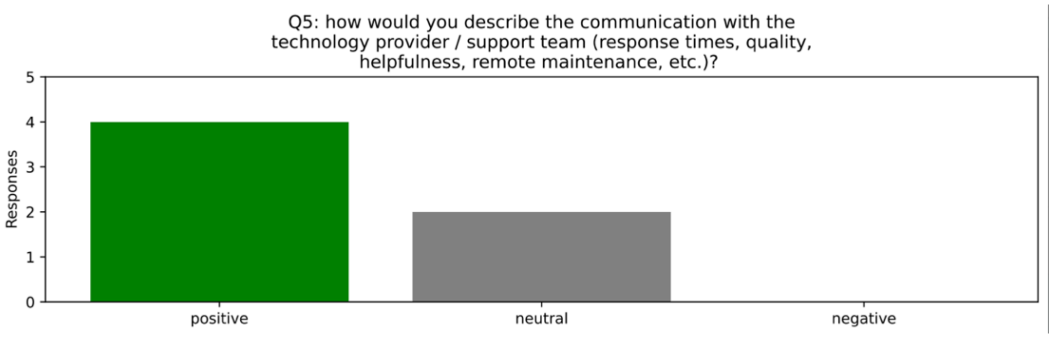


Source: Own Illustration

A significant portion of respondents reported no major **challenges** in dealing with the technology. However, some mentioned issues such as sensor placement and minor malfunctions. Notably, no significant failures or breakdowns have been reported so far, meaning Mean Time to Repair remains untested in real failure scenarios.

The responses suggest that **communication with the technology provider** has been mostly positive, with users rating it as "high level" and "available when needed". However, some users have not had to interact with the support team yet.

Figure 50 - PP9: Communication with provider / support

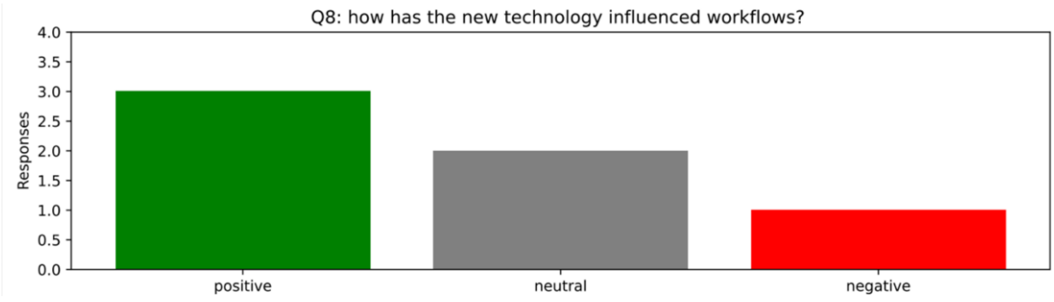


Source: Own Illustration

There is a general understanding among employees that **data protection** measures are in place. Responses indicate that data security is being treated with due diligence and institutional protocols are followed.

While some employees indicated that it is too early to assess the full impact, those who did report changes mentioned improvements in **efficiency**. For example, the ability to monitor clients remotely reduces unnecessary physical checks. The system also provides movement notifications, increasing awareness of resident activity. The data analysis shows 3 positive, 2 negative and 1 neutral response. This suggests that while many users find the technology beneficial, some have encountered challenges or limitations. The negative responses might be related to technical issues, usability concerns or difficulties in adapting workflows to the new system.

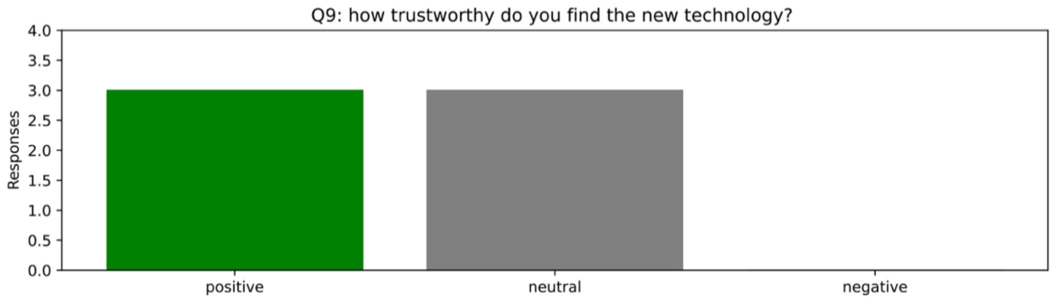
Figure 51 – PP9: Influence on workflow of end-users



Source: Own Illustration

The technology appears to be **trusted by employees**, with many describing it as "credible" and "trustworthy". Additionally, satisfaction levels with the new technology are generally high.

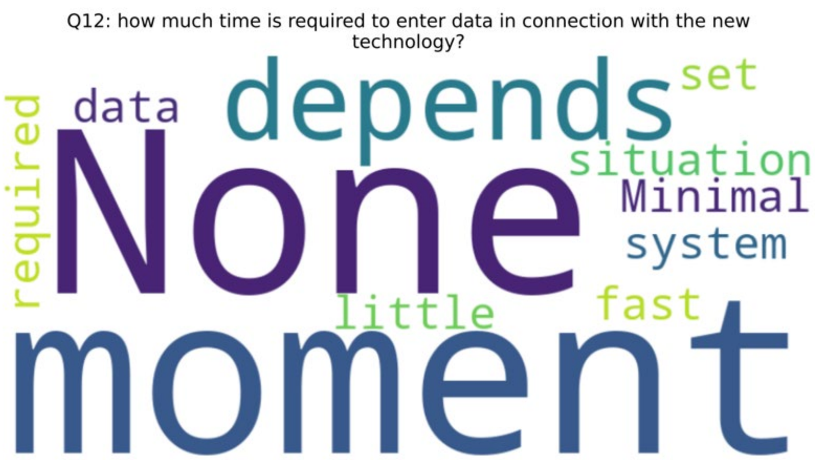
Figure 52 - PP9: Trustworthy of technology



Source: Own Illustration

Most employees report **minimal to no extra effort** required for data entry. The word frequency analysis reveals commonly used terms such as "minimal", "depends", "none" and "moment". This confirms the word cloud analysis, which suggested that most respondents perceive data entry as minimal or even unnecessary. The phrase "depends on the situation" indicates that while data entry is usually not required, there are specific cases where it may be necessary.

Figure 53 - PP9: Time for data entry

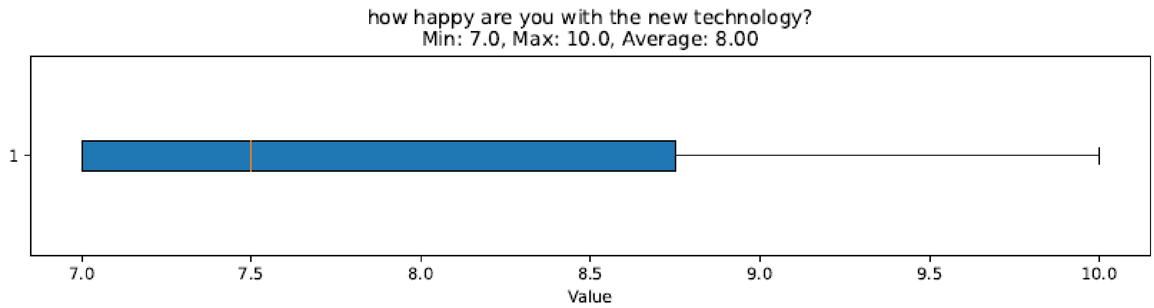


Source: Own Illustration

The occurrence of **false alarms** appears to be low or non-existent at this stage, suggesting that the system is well-calibrated.

The **boxplot for satisfaction with the new technology** confirms that scores range between 7 and 10, with an average rating of 8.0. This fully supports the graphical analysis, demonstrating that overall satisfaction is high, though some users still see room for improvement.

Figure 54 - PP9: Satisfaction of end-users



Source: Own Illustration

In summary, the verification of the raw data largely confirms the graphical analysis, with only minor deviations in the sentiment assessment. The findings reinforce the high satisfaction, strong communication with the provider and minimal data entry requirements. Future improvements should focus on investigating the negative experiences with workflow changes and addressing any remaining integration challenges to further enhance the user experience.

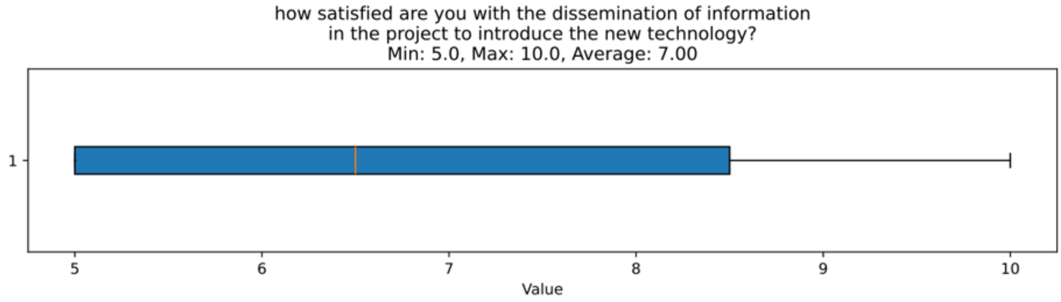
The graphical analysis of the implementation of monitoring devices and SOS buttons provides valuable insights into user experiences and overall sentiment. The digital tool implementation has generally been smooth, with high levels of trust, managerial support and minimal disruptions. Overall, the system is showing **positive results** in improving staff workflow, safety and resident monitoring. The next steps should focus on fine-tuning and expanding the evaluation to include resident and family experiences.

E5.1.2 Virtual Reality System

The implementation of the Virtual Reality (VR) system, aimed to provide cognitive training, relaxation and stress reduction for users. Based on the survey responses, the system was generally well received, though some challenges were noted.

Regarding the **dissemination of information**, user satisfaction was inconsistent. While some participants rated it very highly (10), others were less satisfied (5), indicating that the clarity and accessibility of information about the new technology varied. Training experiences also differed, with some respondents mentioning structured training while others were uncertain about what was expected of them. This suggests that while the system was introduced effectively for some, not all employees felt equally prepared.

Figure 55 - PP9 VR: Satisfaction of dissemination of end-users



Source: Own Illustration

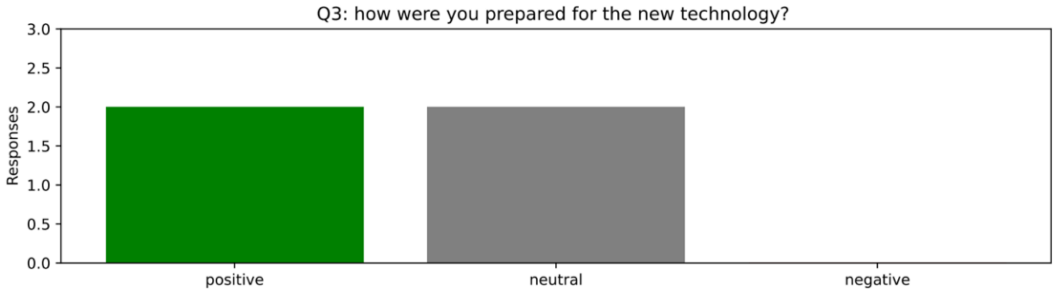
Managerial support was perceived as positive overall, with most users reporting that their supervisors were engaged and provided assistance when needed. Comments such as "we are supported by a superior in a positive sense" and "I perceive the support of the device positively" highlight that leadership played a constructive role in the adoption process. Only one respondent expressed neutrality, indicating that support structures were in place and functioning well for most users.

Figure 56 - PP9 VR: Support of management

Source: Own Illustration

While some participants felt adequately prepared, others found the training insufficient or unclear. This aligns with the earlier findings where **some users described structured training programs, while others were unsure what was expected.** The lack of a strong negative sentiment indicates that while training may not have been perfect, **it was not a major barrier to adoption.**

Figure 57 - PP9 VR: Preparation of end-users



Source: Own Illustration

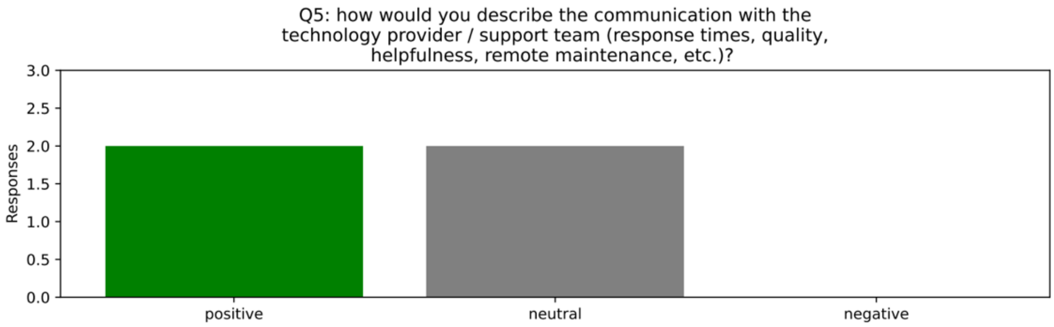
The most frequently mentioned **challenges** were related to **technical issues**. Users reported problems such as poor battery life and early discharging of the devices, as well as technical malfunctions with the VR glasses. Additionally, internet connectivity issues were cited as a limiting factor in some locations, which could impact the seamless use of VR-based cognitive training. Interestingly, no major system failures requiring repair were reported, meaning that Mean Time to Repair was not tested in a critical failure scenario. Nevertheless, addressing these technical concerns would improve overall usability.

Figure 58 - PP9 VR: Challenges of end-users

Source: Own Illustration

Communication with the **technology provider and support team** was rated positively, with users describing their experience as “trouble-free”, “the support team has always been helpful” and “positively”. This suggests that vendor collaboration has been effective and that support was readily available when needed. However, considering the technical issues reported, proactive support measures and better troubleshooting resources could further enhance user satisfaction.

Figure 59 - PP9 VR: Communication with provider / support



Source: Own Illustration

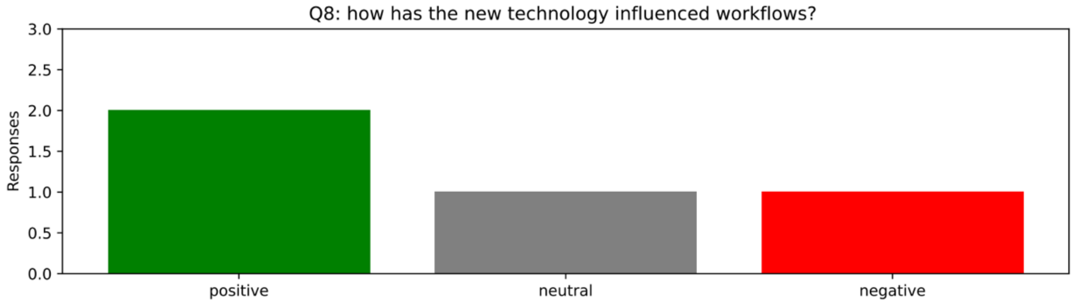
Concerning **data protection**, there was a **mixed awareness** of the measures in place. While some users confidently stated that “all necessary measures” had been taken or referenced GDPR compliance, others admitted “I have no idea”. This suggests that while the system likely meets data protection regulations, employees may require further education and communication regarding security measures.

Figure 60 - PP9 VR: Data protection requirements

Source: Own Illustration

The VR system was seen as having a positive **impact on workflows**, with several users highlighting how it introduced new activities into daily routines. Responses such as “introduced new welcome changes” and “included it in a weekly plan” confirm that the system was successfully integrated into regular activities. However, one respondent mentioned that it added administrative tasks, suggesting that while the system provides cognitive benefits, some additional workload may be required for setup and management.

Figure 61 - PP9 VR: Influence on workflow of end-users

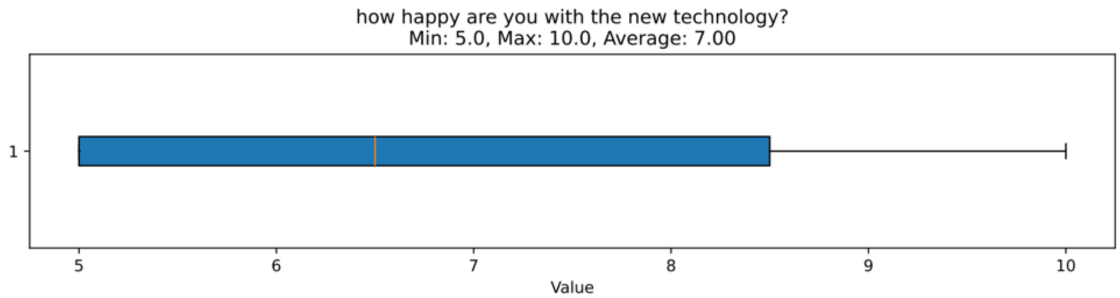


Source: Own Illustration

When asked about the **trustworthiness of the technology**, responses were generally neutral to positive. While one participant stated “It is trustworthy”, others were more hesitant, with comments such as “In the norm” and “I can't answer”. This suggests that while there are no strong concerns regarding credibility, some users may not yet feel entirely confident in the technology’s reliability.

User **satisfaction** with the VR system, as reflected in the boxplot analysis, varied. Ratings ranged from 5 to 10, with an average of 7.0. This indicates that while some users were highly satisfied, others found the experience less impactful. Given the reported technical issues, it is likely that hardware limitations contributed to the lower satisfaction scores. Those who had a smooth experience seemed to appreciate the benefits of VR, while those facing battery life and connectivity problems were less impressed.

Figure 62 - PP9 VR: Satisfaction of end-users



Source: Own Illustration

Regarding **data entry requirements**, responses varied. Some participants found it “not a lot of time”, while others specified that it took between 5 to 15 minutes per recipient. This suggests that data entry is generally manageable but not entirely effortless and the time required depends on the specific use case. While not a major obstacle, further automation or simplification of data input processes could improve efficiency.

One notable positive aspect is that **false alarms were not an issue**, with responses such as “were not fake alarms” and “I don't know, we haven't met it yet”. This suggests that the system was functioning reliably in terms of detecting relevant activity.

All in all the managerial support is strong, training was adequate but could be improved and workflow integration has been mostly positive, though not universally seamless. The most pressing challenges remain technical issues and the adaptation of the technology for elderly residents. While user satisfaction is generally positive, there is room for optimization in training, troubleshooting and reducing administrative burdens. In summary, the VR therapy system shows strong potential in providing cognitive and relaxation benefits, but technical refinements and better user support will be crucial for maximizing its effectiveness and user satisfaction.

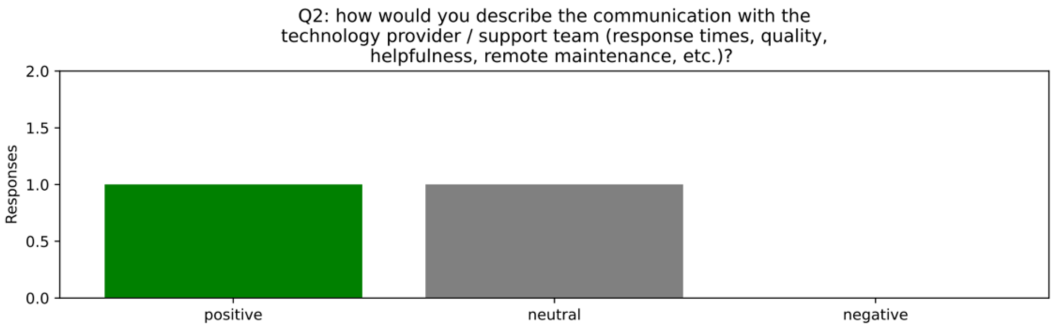
E5.2 Managers

E5.2.1 Monitoring devices and SOS buttons

Overall, the management perceives the **communication** with the **technology provider** as efficient and responsive.

Prominent keywords include *"secured", "runs", "problems", "fast" and "flexible"*. This indicates that respondents generally found communication to be smooth, with no major technical or response issues. The presence of words like *"secured"* and *"problems"* suggests that data security and troubleshooting were relevant topics, though no major concerns appear to dominate. The word *"fast"* further supports the notion that the response times of the provider were satisfactory. One response noted that "communication is secured and runs without problems", while another stated that the provider was flexible and acted quickly. This indicates a generally positive relationship with the vendor, facilitating a smoother implementation process.

Figure 63 - PP9: Communication with provider / support

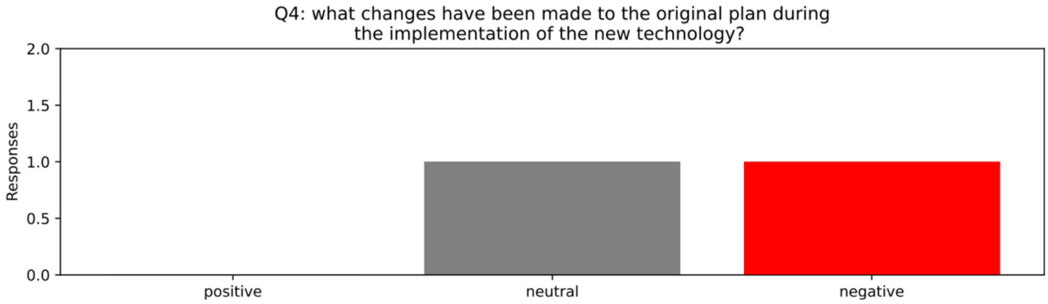


Source: Own Illustration

Compliance with **data protection regulations** was addressed through adherence to GDPR, with responses indicating that necessary agreements were signed and legal requirements were followed according to GDPR regulations. This suggests that the facility took necessary precautions to ensure data security and privacy.

Although direct cost-related responses were not provided, **modifications** to the original implementation plan were minimal. One respondent mentioned that no changes were made, while another pointed out minor room adjustments due to transfer issues. The equal distribution of neutral and negative sentiments, with no positive responses recorded. This suggests that while changes were made to the original plan, they were not necessarily perceived as beneficial. The neutral responses indicate that some changes were expected and accepted, while the negative responses suggest that certain adjustments may have caused challenges or disruptions.

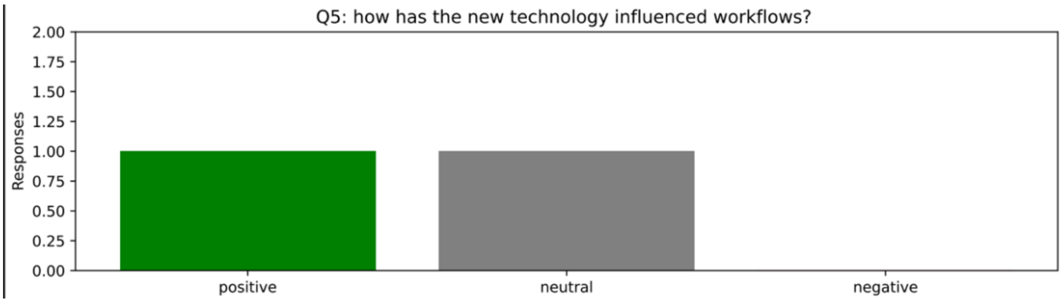
Figure 64 - PP9: Changes of the implementation



Source: Own Illustration

The introduction of the new technology has had a measurable impact on **workflows**. The sentiment analysis presents a **balanced view**, with equal numbers of positive and neutral responses and no negative feedback. This indicates that while the technology did not generate dissatisfaction, it also did not produce overwhelmingly positive impacts. The presence of **positive responses** suggests that some staff members found improvements, particularly in terms of workflow management and efficiency. However, the **neutral responses** imply that for some, the changes were either minimal or had no significant effect on daily operations. This suggests an improvement in workflow efficiency, potentially reducing the burden on staff during shift transitions.

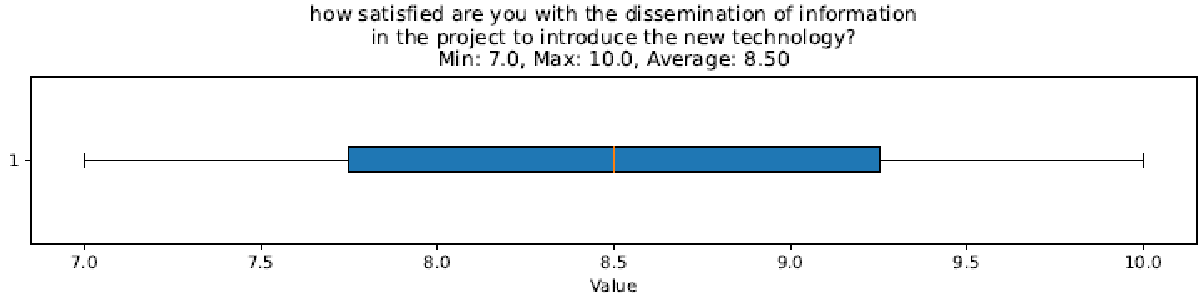
Figure 65 - PP9: Influence on workflow of managers



Source: Own Illustration

The question of the **satisfaction** of the management provides a quantitative overview of responses. The minimum score recorded was 7 and the maximum was 10, with an average of 8.50. This suggests a generally high level of satisfaction with how information was communicated throughout the implementation process. The range of responses (7–10) indicates that while there were slight variations in satisfaction levels, most respondents felt well-informed. The high average score further reinforces the effectiveness of communication strategies used in the project.

Figure 66 - PP9: Satisfaction of management



Source: Own Illustration

Employee satisfaction with the technology appears to be generally positive. One respondent noted that staff were "getting used to" the system and provided "positive feedback". This suggests an adaptation phase is ongoing, but initial impressions are favourable, which may contribute to workforce retention in the long term.

Figure 67 - PP9: Employee satisfaction

Source: Own Illustration

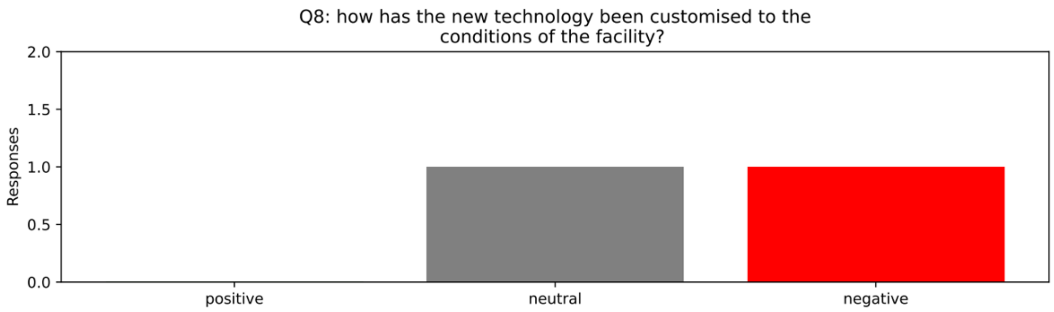
False alarms do not seem to be a significant issue, as one response explicitly stated that they "didn't happen", while another noted that the system accurately captured motion. This suggests that the technology is functioning as expected without causing unnecessary disruptions.

Figure 68 - PP9: False alarms

Source: Own Illustration

Customizations have been made to align with the facility's specific needs. Signal dissemination devices were installed and additional hardware was purchased to ensure smooth operation. This demonstrates adaptability in integrating the new system with existing infrastructure.

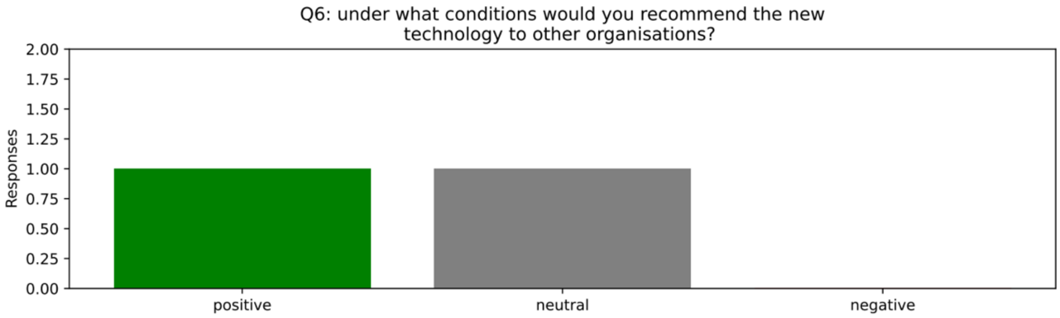
Figure 69 - PP9: Customization of technology



Source: Own Illustration

Management's willingness to **recommend** the technology to other organizations is conditional. One response emphasized the necessity of a “thorough analysis of the facility’s needs”, while another pointed out that a “high-quality internet connection” is a prerequisite. These statements highlight the importance of ensuring that the technology is well-matched to a facility’s existing infrastructure before implementation.

Figure 70 - PP9: Recommendation to other organisations



Source: Own Illustration

The absence of major **deviations** from the original plan and the reported workflow improvements suggest that the technology aligns with the organization's operational objectives. The relatively smooth integration indicates strategic compatibility with the institution's broader goals.

The effectiveness of real-time alerts was not directly addressed in the responses, but the fact that **false alarms** were not reported suggests that notifications are functioning correctly without overwhelming staff with unnecessary alerts.

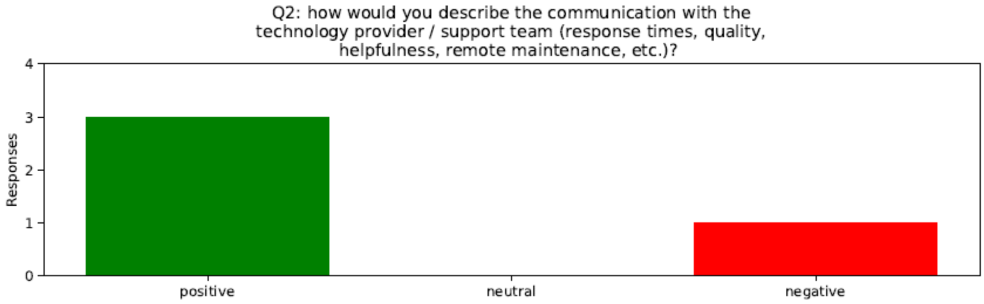
The implementation of the monitoring devices and SOS buttons at the facility has been largely successful, with smooth communication with the vendor, compliance with data protection laws and positive staff reception. Minimal deviations from the original plan indicate effective project management and resource allocation. While workflow improvements have been observed, ensuring a stable internet connection and conducting a facility-specific analysis before implementation are key recommendations for future scalability. The technology's reliability, in terms of false alarms and customization flexibility, further strengthens its viability as a valuable tool in improving resident safety and staff efficiency.

E5.2.2 Virtual Reality System

The management responses from EGTC Via Carpatia regarding the implementation of the virtual reality (VR) solution reveal generally positive feedback across several key metrics. The evaluation focuses on areas where clear data was collected through the questionnaire and avoids extrapolating beyond what is supported by the answers.

Vendor Support and Collaboration was rated very positively. Respondents consistently indicated that the communication with the vendor was smooth and the necessary support was provided throughout the implementation process. praising the helpfulness and availability of support services. According to the sentiment analysis, three responses to the relevant question were positive, and only one was negative. Free-text comments referred to “excellent communication” and “support at a good level”. These qualitative results are reflected in the keyword frequency (“communication”, “provider”, “support”) and topic modelling, which identified phrases like “provider is at very professional level”. The graphical sentiment distribution confirms this positive perception, with only minimal concern raised.

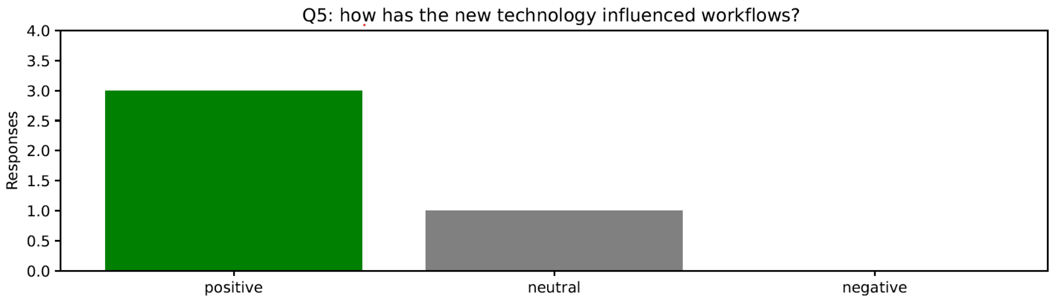
Figure 71 - PP9 VR: Communication with provider / support



Source: Own Illustration

Workflow Efficiency showed a slightly more differentiated picture. While the majority of respondents perceived improvements or at least no negative impact on workflows, one respondent indicated that the system added some complexity. However, the overall impression remains that the system was integrated without significant disruptions and may even enhance specific aspects of daily operations. Respondents mentioned that the VR tool was successfully introduced into the weekly schedule of client activities and contributed to relaxation and cognitive exercises. This is mirrored in the keyword frequency ("activities", "schedule", "clients") and phrases such as "introduction and enrichment of a regular weekly schedule". The comments highlight the integration of the technology into the weekly client activity schedule and the perceived benefit for staff and clients.

Figure 72 - PP9 VR: Workflow influence of managers



Source: Own Illustration

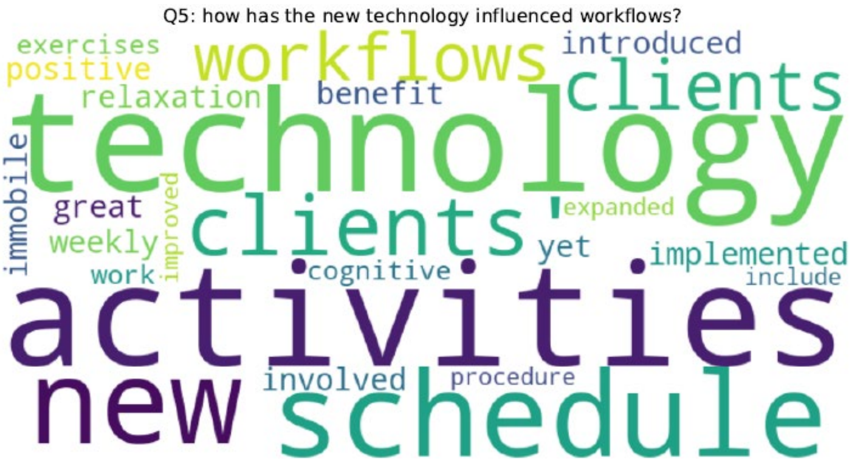
When it comes to **User Satisfaction**, the responses were consistently positive. All respondents indicated that staff were "very satisfied" and "enthusiastic" about the use of the VR solution. This was supported by frequent keyword occurrences such as "satisfaction", "employees" and "motivated" in the textual data. No neutral or negative sentiment was recorded in this category. Phrases such as "Employees evaluate the technology very positively" and "Employees are very satisfied with the use of new technology" underscore strong internal acceptance. This suggests a high level of engagement and general acceptance among employees, which is an important precondition for longer-term success.

Figure 73 - PP9 VR: Employee satisfaction

Source: Own Illustration

The **Alignment with Organizational Goals** is indirectly reflected in the widespread agreement that the technology fits into regular operational routines and enriches client activities. Keywords like "benefit", "introduced" and "implemented" in connection with "weekly schedule" suggest that the solution was not only tolerated but integrated into the care environment in a meaningful and aligned manner. The VR technology was integrated into the weekly activity schedule and perceived as a benefit to clients and staff. Several responses highlighted that the system contributed meaningfully to client engagement, especially among those who are typically less active due to mobility limitations. This implies that the technology fits naturally into the facility's therapeutic and care-oriented structure.

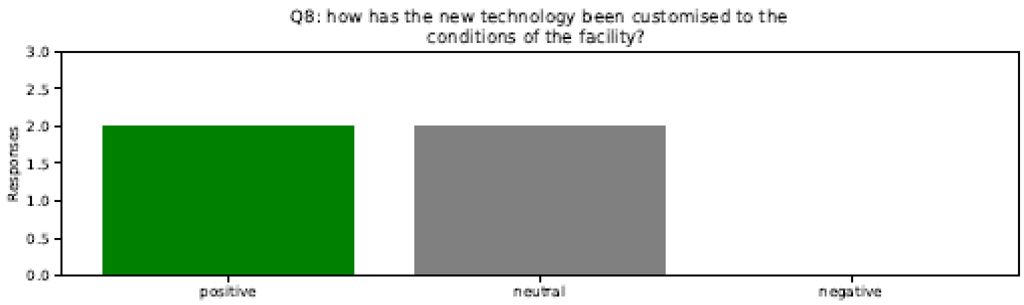
Figure 74 - PP9 VR: Alignment with organizational goals



Source: Own Illustration

The feedback of the **System Customization Flexibility** was evenly split between positive and neutral. While two responses describe successful adaptation to facility needs, the other two are more factual, without explicit praise or criticism. Respondents noted that the system was "customized to the facility's needs", while others gave less detailed but non-critical answers. The word clouds and keyword analysis confirm modest relevance, showing terms such as "facility", "introduced", and "used". While not a dominant theme, the responses suggest sufficient adaptability of the system to local conditions. There was no indication of dissatisfaction or a lack of adaptability, suggesting that the system met at least baseline expectations in this regard.

Figure 75 - PP9 VR: Customisation



Source: Own Illustration

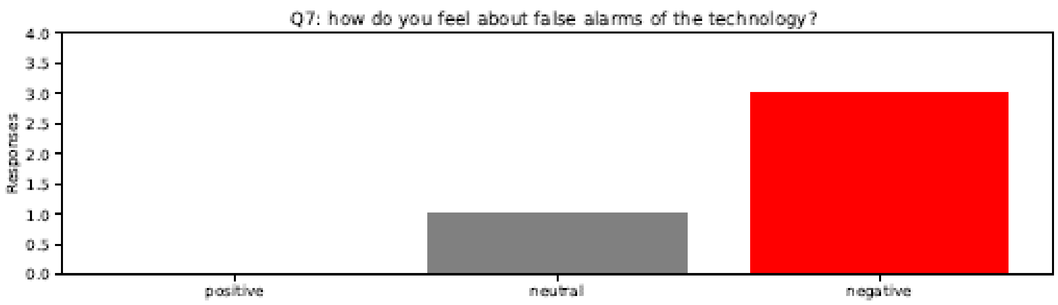
Data Protection Policy and **Implementation Changes** were both characterized by neutral sentiment across all responses. Notably, multiple answers stated “no changes” or “no issues”, suggesting that data protection requirements were either already in place or considered unproblematic and the implementation process required little to no adjustment.

Training and Technical Introduction also received positive ratings. Respondents noted that the technical introduction and accompanying instructions were clear and comprehensible and the support during the early phase was sufficient. This connects with the “Quality of Implementation Timeline” and “Vendor Support” metrics, suggesting that the onboarding process was handled well.

Similarly, **Quality of Implementation Timeline** and potential **Implementation Adjustments** were addressed neutrally. Multiple answers emphasized that no significant changes had been necessary and that the system was “taken immediately” without complications. This implies a smooth rollout, although the absence of detailed feedback limits deeper interpretation.

A noteworthy exception to the overall positive trend was found in the assessment of **Technology Reliability**, specifically in relation to **False Alarms**. This was the only area with predominantly negative sentiment, as three out of four responses mentioned technical issues and recurring disruptions. These issues, while not appearing to undermine the broader success of the project, could affect long-term usability and warrant technical follow-up.

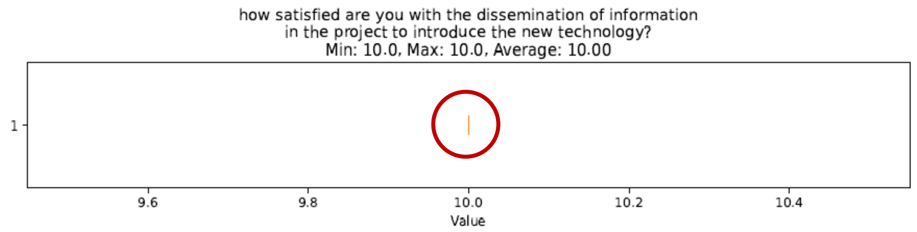
Figure 76 - PP9 VR: False alarms



Source: Own Illustration

Finally, the overall **numeric satisfaction of dissemination of information** rating across all quantifiable items was exceptionally high, averaging a 10.0 out of 10. This aligns with the consistently positive tone found in most qualitative responses and reinforces the overall positive assessment of the technology from the management’s point of view.

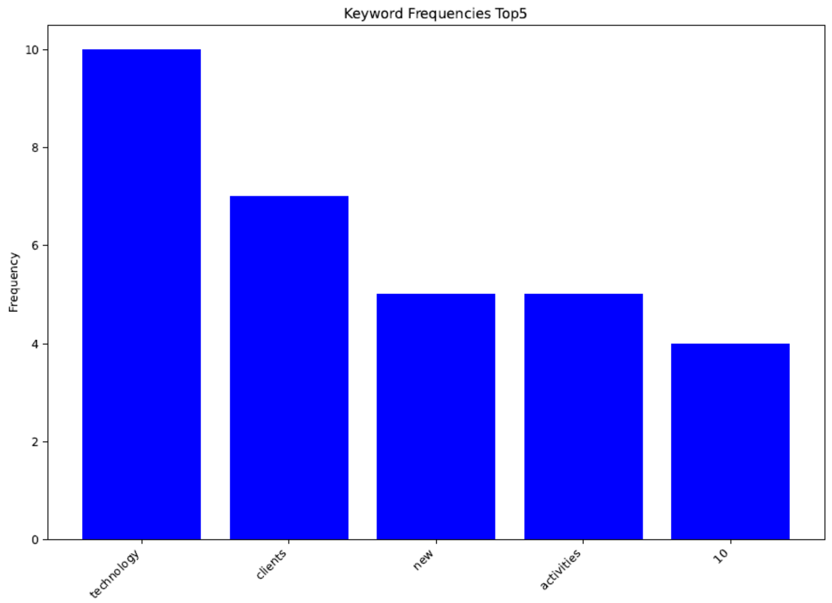
Figure 77 - PP9 VR: Satisfaction of dissemination



Source: Own Illustration

Finally, the keyword analysis confirms that the most commonly used terms ”technology”, “clients”, “activities”, “benefit” and “satisfaction” - centre around practical integration and perceived value, especially in enhancing the experience of immobile residents.

Figure 78 - PP9 VR: Keyword Frequencies



Source: Own Illustration

In summary, the management’s evaluation at EGTC Via Carpatia reflects a highly successful implementation of the VR solution, particularly with regard to vendor collaboration, workflow integration, staff satisfaction and alignment with institutional goals. Isolated technical issues were noted but did not affect the overall outcome.

F CONCLUSION

The monitoring process of Pilot Action 2 within the DigiCare4CE project has provided valuable insights into the practical implementation of digital technologies in long-term care facilities across Central Europe. This chapter synthesizes the key findings from the collected stakeholder feedback, focusing on patterns observed across the pilot sites, common strengths and weaknesses and overall learnings regarding the digital transformation in elderly care settings.

Digital Readiness and Staff Engagement

One of the central observations is the pivotal role of staff readiness and engagement in the successful adoption of new technologies. Facilities that invested in structured training programs and continuous support (e.g. PP3 and PP9) reported higher levels of user satisfaction, better workflow integration and more positive sentiment among caregivers and managers. Conversely, where training was perceived as insufficient or inconsistent (e.g. PP7 and PP8), users expressed more uncertainty, reduced trust in system reliability and greater difficulty integrating the tools into daily routines.

Management support was a recurring success factor. Where leadership actively communicated goals, supported staff and took ownership of the implementation process, acceptance and confidence in the technology were significantly higher. This confirms that leadership involvement is not only desirable but essential in steering digital adoption and overcoming internal resistance.

Workflow Integration and Impact

Across all pilot sites, the technologies showed promising potential to streamline workflows, reduce administrative burdens and enhance safety and monitoring capabilities. Particularly systems involving fall detection, real-time alerts or automated reporting were seen as supportive tools in daily care processes. Nevertheless, several participants noted that while technology can optimize specific tasks, it often requires parallel adaptation of organizational routines, which was not always addressed systematically.

Some technologies, especially virtual reality and cognitive stimulation tools, contributed positively to residents' experiences by enriching daily activities and fostering mental well-being. However, the direct impact on residents was less consistently captured and systematic evaluation from the resident or family perspective remains a gap in the monitoring process.

Technical Usability and Reliability

Usability and technical reliability were critical drivers of acceptance. Systems that were intuitive, required minimal manual data input and offered stable performance (e.g. PP1, PP9) received consistently positive feedback. In contrast, technologies with technical glitches - such as false alarms, unreliable connectivity or limited battery life - negatively impacted user trust and daily workflows. This was especially relevant in the pilots using complex systems with multiple components, such as the sensor and VR setups.

False alarms emerged as a cross-cutting challenge in several sites, reducing perceived system reliability and creating additional workload for staff. In some cases, technical support helped resolve these issues quickly; in others, the disruptions persisted. These findings highlight the need for refined calibration, local customization and user feedback loops during the pilot phase to improve system robustness.

Communication and Support Structures

Effective communication with technology providers was generally rated as positive, especially when support teams were available, responsive and proactive. Remote maintenance capabilities and regular check-ins were particularly appreciated. However, in some cases, end-users reported a lack of direct contact with vendors, relying on management as intermediaries, which sometimes created delays or reduced the immediacy of issue resolution.

Clear, transparent internal communication within facilities also played a critical role in the perceived success of implementation. Where staff were informed about project goals, expected benefits and their roles in the process, the transition was smoother and more widely accepted.

Data Protection, Ethics and Organizational Fit

The topic of data protection received mixed attention. While managers generally reported that GDPR-compliant protocols were in place, end-users were not always aware of these measures or did not consider them relevant to their role. This points to an information gap that may affect trust and legal compliance in the long term. In future rollouts, reinforcing data security communication at all levels will be essential.

Ethical considerations were raised primarily by managers, with concern that digital tools should not replace, but rather complement, human caregiving. This perspective reinforces the need to frame digitalization not as a substitute for empathy and interaction, but as a support structure that enables more personalized and efficient care.

Importantly, most technologies were perceived as generally aligned with the organizational goals of the facilities. Solutions that integrated easily into existing infrastructures, adapted to local routines and responded to staff needs were more likely to be accepted and sustained.

Cross-Cutting Challenges and Lessons Learned

Several overarching challenges emerged from the monitoring data:

- **False alarms and system malfunctions** disrupted workflows and reduced trust in some pilots.
- **Training variability** impacted confidence and readiness among end-users.
- **Limited structured resident feedback** prevented a full picture of user experience.
- **Data protection awareness** was uneven, particularly at the caregiver level.
- **Scalability and sustainability** were rarely discussed in concrete terms, though perceived potential was high.

At the same time, the pilots also demonstrated that with the right conditions - management engagement, targeted support and responsive technology - digital solutions can be smoothly integrated into LTC settings and contribute positively to care quality and staff satisfaction.

Outlook

The findings of this monitoring report reflect the dynamic nature of digital transformation in long-term care. While challenges remain, the experiences documented across pilot sites provide a foundation for continuous improvement, adaptation and eventual scaling of these technologies. They also underscore the importance of involving stakeholders early and consistently, offering tailored support structures and aligning technological implementation with human needs and institutional realities.

As the Evaluation Report and the accompanying Transnational Guidelines will explore in more depth, specific recommendations and common pitfalls encountered during the pilot implementations will be identified. Moreover, the Evaluation Report will take into account all documents developed throughout the DigiCare4CE project in the context of Pilot Actions, thereby enabling a broader analytical perspective. This comprehensive approach allows for a comparison between initial planning and real-world implementation, offering a more nuanced understanding of what supports or hinders the success of digital transformation efforts in LTC facilities.

The collected data from PA2 monitoring reveals not only the practical conditions under which digital care solutions thrive but also the cultural and organizational factors that determine their long-term viability. Future efforts should aim to build on these lessons to develop structured, people-centred digital transformation strategies for the care sector.

G LIMITATION

While the monitoring process has generated valuable insights, several limitations must be acknowledged in interpreting the results.

Firstly, there is a potential for response bias among participants, especially end-users. Although the evaluation and analysis of the responses were conducted centrally by a vendor of Project Partner PP8 in Austria (IMC University of applied sciences Krems) and individual facilities did not receive access to raw data, some staff members may have been concerned that their responses could be traced back to them. This perceived lack of anonymity might have influenced the candour of their feedback, possibly leading to more cautious or favourable answers.

Secondly, the relatively low response rates - particularly in the first monitoring round - limit the generalizability of the findings. The data collected reflects the specific project setting rather than offering representative insights into the broader long-term care sector. As such, the results should be viewed as a snapshot of the DigiCare4CE pilot environment rather than a comprehensive sector-wide evaluation.

To strengthen the monitoring effort, two rounds of data collection were conducted, targeting end-users and management staff. This approach aimed to capture temporal developments and broaden participation across pilot sites. The table below summarizes response rates by partner:

Table 5 - Number of questionnaire responses

Project partner		Monitoring Round 1		Monitoring Round 2		In Total	
		End-users	*Management*	*End-users*	*Management*	*End-users*	*Management*
PP2	DIT	0	0	6	2	**6**	**2**
PP3	ISRAA	10	1	12	3	**22**	**4**
PP7	CVUT	1	1	6	2	**7**	**3**
PP8	NOELGA	7	4	10	8	**17**	**12**
PP9	EGTC Monitoring devices and SOS buttons	0	0	6	2	**6**	**2**
PP9	EGTC VR Solution	10	2	4	4	**14**	**6**

Source: Own Illustration

As shown, response numbers increased substantially in the second round. Some partners, such as PP1 (DIT), were unable to contribute to the first round due to later implementation timelines. Specifically, their solution was not yet fully operational during the first monitoring phase (24 July to 30 September 2024). Similarly, PP3 faced delays in gathering sufficient feedback during the same period.

The second monitoring round, held between 4 November and 20 December 2024, was open to all project partners and formed the primary basis for cross-partner comparison and thematic analysis.

PP9 began implementing the monitoring devices and SOS button solutions in January 2025, which is why no responses were available in the first or second round for that pilot. For this reason, a dedicated monitoring period was established from 1 January to 31 January 2025 to capture relevant feedback for that solution.

Another potential bias could be the language. Although all project partners worked closely to translate the questionnaires into their national language, there is a possibility that the AI translation of the answers back to English may not fully capture the nuances.

In summary, while the monitoring framework allowed for structured evaluation and yielded important insights, the limitations regarding sample size, response distribution and timing of implementation should be considered when interpreting the results.

H LIST OF TABLES

I LIST OF FIGURES

J APPENDIX

J1 Questionnaire

#	Metrics	Questions for peer-review	Questions for monitoring	PA	Target group	Type
1	*Clarity of Objectives & Goals*	n.a.	How satisfied are you with the dissemination of information in the project to introduce the new technology?	✓	*Management; End-users*	*Scale 1-10*
2	*Leadership & Management Support*	n.a.	How do you currently perceive the support of your manager in this project?	✓	*End-users*	*Text*
3	*Staff Training & Engagement*	How were end-users prepared for the new technology?	How were you prepared for the new technology?	✓	*End-users*	*Text*
4	*User-Friendliness of the System*	What challenges have end-users faced so far in dealing with the new technology?	What challenges have you faced so far in dealing with the new technology?	✓	*End-users*	*Text*
6	*Involvement of end-users in Decision-Makin*	How were end-users involved in the decision-making process for selecting the new technology?	n.a.	✓	*End-users*	*Text*
8	*Vendor Support and Collaboration*	n.a.	How would you describe the communication with the technology provider / support team (response times, quality, helpfulness, remote maintenance, etc.)?	✓	*Management; End-users*	*Text*
9	*Data Protection Policy*	What measures have been taken to fulfil legal data protection requirements?	What measures have been taken to fulfil legal data protection requirements?	✓	*Higher Management; Management; End-users*	*Text*
11	*Quality of Implementation Timeline*	n.a.	What changes have been made to the original plan during the implementation of the new technology?	✓	*Higher Management; Management*	*Text*
13	*Mean Time to Repair (MTTR):*	n.a.	How long did the repair take after a failure of the new	✓	*End-users*	*Text*
14	*Workflow Efficiency*	How has the new technology influenced workflows?	How has the new technology influenced workflows?	✓	*Management; End-users*	*Text*
15	*Trust (Data Accuracy and Integrity)*	n.a.	How trustworthy do you find the new technology?	✓	*End-users*	*Text*
16	*User Satisfaction*	n.a.	How happy are you with the new technology?	✓	*End-users*	*Scale 1-10*
17	*Scalability & Future Readiness*	n.a.	Under what conditions would you recommend the new technology to other organisations?	✓	*Higher Management; Management*	*Text*
18	*Patient Satisfaction Scores*	What feedback have end-users received from clients about the new technology?	What feedback have you received from residents/patients about the new technology?	✓	*End-users*	*Text*
22	*Task Completion Time*	n.a.	How much time is required to enter data in connection with the new technology?	✓	*End-users*	*Text*
23	*Automated Alerts & Notifications*	n.a.	How do you feel about false alarms of the technology?	✓	*Management; End-users*	*Text*
26	*System Customization Flexibility*	How has the new technology been customised to the conditions of the facility?	How has the new technology been customised to the conditions of the facility?	✓	*Higher Management; Management*	*Text*
28	*Workforce Satisfaction & Retention*	How does the management perceive employee satisfaction with the new technology?	How do you perceive employee satisfaction with the new technology?	✓	*Higher Management; Management*	*Text*

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Evaluation Report – Pilot Action 2

A 2.3 Monitoring & Evaluation Report of the implementation process (Coordinator: PP8 NOELGA)

D.2.3.3 Evaluation Report Pilot Action 2

Inhaltsverzeichnis

A SUMMARY

BACKGROUND AND OBJECTIVE:

Long-term care (LTC) systems across Europe face growing challenges due to demographic change and a persistent shortage of skilled staff. The DigiCare4CE project responds to this situation by promoting digital transformation through two pilot actions. While Pilot Action 1 (PA1) focused on digital documentation and management systems, Pilot Action 2 (PA2) explored the integration of physical solution systems — such as sensors, VR tools and AI-based monitoring — into LTC facilities. Together, both actions offer insights into how technology can support staff, improve workflows, and enhance care quality.

This report focuses primarily on the evaluation of PA2, while also integrating selected comparative findings from PA1 in the result synthesis. The detailed evaluation of PA1 is documented in a separate report, coordinated by PP2 GGZ.

The core guiding question addressed is: **What are the key factors and steps for the successful implementation of digital innovations in long-term care?**

METHOD:

The evaluation followed a mixed-methods approach, combining qualitative and quantitative data collected from implementation plans, monitoring reports, peer review documentation and standardized fact sheets. The analysis was guided by the DigiCare4CE evaluation framework and supported by thematic coding, comparative analysis, and cross-case synthesis. Data were gathered from care staff, management and project teams across five PA1 and five PA2 pilot sites in Central Europe.

RESULTS:

Pilot Action 1 demonstrated how digital information systems can streamline workflows, reduce documentation effort and support coordination — when they are well integrated and aligned with daily practices. Pilot Action 2 showed that physical technologies such as smart sensors, robotic tools and immersive therapy can improve resident safety, activate cognitive and emotional resources, and reduce stress among staff. Across both actions, successful pilots emphasized co-creation, simplicity, usability, structured training, and ethical transparency. Common barriers included digital literacy gaps, lack of system interoperability and uncertainty around data handling.

CONCLUSION:

The DigiCare4CE project confirms that digital transformation in long-term care is not just a matter of introducing new tools — it is a context-driven, human-centered change process. Whether implementing administrative platforms or sensor-based systems, success depends on aligning innovations with user needs, care routines, and institutional realities. Technologies that are intuitive, well-supported and meaningfully embedded in care processes can bring substantial benefits, even in resource-constrained environments. Ultimately, the findings provide a practical roadmap for managers, practitioners and policymakers — and support a broader vision for the future: **a digital transformation of care that is inclusive, ethical, and purpose-driven.**

KEYWORDS: *digital transformation, long-term care, co-creation, smart care solutions, workflow integration, ethical technology use, user-centered implementation*

B INTRODUCTION

B1 Background

Long-term care (LTC) systems across Central Europe are facing growing structural pressure due to demographic change. As populations age, the demand for professional care is rising sharply, while the availability of skilled care workers continues to decline. This dual dynamic creates an urgent need for innovative, sustainable solutions that can relieve staff, safeguard care quality and maintain dignity in aging.

Against this background, the DigiCare4CE project was launched to support the digital transformation of long-term care services through the transnational exchange and testing of smart technologies. The project is built around two distinct but complementary Pilot Actions:

Pilot Action 1 (PA1) focused on the digitalization of care management and documentation processes. It explored how tools such as electronic health records, mobile documentation apps and digital coordination systems can reduce administrative burdens, improve internal workflows and facilitate communication with external healthcare actors.

Pilot Action 2 (PA2) shifted the focus from data systems to the integration of physical, environmental and IoT-based technologies within care environments. Its aim was to investigate how tools like wearables, fall sensors, VR systems and smart emergency buttons could support care delivery, enhance resident safety and promote well-being — especially for those with physical or cognitive impairments.

This evaluation Report focuses on the Pilots of Pilot Action 2. PA2 was implemented across **five regions in Central Europe**: Austria, Germany, Italy, Slovakia and the Czech Republic. The selected care facilities each tested one or more **physical solution systems** under real-world conditions. These included fall detection technologies, cognitive stimulation tools, ambient monitoring systems and immersive therapy applications.

The overarching goal was to examine how such technologies could:

- increase safety and autonomy for residents,
- support cognitive and emotional stimulation,
- relieve pressure on care staff,
- and demonstrate practical pathways toward scalable integration.

The pilot actions were not only technically implemented, but also accompanied by monitoring and evaluation processes that captured feedback from **care staff**, **management** and the **project team**. This report synthesizes these results and reflects on the enabling factors and barriers in each case. The implemented pilot actions have been:

NOELGA (Austria)

- **Goal:** Increase safety and autonomy for residents using intelligent ambient monitoring
- **Technology:** Motion and fall sensors, smart emergency buttons, centralized dashboard

DIT (Germany)

- **Goal:** Promote cognitive and physical activation while easing staff workload
- **Technology:** Hello Mirror – an interactive touchscreen for exercise, memory games and therapy

ISRAA (Italy)

- **Goal:** Strengthen fall prevention and real-time monitoring through AI
- **Technology:** ANCELIA – a sensor system with AI-based analytics and alert functions

EGTC Via Carpatia (Slovakia)

- **Goal:** Enhance cognitive stimulation and emergency responsiveness
- **Technology:** cognitive games using physical objects and/or tablet/PC

CVUT (Czech Republic)

- **Goal:** Test and compare multiple assistive technologies for LTC
- **Technology:** Motion sensors, the PETBOT (robotic companion) and cognitive tablet games

These five diverse pilots form the foundation for the following evaluation, which explores their individual trajectories and cross-cutting themes. By understanding what worked, what challenged the process and how each pilot adapted to its context, this report aims to provide a consolidated view of how physical technologies can be effectively integrated into long-term care systems and what steps are required to make this transformation sustainable.

B2 Objective

This evaluation report aims to provide a structured, comparative analysis of **Pilot Action 2** within the DigiCare4CE project, which focused on the integration of physical solution systems — such as sensors, wearables, emergency buttons and virtual reality (VR) tools — into long-term care facilities across Central Europe.

The core objective of the report is twofold. Firstly, it documents how each pilot was implemented in practice, whether and how deviations from the original plans occurred and which adjustments were made in response to contextual or organizational factors. Secondly, it compares the pilot experiences across project partners, with a view to identifying common patterns, key differences and transferable strategies for future digital transformation in LTC environments.

This evaluation is guided by the overarching research framework of DigiCare4CE. At the project level, the central research question is:

“Which factors influence the efficiency of the implementation process of information systems in long-term care facilities?”

For **Pilot Action 1**, this is refined into the specific guiding question: **„How should digital technology be implemented in long-term care facilities?“**

For **Pilot Action 2**, this is refined into the specific guiding question: **“What are the key steps in the integration of physical solution systems in long-term care facilities?”**

By answering these questions, the report not only contributes to reflection and transnational learning but also forms an **evidence base for the development of practical implementation guidelines**, to be published separately as Practitioner Guides. These will support practitioners, facility managers and policymakers in navigating similar innovation processes.

The evaluation draws upon the following key sources:

- Partner-specific **Implementation Plans**, which defined the strategic and technical aims of each pilot;
- the **Monitoring Report**, based on structured feedback from end-users and management teams across two rounds of data collection;
- **Joint Peer Review Reports**, which captured external assessments of the implementation process;
- **Pilot Action Output Fact Sheets**, summarizing the technical and organizational results of each pilot in a standardized format.

Together, these sources provide a multi-perspective view on the PA2 implementation process — combining documentation, stakeholder insights and external review. Through this, the report contributes to the broader DigiCare4CE mission of building capacity for sustainable, human-centered digital innovation in European long-term care systems.

C METHODOLOGY

C1 Data Collection

To ensure a comprehensive and multi-perspective evaluation of Pilot Action 2, a variety of data sources were utilized. These covered the entire project lifecycle — from planning to implementation and reflection — and allowed for the triangulation of insights across different stakeholder groups, document types and methodological formats. The data includes both quantitative and qualitative inputs and was gathered from five project partners implementing PA2 pilots DIT (Germany), ISRAA (Italy), CVUT (Czech Republic), NOELGA (Austria) and EGTC (Slovakia)

The main sources used in this evaluation are as follows:

- **Implementation Plans** (*partner-specific planning and setup documents*)
- **Monitoring Report** (*structured feedback from care staff and management via questionnaires*)
- **Joint Peer Review Report** (*external cross-partner feedback collected during on-site visits*)
- **Pilot Action Output Fact Sheets** (*summarized results and reflections per partner*)
- **Project Brochure and Application Documents** (*background and strategic framing)*

Together, these sources enabled a contextualized, evidence-based understanding of how each pilot progressed, what worked well, what challenges emerged and how stakeholders experienced the technologies in practice.

C1.1 Implementation Plans

Each partner submitted a detailed **Implementation Plan** at the outset of PA2. These documents provided structured information on:

- The **selected technology or system** (e.g. sensors, VR, robotic tools),
- **Objectives and expected outcomes**,
- **Timeline, stakeholder roles and training strategies**,
- Technical specifications, ethical considerations and sustainability plans.

The Implementation Plans served as a **baseline reference**, against which actual implementation progress could later be evaluated. They were authored by the **local project coordinators** and often co-developed with facility management.

C1.2 Peer Review Report

The **Joint Peer Review Report** compiled findings from a series of transnational site visits conducted in 2024. Peer Reviewers — including representatives from other project partners and external experts — visited each pilot site to:

- Observe implementation status on site,
- Conduct structured interviews with care staff and management,
- Evaluate training, usability, integration and change management aspects.

Reviewers used a **standardized evaluation template**, which included metrics such as user engagement, data protection, interoperability, ethical handling and sustainability. The result is a cross-comparable, **externally validated dataset** that complements internal monitoring.

C1.3 Monitoring Report

The **Monitoring Report** is based on **two rounds of standardized questionnaires** that were distributed to two key stakeholder groups at each pilot site:

- **End-users** (typically care staff),
- **Management** (facility leadership and project leads).

Surveys were administered in local languages and covered multiple thematic areas such as:

- Usability of the system,
- Technical and organizational integration,
- Perceived impact on workflows and care quality,
- Ethical and data protection aspects,
- User confidence and satisfaction.

The responses were translated into English using AI-supported tools and then analyzed for both **content and sentiment**. This enabled a structured evaluation of how the technologies were experienced **from within the organizations themselves**.

C1.4 Pilot Outputs (Fact Sheet & Evaluation Questionnaire)

Each partner submitted a **Pilot Action Output Fact Sheet** after implementation, using a standardized template developed within the project. These concise but informative summaries included:

- Territorial challenges and context,
- Main goals and activities,
- Technical descriptions of the implemented solution,
- User involvement and training activities,
- Expected and observed outcomes,
- Sustainability and transferability considerations.

These documents served as a **final snapshot** of the pilot, written collaboratively by project teams and local stakeholders. They allowed for comparative analysis of **implementation depth, focus areas and follow-up plans** across regions.

C2 Data analysis

The analysis of Pilot Action 2 followed a **mixed-methods evaluation design**, aimed at capturing both the measurable impacts and the contextual nuances of implementing physical solution systems in long-term care facilities. This approach enabled a differentiated understanding of how digital tools were deployed, experienced and adapted across diverse institutional and regional settings.

The analytical framework was guided by the structural parameters and evaluation dimensions outlined in the project's Deliverable **D.2.1.2 "Toolbox for the Pilots"**, which provided standardized structure for assessing implementation progress, stakeholder engagement, technical fit and sustainability. These criteria were applied across all pilot sites to ensure methodological consistency and comparability.

The **Implementation Plans**, **Peer Review Reports** and **Pilot Output Fact Sheets** were analyzed through a **qualitative content analysis**, using a thematic coding approach. This included the identification and comparison of:

- Planned vs. actual implementation pathways,
- Internal project dynamics and management strategies,
- Stakeholder involvement and communication structures,
- Reported deviations, adaptations and lessons learned.

Recurring themes such as co-creation, staff training, technical integration and organizational change management were identified and mapped across pilot partners to extract transferable patterns and region-specific challenges.

In particular, the peer review documentation — based on structured, externally led on-site assessments — provided a valuable layer of validation and triangulation for partner self-reports. The fact sheets further contributed concise contextual profiles that supported the interpretation of implementation depth and focus areas.

The **Monitoring Report**, derived from standardized questionnaires distributed to care staff (end-users) and management teams, served as the primary source of quantitative data. These surveys collected structured feedback on key implementation dimensions including:

- Usability and system intuitiveness,
- Reliability and responsiveness of technologies,
- Impact on daily workflows,
- Ethical and privacy concerns,
- Overall satisfaction and acceptance.

These techniques allowed for the systematic interpretation of diverse feedback, while also ensuring that both dominant narratives and outlier perspectives were represented in the evaluation.

In the final synthesis step, all findings were consolidated into **partner-specific analytical profiles**. These served as the basis for the structured presentation of results in this report. Each profile reflects not only the performance of a specific pilot, but also its embeddedness within a particular care context, institutional culture and implementation strategy. While computational tools supported parts of the analytical process, the interpretation, comparison and presentation of results were further refined through **manual review and expert-based contextualization**, ensuring both methodological rigour and practical relevance.

D RESULTS of Project Partners

This chapter presents the results of Pilot Action 2 as implemented by each project partner within the DigiCare4CE project. Given the diverse regional contexts, organizational structures and technological approaches across partners, the analysis has been structured on a **partner-by-partner basis** to enable a detailed and differentiated understanding of the implementation processes and outcomes.

Each sub-section follows a uniform structure, assessing:

- The **original planning and objectives** of the pilot,
- The **actual implementation** and any deviations encountered,
- The **monitoring results** based on user and staff feedback,
- The insights from **external peer reviews and pilot output fact sheets** and
- A concluding evaluation summary that reflects on strengths, challenges and key success factors.

This structured approach allows not only for transparency in evaluating each pilot individually but also lays the foundation for a cross-comparison of experiences and lessons learned across the partnership. These insights are crucial for identifying common success factors and barriers, as well as transferable strategies for future digital transformation efforts in long-term care settings.

D1.1 Pilot Action DIT (Germany)

D1.1.1 Intention

The pilot action of the Deggendorf Institute of Technology (DIT) underwent a substantial shift during the course of the DigiCare4CE project. Originally, DIT had planned to implement a digital coordination and communication tool aimed at improving shift documentation and internal workflows in a rural long-term care facility. This planned system focused on enhancing communication between nursing staff, reducing paper-based documentation and facilitating better information flow across different shifts. These ambitions were outlined in DIT's original implementation plan, which emphasized administrative efficiency and the reduction of fragmented communication methods such as handwritten notes or verbal reports.

However, due to internal challenges — including strategic reorientation, resource limitations and implementation hurdles — the originally envisioned system could not be realized as planned. Instead, after a reassessment of local needs and capacities, DIT decided to redirect the pilot action to focus on the introduction of the "Hello Mirror" an interactive and sensor-supported digital mirror aimed at promoting cognitive and physical activation for elderly residents. This marked a strategic shift in both thematic and functional focus: away from internal documentation systems and toward a resident-centered activation technology.

The Hello Mirror offers a wide range of use cases including fall prevention training, memory exercises, music therapy and daily movement routines. Its intuitive interface allows for use by both nursing staff and residents, including those with limited mobility. The mirror can be used both individually and in group settings, thereby enabling a flexible application tailored to the needs of various care contexts. The selection of the Hello Mirror was made following an internal review of alternative solutions, including a care tablet and a multi-user "Care Table." These alternatives were discarded due to usability challenges and insufficient adaptability to the target group's needs.

D1.1.2 Result

Implementation of the Hello Mirror was realized in close cooperation with the local care partner BRK (Bayerisches Rotes Kreuz). Although the mirror was not part of the initial implementation plan, the pilot team successfully developed a comprehensive change management strategy to integrate the solution. Staff were actively involved in the rollout phase through targeted training sessions, interactive workshops and feedback rounds. The delayed start of the pilot — resulting from the change in technology — required tight coordination and focused communication, which DIT and its local partner managed effectively.

Feedback collected through monitoring questionnaires and peer review visits highlighted strong acceptance of the new system. End-users reported that the Hello Mirror contributed to greater motivation among residents and improved group dynamics during care routines. The technology was perceived as intuitive and adaptable to a variety of care situations. Peer reviewers confirmed that the system's modularity and engaging content were particularly well-suited to the LTC environment. The monitoring report further emphasized the motivational value of the mirror and its capacity to support both individual and group-based care activities.

Despite this success, some limitations were also observed. The touch sensitivity of the mirror posed challenges for some elderly users, particularly those with diminished tactile responsiveness. In addition, since the solution was selected after the pilot had already started, end-users were not involved in the initial decision-making process. Nevertheless, the participatory implementation and staff-oriented rollout helped to mitigate this issue. Peer reviewers also noted that the mirror, as a standalone device, did not require integration into the existing IT infrastructure, which simplified technical implementation but limited possibilities for data collection or digital documentation.

D1.1.3 Resume

From an evaluation perspective, the DIT pilot action is an example of adaptive management and responsiveness to contextual constraints. While the change in technological focus initially appeared as a deviation from the project plan, it ultimately demonstrated strategic foresight and the ability to recalibrate objectives in light of real-world challenges. By prioritizing a solution that directly addressed the psychosocial well-being of residents — particularly in a rural care context — DIT succeeded in implementing a technology that delivered measurable benefits despite time constraints and a late-stage change in direction.

The pilot's strengths lie in its clear alignment with user needs, strong staff engagement and successful training approach. Its weaknesses, such as the limited involvement of users in the selection phase and the lack of IT integration, were addressed transparently and balanced by its overall effectiveness. The Hello Mirror represents a transferable and scalable solution for similar care environments, especially where digital activation tools are scarce and user-friendliness is essential.

In conclusion, the pilot action implemented by DIT provides a compelling example of how the successful integration of physical solution systems in long-term care facilities depends not only on technological readiness, but on adaptability, stakeholder engagement and user-centered implementation. The shift from an originally planned administrative tool to a resident-focused activation device illustrates the importance of aligning technological solutions with the actual needs and capacities of both staff and residents. Key steps that contributed to the successful adoption of the Hello Mirror included a pragmatic reassessment of project goals, close cooperation with the LTC provider, hands-on staff training and iterative adaptation based on user feedback. Even though the decision-making process initially lacked end-user involvement, this was effectively mitigated by an inclusive and transparent implementation strategy. The mirror's intuitive interface, flexible use cases and capacity to foster cognitive and physical engagement were essential factors in achieving high acceptance among care staff and residents alike. By focusing on practical added value rather than technical sophistication alone, DIT demonstrated that even small-scale, standalone physical technologies can generate meaningful improvements in care quality when they are well-integrated into existing routines and embraced by users. This pilot thus offers valuable insights for future digital transformation efforts in LTC, especially in rural or resource-constrained settings.

Based on the implementation and evaluation of the Hello Mirror at DIT's pilot site, the following key steps were identified as critical to the successful integration of physical solution systems in long-term care environments:

- **Reassessing and realigning the pilot vision** based on local needs and contextual realities, demonstrating strategic flexibility when initial plans cannot be fulfilled.
- **Involving care staff during implementation**, even if not in the initial technology selection, to ensure practical usability and encourage buy-in.
- **Providing hands-on training and guided use cases** to empower staff and support confident system adoption.
- **Focusing on intuitive, user-friendly design** to accommodate varying levels of digital literacy and enable independent or group-based use.
- **Ensuring strong collaboration with local care providers**, fostering joint ownership and tailoring the solution to specific care routines.
- **Monitoring impact through staff feedback and observations**, allowing for iterative adaptation and validation of benefits.
- **Respecting ethical and data protection principles**, particularly when working with vulnerable populations.
- **Positioning the solution within existing care goals**, such as cognitive activation and psychosocial well-being, rather than as a disruptive or isolated innovation.

These steps highlight that the successful integration of physical technologies in LTC depends not only on the technical solution itself but also on adaptive planning, stakeholder engagement and contextual sensitivity throughout the process.

D1.2 Pilot Action ISRAA (Italy)

D1.2.1 Intention

The Italian project partner ISRAA (Istituto per Servizi di Ricovero e Assistenza agli Anziani) focused its Pilot on the implementation of ANCELIA, an AI-driven technology developed by TeiaCare, aimed at enhancing elderly care services. The pilot was conducted at the "Nucleo Sole" unit of the Zalivani Institute, covering 32 residents with moderate to severe dementia. The ANCELIA system is a comprehensive AI-driven monitoring solution composed of several interconnected components. At its core is an optical sensor equipped with an AI algorithm capable of automatically collecting data on residents' conditions, including presence or absence in bed or the room, body posture and potential fall risk. This data feeds into two distinct interfaces: the Carer App, which delivers real-time alerts when residents require immediate attention and the Manager App, which aggregates and visualizes care-related data to support objective decision-making at the administrative level. The main objective was to support care workers — especially during night shifts — by detecting critical situations like falls or agitation through real-time monitoring and notifications. Additionally, the solution was intended to assist management with data-driven decision-making via analytics and dashboards. The system supports personalized care through customizable alert settings, allowing staff to tailor interventions to individual residents' needs. Moreover, it generates retrospective analytics on resident routines, alerts and staff responses, providing insights into care quality, response times and risk patterns. By combining real-time monitoring with advanced data analysis, the system optimizes care delivery while relieving staff, particularly during night shifts.

D1.2.2 Result

ISRAA successfully implemented the full ANCELIA system, installing sensors for each bed, providing devices for the staff and initiating structured training. The deployment followed a preparatory phase including ethical, technical, organizational and communication strategies and ensured compliance with GDPR and Italian regulations. No major deviations occurred from the original plan. However, integration with the existing digital health record system was not realized during the pilot. Still, this was not considered a deviation, as full integration had been envisioned only for a future scaling phase. The pilot focused on collecting actionable data and building digital competencies among staff. The management of ISRAA adopted a holistic change approach, combining strong leadership, continuous stakeholder engagement and adaptive technical support. Importantly, staff training was comprehensive and tailored, including night-shift simulations and shadowing, which proved critical for acceptance and uptake.

The monitoring data revealed notable improvements in fall prevention, early detection of resident agitation and time optimization during care delivery. The ANCELIA dashboard facilitated real-time alert management, retrospective analysis and informed care planning. Feedback from the care team highlighted increased confidence during night shifts, reduced workload through optimized alerting and better coordination via objective data. Managers reported improved oversight and a more strategic allocation of care resources. Satisfaction surveys indicated enhanced well-being among staff due to perceived reduction in stress and burnout risk. Importantly, the residents' privacy and dignity were upheld through structured privacy protocols and clear communication with their representatives and relatives.

The joint peer review underscored the strengths of ISRAA's pilot, particularly in stakeholder engagement, structured change management and careful training rollout. External reviewers praised the methodical approach to risk assessment, the attention to GDPR compliance and the granular evaluation metrics. One limitation noted was that certain staff groups were initially hesitant, especially older workers less familiar with digital tools. However, this challenge was overcome through continuous support and positive leadership. The Pilot Output Fact Sheet reinforced these findings, emphasizing improved care quality, optimized workload distribution and ANCELIA’s potential for future homecare adaptation.

D1.2.3 Resume

ISRAA’s pilot action successfully demonstrated how AI-based sensor systems can be integrated into long-term care when supported by strong leadership, structured training and clear communication. The implementation of the ANCELIA system was professionally managed and aligned with the care facility’s operational needs, particularly improving night-shift safety, response times and managerial oversight through real-time alerts and analytics. A key success factor was the step-by-step training approach, which empowered staff across different roles and addressed initial hesitations, especially among less digitally experienced employees. The ethical framework, including GDPR compliance and resident communication, was well established and contributed to high acceptance levels. While full integration into existing digital documentation systems was not achieved during the pilot, this did not hinder the solution’s effectiveness in daily routines. Overall, the pilot underscores the importance of aligning technology with real care challenges, engaging all stakeholders early and embedding solutions into everyday practice — offering a transferable model for future implementations in similar settings.

The key steps in the integration of physical solution systems in long-term care facilities in the case of ISRAA are:

- Conducting a **needs-based technology selection process**, rooted in everyday care challenges.

- Involving **multidisciplinary stakeholders** — from caregivers to legal advisors — in the decision-making process.
- Providing **structured, role-specific training** with shadowing and follow-up support.
- Ensuring **clear communication** with all actors, including relatives and residents.
- Building **flexible infrastructure** capable of integrating and adapting to future developments.
- Maintaining **close cooperation with vendors** for customization, updates and troubleshooting.
- Embedding the system into **daily operations** to make its use intuitive and beneficial.
- Implementing **data protection strategies** early to align with ethical and legal requirements.
- Enabling **feedback loops** through regular team meetings and analytics to support continuous improvement.

D1.3 Pilot Action CVUT (Czech Republic)

D1.3.1 Intention

CVUT's pilot action in Prague was designed to evaluate the implementation and integration of three distinct physical technologies aimed at improving the quality of care, resident well-being and staff support. The pilot tested:

1. Monitoring Sensors (Smart Detection System) for fall detection and movement tracking;
2. The PETBOT, a robotic pet designed to enhance emotional stimulation and companionship;
3. Cognitive games, using physical objects and deployment via tablet/PC, to support cognitive activation and engagement of elderly residents.

The main goal was to assess the usability, effectiveness and acceptance of each solution individually and in combination, generating evidence for their integration potential in Czech LTC settings. This multi-tool approach reflected a strong emphasis on user-centered technology testing, comparative evaluation and transferability.

D1.3.2 Result

All three systems were successfully implemented within the pilot period. The Monitoring Sensor system was installed to detect motion patterns and potential falls in resident rooms. The PETBOT was introduced as an interactive robotic companion for emotional stimulation, especially for residents with limited mobility or cognitive decline. The Cognitive Game was used in group and individual settings to stimulate memory and attention. One notable implementation strength was CVUT's stepwise testing and iterative adaptation. The pilot began with baseline observations and gradually introduced each solution, allowing staff and residents to adapt progressively. While there were no major technical challenges, one difficulty reported was the initial uncertainty among staff regarding the practical value of each system, particularly the PETBOT, which was unfamiliar in Czech care contexts. This was mitigated through regular team discussions and inclusion of staff in data collection and observation processes. CVUT researchers maintained close collaboration with care professionals, supporting the co-design of the testing protocols and collecting both qualitative and quantitative feedback throughout the pilot.

Monitoring data and feedback from staff and residents were gathered through structured questionnaires and observational logs. According to the monitoring report, all three solutions were well-received, with high acceptance and interest noted among both care staff and residents. The Monitoring Sensor system was appreciated for enhancing safety perception and allowing staff to respond more confidently to resident needs, particularly during night shifts. The PETBOT evoked diverse reactions: while some residents developed emotional connections with the robot, others found it less engaging. Nonetheless, staff noted that the PETBOT fostered interaction and served as a stimulus for social activity. The Cognitive Game proved especially effective among more active residents, supporting attention and short-term memory while offering moments of joy and structured interaction. Across all tools, care staff reported that implementation improved awareness of technological possibilities and encouraged discussion about future digital integration.

The peer review process confirmed the strong experimental design of the CVUT pilot, particularly its comparative testing approach. Reviewers praised the structured methodology, involvement of end-users in feedback processes and adaptability of the implementation. The clear delineation of testing phases and documentation of user experiences was seen as a model for exploratory pilots in care settings. However, some limitations were also identified. Due to the pilot's experimental nature, the systems were not integrated into routine workflows or digital infrastructures, limiting the scope for immediate long-term implementation. Reviewers also suggested that more focus on long-term data tracking and usage scenarios would strengthen transferability.

D1.3.3 Resume

The Output Fact Sheet summarized that the pilot created valuable input for decision-making in Czech care policy, demonstrating both the opportunities and limitations of low-threshold, physical digital solutions. CVUT's pilot action demonstrates how multi-component digital innovation can be explored effectively within a long-term care setting. The strength of this pilot lies in its structured, comparative evaluation of three different physical technologies, supported by methodical testing and open stakeholder communication. What worked particularly well was the stepwise, co-creative testing strategy, which minimized resistance and created space for meaningful reflection among staff and residents. CVUT's research-driven implementation created a safe environment to experiment with unfamiliar tools such as the PETBOT and allowed critical but constructive feedback to inform evaluation. Even though the tools were not embedded into existing IT systems or workflows, their low entry barriers and standalone functionality allowed for a smooth pilot experience. The pilot's contribution lies in creating awareness, initiating reflection and highlighting user preferences, paving the way for evidence-based decisions in digital care strategies.

The key steps in the integration of physical solution systems of this pilots have been:

- Designing a **phased implementation strategy** that introduces technologies gradually to reduce resistance.
- Engaging care staff and residents from the beginning to **co-shape testing and evaluation**.
- Selecting **diverse tools** that address cognitive, emotional and safety-related aspects of care.
- Ensuring **methodical data collection and analysis** to inform technology assessment.
- Creating **safe, exploratory environments** for testing unfamiliar systems without pressure.
- Promoting **internal discussion and reflection** among staff to assess real-world applicability.
- Maintaining **vendor and researcher collaboration** for adjustments and learning.
- Focusing on **user experience and low-threshold usability** for broader acceptance.
- Using findings to inform **future policy decisions and system integration planning**.

D1.4 Pilot Action NOELGA (Austria)

D1.4.1 Intention

The pilot action implemented by NOELGA took place at the Nursing and Care Centre in Raabs an der Thaya, one of the 48 publicly operated nursing homes in Lower Austria. The facility serves elderly residents with long-term and short-term care needs, including day care and palliative services. The original aim of the pilot was to enhance fall prevention and detection through digital technology. Specifically, the project planned to test a sensor-based system — cogvisAI — capable of recognizing critical incidents such as falls, detecting unusual motion patterns and improving response time and workflow efficiency for staff. The broader goals of the pilot aligned with NOELGA's regional strategy for digital health innovation and quality improvement in LTC. These included reducing false alarms, improving the effectiveness of fall alerts and enabling better data-supported decision-making in care provision. The system was expected to support a shift from reactive to preventive care while relieving staff from some of the stress associated with constant monitoring, especially during night shifts.

D1.4.2 Result

The pilot was implemented largely as planned, with cogvisAI sensors installed in several rooms across the Raabs facility. The sensors were integrated with the center's alarm infrastructure, enabling staff to receive alerts in real time. The sensor system operates independently, with data stored and accessed via a dedicated online platform. Despite the lack of linkage to individual health records, the platform provides sufficient functionality for documentation and analysis purposes, including real-time alerts, filtered data views and post-incident analysis of falls. This setup enables care staff and management to monitor trends, review critical incidents and make informed decisions based on structured and accessible event data.

One notable deviation from the ideal implementation was the lack of end-user involvement in the technology selection process. The decision to implement cogvisAI was made centrally by NOELGA's head nursing department, without only consulting the facility management in Raabs/Thaya. While this top-down approach accelerated procurement, it also led to initial skepticism and reduced ownership among care staff. Furthermore, technical limitations such as occasional sensor failures (e.g. false negatives in fall detection) required targeted staff training and repeated configuration. Despite these challenges, the local management responded proactively. They organized multiple on-site training sessions, adjusted the system's sensitivity settings and facilitated close cooperation between the vendor and nursing staff. This iterative adaptation helped to gradually build trust in the technology and improve user competence.

Feedback from the monitoring phase, as captured in the project's standardized questionnaires and user feedback, reveals a mixed but ultimately constructive picture. Staff initially voiced concerns about the system's reliability, especially regarding inconsistent alarm responses. However, these concerns were largely attributed to user handling errors, not system faults. Through additional training, confidence in the system improved. End-users reported that the system had begun to reduce the need for alternative fall prevention tools, such as fall mats and supported faster staff response in critical situations. Management noted improvements in the quality of fall data and appreciated the ability to review incidents more systematically via the cogvisAI web platform. The limited integration of sensor data into the broader IT infrastructure and resident records, however, was cited as a constraint in fully realizing the system's potential. Moreover, while residents and family members were informed and consent was secured through information events, the lack of systematic data feedback to staff and limited evaluative documentation hindered the broader assessment of impact.

The peer review, conducted in April 2024, confirmed that the pilot action was well-prepared, executed according to ethical and legal standards and supported by cooperative vendor relationships. Peer reviewers appreciated the professionalism of the training sessions, the openness of staff to improvement and the strong alignment of the system with NOELGA's broader digitalization goals. However, several critical points were raised. The absence of a transparent, participatory decision-making process in selecting the system was identified as a weakness, along with the partial system integration. Reviewers also recommended improving data analytics functions, such as incorporating AI features for predictive fall risk assessment and enabling better cross-facility comparability. On the positive side, the ease of configuration, adaptability to room conditions and data protection compliance were highlighted as significant strengths. The system's design, which does not collect visual data, was praised for its respect of resident privacy. Importantly, reviewers noted that staff trust and satisfaction improved steadily over the pilot phase, reflecting successful change management despite the initial lack of co-creation.

D1.4.3 Resume

The pilot action by NOELGA demonstrated how a well-supported but centrally steered implementation of a physical solution system in LTC can deliver meaningful benefits, even in the face of limited initial buy-in. Key success factors included the strong institutional support, responsive vendor collaboration and ongoing training efforts that helped staff gain confidence in the technology. The implementation of the cogvisAI sensor system contributed positively to safety-related workflows by enabling timely fall detection and structured alarm responses. Over time, end-users gained trust in the system and its integration into daily routines became smoother. Nevertheless, challenges around end-user engagement, system interoperability and data feedback loops revealed areas where greater co-creation and technical integration would have enhanced impact. The initial lack of user involvement in selecting the technology limited early adoption momentum and delayed the development of a strong user-system relationship. From an ethical and legal standpoint, the system performed well — particularly because it does not transmit or store visual data and maintains a high standard of privacy compliance.

This pilot case thus illustrates that for physical solution systems to be effectively and sustainably integrated into long-term care, implementation must extend beyond technical installation. It requires a human-centered approach that balances technology, workflows and ethical considerations.

The NOELGA pilot highlights several key steps for the successful integration of physical solution systems in LTC:

1. **Needs-based technology selection** aligned with facility workflows.
2. **Early involvement of end-users** in decision-making to foster ownership.
3. **Structured training and follow-up support** to ensure safe and confident use.
4. **Transparent communication with residents and families**, including ethical consideration.
5. **Vendor cooperation** for iterative adjustments and maintenance.
6. **System integration into existing care routines and documentation flows**, to avoid data silos.
7. **Evaluation and feedback mechanisms** to measure impact and inform long-term adoption.

D1.5 Pilot Action EGTC (Slovakia)

D1.5.1 Intention

The pilot action conducted by EGTC Via Carpatia addressed core challenges in long-term care facilities, particularly improving safety, enhancing nighttime supervision and integrating therapeutic innovations to support cognitive and mental health. While the initial pilot plan envisioned the use of SOS wristbands for client monitoring, this approach was reconsidered during the preparation phase. Based on internal evaluation and a proposal from an external technology provider, they decided to implement a motion-monitoring system instead. This adjustment reflected a shift in focus, rather than collecting direct health data, already available through regular check-ups, the facility prioritized behavioral monitoring that could detect subtle changes in residents' nighttime activity patterns. This change enabled staff to respond more proactively, especially during night shifts. Although this deviation marked a strategic adaptation from the original plan, it aligned closely with the facility's care goals and improved real-time responsiveness.

The final dual-technology implementation, consisting of motion monitoring and Cognity Care's VR platform, was introduced through a coordinated, multi-stakeholder process involving staff from Arcus and Via Lux, academic advisors, and technology providers. Staff received training tailored to both technologies, and residents were onboarded in structured sessions to ensure a smooth transition into everyday use. Target groups included elderly residents, care staff and facility management. The main goal was to introduce smart technologies that support both staff efficiency and resident well-being, while also evaluating their potential for broader implementation. EGTC implemented a dual-technology pilot involving motion sensors with SOS functionality and a virtual reality solution using Cognity Care software. The sensors — installed in residents' rooms and bathrooms — enabled real-time monitoring via a mobile application, ensuring rapid response during emergencies, especially overnight. SOS buttons triggered instant alerts, improving reaction times and resident safety. Meanwhile, VR headsets were used to deliver cognitive training and stress-relief content, tailored to the needs of elderly users. EGTC coordinated a multi-stakeholder implementation process, involving staff from Arcus and Via Lux facilities, academic experts and technology providers. Staff training and structured onboarding of residents ensured a smooth transition into daily operations.

D1.5.2 Result

Monitoring feedback indicates high satisfaction among both management and end-users. Staff reported improved workflow efficiency during night shifts and reduced stress levels due to quicker emergency response enabled by the monitoring system. Residents also responded positively to the VR therapy, particularly in terms of enjoyment and perceived mental engagement. Feedback was collected during regular reviews and post-training evaluations. Staff appreciated the practicality and user-friendliness of the solutions, while residents showed interest and curiosity in the VR experiences. According to the monitoring report, the implementation significantly improved perceived safety and early data suggests a positive impact on cognitive stimulation and mental well-being.

The peer review highlighted strong points in co-creation, stakeholder engagement and system usability. Reviewers noted that EGTC's approach — characterized by the active involvement of end-users in planning and the flexibility in adapting technologies to real-world conditions — contributed greatly to the successful implementation. Stated strengths included the practical relevance of the monitoring system, its low maintenance requirements and the immersive qualities of the VR tool. One minor concern noted was the absence of structured long-term plans for potential system scaling beyond the initial pilot scope. However, EGTC clarified that the equipment remains property of the organization and will continue to be used beyond the project duration, ensuring sustainability.

D1.5.3 Resume

The EGTC pilot effectively demonstrated that sensor-based monitoring and virtual reality therapy can significantly enhance safety, workflow efficiency and resident engagement in LTC environments. The real-time responsiveness of the monitoring system, paired with the engaging and therapeutic content of VR, led to a noticeable improvement in both staff satisfaction and resident well-being. This outcome was further supported by the careful planning, active involvement of multiple stakeholders and robust training mechanisms. By addressing both the physical and cognitive needs of residents, the implementation offers a holistic approach to care innovation.

Based on the implementation experience and evaluation findings of EGTC's pilot action, several transferable lessons

- Initiating a **technology selection process** grounded in real-world care needs and facility-specific challenges.
- **Involving end-users** — including caregivers and residents — in co-design and testing phases to increase acceptance.
- Providing **structured and scenario-based training** for staff, complemented by technical support.
- **Ensuring communication** with residents and families to foster transparency and trust.
- **Customizing technical functionalities** to the operational needs of LTC facilities.
- **Embedding** the technologies seamlessly into daily routines through iterative adaptation.
- Ensuring **equipment durability** and **low-maintenance design** to reduce long-term burden.
- Establishing **multi-stakeholder coordination** to enhance implementation quality and system ownership.

E Cross-Partner Evaluation

The implementation of Pilot Action 2 across all DigiCare4CE project partners revealed a rich diversity of approaches, technologies and contextual adaptations. Despite this heterogeneity, several overarching patterns and strategic insights emerged that help to understand what makes the integration of physical solution systems in long-term care both effective and sustainable. This chapter synthesizes these findings and compares implementation strategies, outcomes and lessons learned across the five pilot sites. It also contributes to answering the guiding research question for PA2:

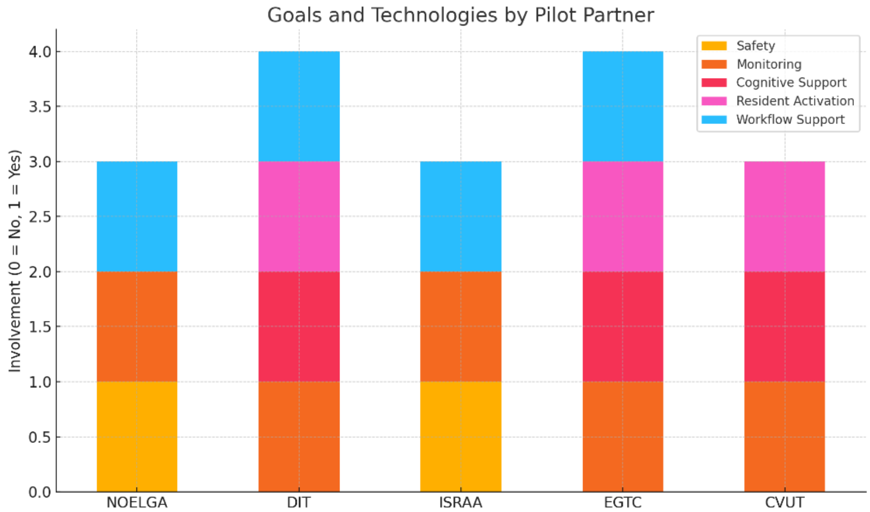
“What are the key steps in the integration of physical solution systems in long-term care facilities?”

Technical Focus and Use Cases of Technologies

The physical systems implemented varied significantly in terms of type, complexity and purpose. Some partners focused on safety and monitoring technologies (e.g. ISRAA’s AI-assisted sensor platform, NOELGA fall detection sensors and EGTC with Monitoring Sensors and SOS Buttons), while others explored cognitive stimulation and emotional engagement tools (e.g. DIT with the Hello Mirror, CVUT’s PETBOT and cognitive games). This variety reflects both regional care priorities and differing levels of digital maturity across LTC facilities. Notably, CVUT’s multi-tool pilot stands out as the most experimental and comparative in nature, testing several technologies in parallel. In contrast, NOELGA and ISRAA focused on more deep integration of fewer tools, aiming at longer-term usability. Such differences underline that **there is no one-size-fits-all solution —** instead, success depends on how well technologies align with the specific needs, capacities and workflows of each setting

The functional diversity of technologies deployed in PA2 was striking. A core insight from the cross-site analysis is the shift away from administrative digitalization toward tools that directly support care activities. Figure 1 shows the distribution of the primary technology functions across all pilot partners of PA2. The focus on monitoring and stimulation, is a direct result of the project strategy in PA2, which emphasised the practical benefits for residents and carers. Safety aspects and interactive elements are on a par, while documentation remains rather marginal. This distribution reflects a resident-centered innovation approach, emphasizing real-time supervision, cognitive activation and responsiveness.

Figure 1 - Distribution of technology functions implemented across PA2 pilots



Source: Own Illustration

Implementation Strategies

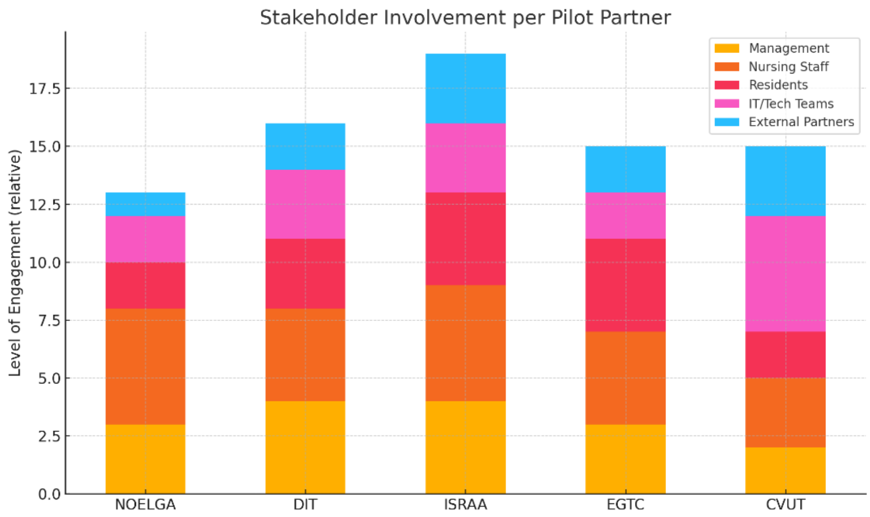
Across partners, phased and user-oriented implementation processes proved to be a common success factor. Pilots that actively involved care staff in testing and adaptation (e.g. DIT, ISRAA, CVUT) reported smoother uptake and higher satisfaction. Structured training and scenario-based simulations further contributed to building trust in the systems, especially among staff with limited digital experience.

Where deviations from original plans occurred, flexible project management and transparent communication ensured that the revised implementations still achieved meaningful results.

Stakeholder Engagement as a Driver of Implementation Success

Stakeholder involvement played a pivotal role in implementation quality. As shown in Figure 2, the levels of engagement varied substantially across the five sites. ISRAA showed the most balanced and comprehensive involvement across all stakeholder groups, including management, care staff, residents, IT personnel and external partners. In contrast, NOELGA and EGTC demonstrated strong participation from nursing and technical teams but lower engagement from residents and external actors. These patterns suggest that broader involvement — especially from those directly affected by the systems — fosters smoother implementation and higher acceptance. Partners who adopted inclusive formats such as co-design workshops, early user interviews, or iterative training (e.g. DIT, ISRAA) reported more stable uptake and fewer behavioral resistances during rollout.

Figure 2 - Level of stakeholder involvement across PA2 pilot partners



Source: Own Illustration

Monitoring and User Feedback

Monitoring data revealed that **staff acceptance** is heavily influenced by the perceived **usefulness and simplicity** of the system. Solutions that visibly reduced workload (e.g. NOELGA's and EGTC's monitoring systems) or brought immediate emotional or cognitive benefits to residents (e.g. PETBOT, VR therapy) were more positively received. Importantly, the inclusion of residents and their families — through informed consent, transparency and communication — was identified as a key enabler of ethical and socially acceptable implementation. Pilots that emphasized privacy and data protection (e.g. ISRAA, NOELGA) were able to foster greater trust and confidence in the technologies.

Shared Success Factors and Recurring Implementation Barriers

The cross-site analysis identified several shared enablers of success. These include the formation of interdisciplinary teams involving management, technical staff and end users; early inclusion of frontline care workers in design and planning phases; ongoing training and motivational formats; and a proactive feedback culture that allowed for quick responses to challenges. Notably, the development of structured implementation plans contributed not only to project clarity, but also to improved internal coordination and increased confidence among staff. However, recurring barriers also emerged. These included digital literacy gaps, weak interoperability with existing documentation systems, technical maintenance burdens and concerns around surveillance and depersonalization of care. These challenges illustrate the importance of embedding support structures — technical, educational and ethical — throughout the implementation process.

Pilot-Specific Insights and Variations in Outcomes

These patterns are further supported by the summary of site-level experiences. NOELGA reported increased staff confidence and improved night-time monitoring, although connectivity and alert fatigue posed challenges. DIT emphasized emotional and motivational gains from interactive tools, but faced integration and training gaps. ISRAA highlighted incident reduction and faster response times, facilitated by AI-based alerts and analytics. EGTC's VR-based interventions were well received in cognitive therapy but required high servicing efforts. CVUT's modular technologies showed research value but received mixed reactions from residents, reflecting the experimental nature of robotic interaction in elderly care.

Conclusions and Transferable Lessons for Scalable Innovation

Overall, the comparative analysis confirms that successful integration of physical digital systems in LTC hinges on a nuanced interplay of context, technology and human behavior. Flexibility, co-creation and alignment with institutional goals are more important than standardization or technological complexity. Each pilot offered a different pathway to transformation — proving that digital innovation in care is not about replicating a template, but about adapting smartly and responsibly to local needs. The experiences from PA2 provide a valuable blueprint for scaling similar solutions and inform the further development of guidelines, policy strategies and practical support tools across the European care sector.

Table 1 - Overview about the findings of Pilot Action 2

Partner	Solution Type	Key Benefit	Main Challenge
NOELGA	Motion sensors, alert buttons	Improved resident safety and autonomy	Alert fatigue
DIT	Health Mirror, VR therapy	Increased activity and staff relief	System integration, digital skills gap
ISRAA	ANCELIA AI monitoring	Real-time monitoring and fall detection	Installation workload, training gaps
EGTC	VR, SOS wristbands, sensors	Cognitive stimulation and engagement	Maintenance demands, personalization
CVUT	AI tracking, robotic interaction (Petbot)	Modular monitoring, research focus	User skepticism, calibration issues

Source: Own Illustration

F DISCUSSION

F1 Summary of findings

The evaluation of Pilot Action 2 within the DigiCare4CE project demonstrated high user satisfaction, improved workflow efficiency and generated meaningful insights into aspects such as trust, ethics and implementation management. Across most sites, technologies were found to be intuitive and supportive of care delivery. Nonetheless, some challenges emerged, including false alarms, gaps in training and concerns about surveillance.

Management teams across the pilot sites expressed a generally positive view of the digital solutions, recognizing their potential but also emphasizing the need for clearer cost-benefit analyses and strategic integration planning.

From the implementation experiences, key lessons were identified:

1. Starting with small-scale implementations supports adaptation and confidence-building.
2. Ongoing training is essential to maintain long-term usage.
3. Technologies should support — rather than replace — human care.
4. Regular feedback loops enhance adaptability and responsiveness.

Smart technologies showed tangible potential in increasing safety and care quality, while also alleviating workload for staff. However, their success is dependent on infrastructure, readiness, consistent training and sustainable support models. The experiences gathered can provide a replicable framework for national and European digital care strategies.

F2 Answering of Research Questions

The following section brings together the insights from both Pilot Action 1 and Pilot Action 2 to answer the overarching research question of the DigiCare4CE project: **"How should digital technology be implemented in long-term care facilities?"** as well as the pilot action specific research questions "**Which factors influence the efficiency of the implementation process of information systems in long-term care facilities?"** for pilot action 1 and **"What are the key steps in the integration of physical solution systems in long-term care facilities?"** for pilot action 2.

Drawing on practical experiences from eight pilot implementations across Central Europe, this chapter synthesizes key insights into how digital technologies should be effectively implemented in long-term care facilities. Detailed findings related to Pilot Action 1 are presented in the corresponding monitoring and evaluation report, coordinated by project partner PP2 GGZ.

F2.1 Answer of the Research Question - Project level

Drawing on practical experiences from eight pilot implementations across Central Europe, this chapter synthesizes key insights into how digital technologies should be effectively implemented in long-term care facilities.

Digital Transformation as a Context-Driven Process

The DigiCare4CE project illustrates that the implementation of digital technologies in long-term care (LTC) settings is not a matter of simply installing tools—it is a multidimensional change process embedded in specific care cultures, routines, and organizational structures. The evaluation of Pilot Action 1 (focusing on digital information and management systems such as documentation tools, planning platforms, and rehabilitation monitoring) and Pilot Action 2 (focusing on IoT and sensor-based technologies for safety, stimulation, and autonomy) has shown that successful implementation depends on the alignment between human needs, technological fit, and organizational readiness.

The project revealed that each care facility required a tailored approach. For example, while GGZ (PA1) focused on integrating lightweight tools like a mobile document scanner into an existing system (ilvi), ISRAA (PA2) implemented an advanced AI-based behavior monitoring system requiring infrastructure adaptations, staff role clarification, and a well-managed ethical communication strategy. For instance at RRDA (Poland), the newly developed DC Analytics app was also directly aligned with daily workflows of physiotherapists and replaced inefficient paper-based rehabilitation documentation, ensuring relevance from day one. In addition, at EGTC Via Carpatia (Slovakia), the team tailored the cognitive VR therapy and emergency system to the specific needs of older residents in rural care settings, embedding it in regular care routines with personalized activation plans.

The pilots confirmed that technologies can only generate value when they respond to clearly identified needs and are operationally embedded—rather than simply deployed.

Co-Creation, Participation, and Shared Ownership

Across both pilot actions, **early and consistent involvement of staff** in the design, selection, and testing of technologies was a critical success factor. GGZ involved care staff, IT, and executive management in an intensive preparatory phase, including on-site observation of care workflows, strategic benchmarking trips (e.g. to Denmark), and structured co-creation workshops. These efforts resulted in the identification of two clearly needed tools—of which the scanner was rapidly adopted due to alignment with daily practice. At ISRAA (PA2), staff were consulted during the development and configuration of the ANCELIA sensor system. Their input shaped decisions on camera placement, notification thresholds, and resident communication. Similarly, at NOELGA (PA2), a phased co-design process involving care professionals, management, and external specialists led to the introduction of personalized sensor-based emergency protocols and an accessible dashboard interface. Another best practice was derived from TUKE (PA1) – the project team completely reoriented its pilot based on user feedback, replacing IS CYGNUS with a SharePoint solution designed together with administrative and nursing staff.

In contrast, pilots that skipped or minimized participatory design - such as in early phases of CVUT (PA2)—encountered slower uptake, unclear expectations, and resistance from staff unsure about the purpose and function of the new technologies. The DigiCare4CE experience shows that **co-creation is not an add-on but a prerequisite** for successful implementation.

Usability, Simplicity and Perceived Benefit

Efficient implementation depends not only on the quality of the system but on how **understandable, intuitive, and obviously useful** it is for its users. In both pilot actions, tools that were visually clear, technically stable, and functionally focused were better received.

For example DC Analytics, developed by RRDA (PA1), required minimal explanation, ran on mobile devices, and directly supported physiotherapists in their daily rehabilitation planning. It replaced inefficient paper forms, reduced workload, and made resident feedback visible - leading to widespread and sustained use. Similarly, the Hello Mirror by DIT (PA2) combined cognitive training, entertainment, and physiotherapeutic exercises in one user-friendly interface. Staff noted that the device required little supervision, was popular with residents, and could be flexibly integrated into group and one-on-one settings.

In contrast, imitoWound (GGZ, PA1) failed to meet usability expectations due to login difficulties, camera alignment issues, and lack of interoperability - despite staff buy-in during the planning phase. These examples highlight the importance of **immediate functional benefit and interface clarity** in fostering adoption, especially in time-sensitive care settings.

Integration into Existing Systems and Workflows

Pilots showed that **technologies should not add complexity but simplify existing processes**. Solutions that built on existing infrastructures (e.g. ilvi at GGZ, Microsoft 365 at TUKE) or mimicked familiar work patterns had a clear advantage. TUKE (PA1) used SharePoint to digitalize and streamline task management, medication routines, and documentation - without disrupting staff habits. The system was embedded in the facility's existing IT environment, minimizing friction. GGZ's document scanner was integrated into the HIS and used daily within ilvi, the already existing documentation tool. ISRAA (PA2) aligned its AI-based alert system with existing staff workflows and documented procedures, ensuring that alerts were not experienced as interference but as support. In contrast, CVUT's robotic companion PETBOT remained partly unused due to unclear role definition and lack of integration into care routines. **System integration emerged as a technical and procedural requirement**—without it, even promising tools risk irrelevance.

Training as an Ongoing and Role-Specific Process

Implementation success also depended on **how training was delivered and maintained**. TUKE (PA1) offered personalized onboarding with support materials tailored to different staff roles. DIT (PA2) used training videos, workshops, and scenario-based sessions that emphasized real-life use cases of the Hello Mirror. ISRAA (PA2) invested in multi-level training for management, care teams, and external IT staff—recognizing that sensor-based systems affect workflows across all levels. ISRAA also offered short video tutorials and quick-reference cards for each staff role, allowing flexible repetition and supporting learning across multiple shifts.

RRDA (PA1) provided continuous IT support via an internal staff member who adapted DC Analytics based on therapist feedback. This combination of availability, flexibility, and adaptation proved crucial, especially in facilities with limited IT literacy.

Best practices included:

- **Peer training** (e.g. "train the trainer" approach at GGZ and TUKE),
- **Hands-on sessions** using real devices before rollout (ISRAA, NOELGA),
- And **training refreshers** after the first weeks of active use (DIT, RRDA).

Training was most effective when understood not as a fixed event but as a **scaffolded learning process**.

Leadership, Communication, and Strategic Framing

The role of **institutional leadership and communication culture** emerged as a key enabler of implementation efficiency. Facilities where management clearly endorsed the digital solution, communicated its purpose, and aligned it with broader strategic goals (e.g. ISRAA, GGZ, TUKE) reported stronger staff engagement. In contrast, lack of visible leadership or unclear responsibilities slowed down momentum. Moreover, regular communication - through meetings, internal newsletters, or informal updates - helped to anchor the innovation in the daily narrative of the care team. The pilots suggest that leadership is not only about decision-making, but also about **consistent internal messaging and symbolic support** for change.

Iterative Learning and Feedback Culture

Implementation processes that remained **open to adaptation and feedback from different perspectives** developed stronger user commitment and were more successful over time. RRDA used weekly staff input to refine DC Analytics. NOELGA collected quantitative and qualitative feedback through structured staff debriefings. ISRAA revised alert protocols based on night-shift staff feedback, reducing unnecessary system triggers. CVUT used structured resident interviews to assess PETBOT reception and modified content and placement accordingly—though uptake remained limited, user feedback shaped iterations.

Even pilots with initially hesitant users reported increased motivation after visible adjustments were made. The **perception that staff voices shape the system** proved to be a major driver of engagement. Iterative, feedback-responsive processes reduced the pressure to “get it right from the start” and instead built collective ownership. The practical experiences from the pilots show that implementation should be approached not as a fixed rollout, but as a dynamic learning cycle—allowing the system to evolve with its users. This iterative logic also helps to maintain motivation and reinforce the value of the innovation.

Ethical Awareness and Transparency

Particularly in PA2, where sensor technologies and AI systems were tested, **ethical concerns such as data privacy, surveillance, and informed consent** played a prominent role. Pilots like ISRAA and NOELGA addressed these issues proactively by engaging residents and families in explanatory sessions, offering opt-out choices, and ensuring that data flows were transparent and secure. NOELGA for instance implemented a multi-stage resident consent process for fall sensors, including simplified materials, individual opt-outs, and transparent communication with families. This ethical framing was not just a compliance requirement but contributed significantly to building trust and acceptance.

The DigiCare4CE project demonstrates that the implementation of digital technology in LTC should not be viewed as a matter of equipment procurement or IT deployment alone. Rather, it must be approached as a **socio-technical process** that unfolds across organizational layers and evolves over time. It depends on careful alignment between human practices and digital infrastructures, guided by simplicity, transparency, and shared purpose.

Digital tools succeed not because of their technical features alone, but because of **how they are introduced, communicated, embedded, and refined**. Where this is done well, even modest solutions can improve documentation quality, coordination, safety, and care experience.

F2.2 Answer of Research Question - Pilot Action 1

Based on the findings presented in the report of pilot action 1, the following section provides a structured answer to the central research question of Pilot Action 1: ***Which factors influence the efficiency of the implementation process of information systems in long-term care facilities?***

Implementation as a Socio-Technical Process

The evaluation of Pilot Action 1 within the DigiCare4CE project shows that the efficient implementation of digital information systems in long-term care (LTC) facilities is not merely a technical or administrative task, but a complex and iterative process shaped by organizational culture, technological alignment, and human dynamics. While the specific technologies, institutional settings and use cases varied, the cross-case analysis reveals a number of decisive factors that, in combination, determine whether implementation efforts lead to sustainable integration or face resistance and fragmentation.

Participatory Planning and Staff Engagement

A first essential factor influencing implementation efficiency is the degree of participatory planning and early involvement of those who will later use the system. When care professionals, IT staff, and managers are engaged in identifying needs, selecting appropriate technologies, and shaping the implementation strategy, the resulting system is more likely to align with actual workflows and be perceived as useful rather than imposed. Co-creative processes, such as structured interviews, on-site observations, and collaborative workshops, contribute to a shared sense of ownership and relevance. Direct engagement with end-users, not only via management, but through hands-on discussion formats and feedback loops, emerged as particularly effective.

This was clearly demonstrated in one pilot, where weekly interdisciplinary team meetings between care professionals, project staff, and IT developers served as the main driver of iterative system development. In another case, strategic visits to model regions, followed by co-creation sessions with staff, laid the foundation for selecting the right technology path. Importantly, partners emphasized that explaining the nature of the project as a **pilot**—with open-ended results and room for testing—was key in managing staff expectations and preventing early frustration.

Workflow and System Integration

Closely linked to this is the importance of ensuring that new technologies integrate seamlessly into existing organizational systems and routines. Efficiency gains are only realized when digital tools support, rather than disrupt, established processes. When technologies are designed to extend already used platforms or replicate familiar work patterns in digital form, they are easier to adopt and more readily accepted by staff.

One facility demonstrated this by building its solution directly into a Microsoft-based IT environment already in use, which enabled care teams to continue using familiar tools while benefiting from new features. In contrast, a separate documentation app piloted elsewhere failed to gain traction due to its lack of integration with the hospital information system—resulting in duplicate documentation and declining staff motivation. These examples underline that integration is not only a technical task but a functional one: technologies must “fit” into the procedural and temporal logic of daily care.

Usability and Technical Maturity

Equally important is the usability and technical maturity of the systems deployed. Tools that are stable, intuitive, and well-aligned with the digital competencies of the user base can be introduced more quickly and with less training overhead. In practice, this means prioritizing simplicity over feature richness and ensuring that systems function reliably under real-life conditions.

In one case, a mobile scanning tool was accepted immediately because it delivered clear benefits, required minimal training, and integrated seamlessly into staff routines. By contrast, a wound documentation tool—though conceptually promising—was abandoned because of persistent login problems, limited photo quality, and failure to integrate with clinical systems. Elsewhere, a rehabilitation tracking app was positively received largely due to its intuitive interface and its ability to generate useful reports with minimal effort. These cases confirm that usability is not a side condition, but a core requirement for implementation efficiency.

Training and Responsive Support

Another key element is the implementation of structured and responsive support mechanisms. Efficient implementation requires more than initial training—it depends on ongoing, adaptive forms of support that are tailored to different user roles and evolving levels of digital literacy.

One successful approach involved onsite training in small groups, followed by a “multiplier” model where experienced staff supported peers. Another pilot ensured continuous support through an internal IT lead who resolved issues immediately and adapted features based on user suggestions. Yet another site scheduled vendor visits and training refreshers at regular intervals. These varied formats—classroom sessions, in-practice coaching, simplified manuals, and peer support—proved especially effective in reducing anxiety, enhancing confidence, and reinforcing the utility of the new system in everyday care.

Modularity and Scalability of Solutions

Furthermore, the scalability and modularity of the chosen systems play a crucial role. Technologies that allow for gradual expansion, adaptation to new workflows, or the integration of additional modules enable a stepwise rollout and reduce the complexity of organizational change.

One facility initially launched its tool for a narrow use case (e.g. rehabilitation feedback) and later expanded to broader reporting and quality management functions. Another introduced basic SharePoint functionalities first and incrementally configured new workflows based on staff input. These modular designs created space for iterative learning, minimized disruption, and allowed the organization to respond flexibly to shifting needs. In contrast, pilots that attempted to deploy feature-rich solutions from the start encountered more resistance and longer onboarding times.

Digital Readiness and Staff Diversity

A recurrent challenge in all pilots was the heterogeneity of digital readiness among staff. Differences in familiarity with digital tools—particularly across age groups, job roles, and levels of experience—can significantly slow down implementation and lead to unequal participation.

In one setting, digital champions were identified among staff and engaged as peer trainers, while more digitally hesitant colleagues received step-by-step guidance. In another pilot, the training plan was explicitly tailored to accommodate part-time workers and staff with limited exposure to technology. These experiences show that inclusive training strategies and a learning-oriented change culture are essential to maintaining engagement and ensuring equity during digital transitions.

Feedback and Iterative Refinement

Projects that embedded structured feedback mechanisms into the implementation process were able to respond more flexibly to emerging problems and continuously improve system fit. Feedback loops, whether through formal evaluation rounds, informal exchanges, or digital surveys, enabled project teams to adjust training, modify interfaces, and refine documentation practices in real time.

In one case, physiotherapists were invited to weekly testing reviews to suggest concrete changes to the interface or data fields. Another facility collected structured input from users in two monitoring rounds, which informed improvements to workflows and support services. Beyond improving the system, these practices also strengthened staff ownership and demonstrated that their input was valued, which in turn increased motivation and trust in the innovation process.

Leadership, Communication, and Change Culture

Emerging as an additional and essential dimension is the role of leadership commitment and communication culture. Implementation was found to be more efficient in facilities where top management actively supported the process, communicated a clear vision for digitalization, and created space for discussion and experimentation.

One pilot benefited from strong executive endorsement and regular reporting formats between care leadership and the IT team, ensuring transparency and consistent messaging. In another case, the lack of visible leadership engagement slowed down momentum and created uncertainty about long-term goals. Across all cases, it became evident that staff acceptance was significantly higher when the digital initiative was framed as a strategic investment in quality—not just a technical upgrade.

Efficiency as Alignment

Taken together, these findings suggest that the efficiency of implementing information systems in long-term care facilities is not defined by the speed or scope of deployment alone. Rather, it emerges from the alignment of technology, process, and people—guided by principles of co-creation, simplicity, adaptability, and support. Efficient implementation is ultimately a socio-technical achievement: it requires not only functioning software and adequate infrastructure, but also a shared vision, mutual trust, and a sustained investment in the digital capacity of care institutions.

F2.3 Answer of Research Question - Pilot Action 2

What are the key steps in the integration of physical solution systems in long-term care facilities?

The evaluation of five pilot actions across Central European long-term care facilities — each testing a physical solution system tailored to local needs — has yielded a broad range of insights into the conditions under which such technologies can be successfully introduced and sustained. Despite contextual differences, a number of **recurring strategic, organizational and ethical factors** emerged across all pilots. These factors not only determined implementation success, but also shaped the long-term acceptance, usability and impact of the solutions.

The integration of physical technologies in LTC is not a purely technical process. Rather, it is a complex socio-technical transformation that depends on aligning technology with human needs, organizational capacities and systemic frameworks. The following dimensions represent the core components of effective integration, drawn from cross-case evidence:

Needs-based Technology Selection

Integration begins with identifying and clearly defining the specific needs and challenges in the care environment — be it fall prevention, documentation burden, cognitive decline, or emotional isolation. Successful pilots (e.g. ISRAA, NOELGA, EGTC) grounded their technology choice in daily care realities, ensuring relevance and contextual fit from the outset.

Participatory Planning and Co-Creation

Involving end-users early — particularly frontline care workers — in the selection, design, or at least testing phase is crucial. Projects like CVUT and DIT showed that co-creation fosters ownership, reduces skepticism and increases acceptance. Conversely, top-down approaches with little user input (e.g. NOELGA) required more effort during rollout to build trust and engagement.

Training and Capacity Building

Structured, hands-on training programs (e.g. simulations at ISRAA, staged onboarding at CVUT) were key enablers of successful implementation. Training should be role-specific, continuous and include follow-up support to address uncertainties, especially for less digitally literate staff.

Transparent Communication and Ethics

The integration of physical systems must be grounded in clear, transparent communication with residents, families and staff. Trust is further enhanced when ethical principles, especially around privacy and data protection, are respected and actively communicated — as seen in ISRAA's and NOELGA's pilots.

Technical Flexibility and Adaptation

Technologies that are modular, low-threshold and adaptable — such as PETBOT, Hello Mirror and VR tools — proved easier to embed into daily routines. Conversely, complex systems requiring IT integration or organizational restructuring faced higher entry barriers and risks of resistance.

Workflow Integration

True integration requires embedding the technology into existing care routines and decision-making processes, not treating it as a parallel system. ISRAA's dashboard-based alert management and DIT's co-use of the Hello Mirror in activity planning illustrate how well-aligned use can enhance care without overburdening staff.

Cross-Functional Coordination

Pilot actions that included multiple levels of stakeholders — management, staff, tech providers, residents — achieved better alignment and implementation quality. EGTC and ISRAA especially benefited from ongoing stakeholder dialogue and cross-functional decision-making.

Evaluation and Feedback Loops

A culture of ongoing monitoring, reflection and adjustment was visible in the most successful pilots. CVUT's iterative pilot design and ISRAA's regular staff feedback sessions enabled continuous improvement and deeper learning, allowing issues to be addressed before they became barriers.

Sustainability Planning

Ensuring the long-term use of physical systems requires not only technical durability, but also ownership structures, maintenance strategies and scaling plans. EGTC and ISRAA already committed to keeping the systems in place, while others highlighted the need for policy and funding support for broader adoption.

The integration of physical solution systems in long-term care is successful when it is **context-sensitive, user-driven, ethically sound and strategically supported**. It thrives on **collaboration across sectors**, clarity in communication and adaptability in execution. Technology alone does not transform care; rather, it is the way technology is introduced, interpreted and embedded that determines its value and sustainability.

These findings offer a roadmap not only for future pilots, but for wider digital transformation processes in LTC across Europe — anchored in dignity, practicality and long-term vision.

F3 Identified challenges

Several challenges arose during implementation, including technical issues (e.g. sensor calibration), organizational hurdles (e.g. staff shortages) and cultural barriers (e.g. digital skepticism). On the evaluation side, difficulties included incomplete or asynchronous data, language barriers and a lack of long-term impact data.

To enhance future evaluations, improved alignment of data collection tools from the outset is recommended. Mixed-method approaches — blending surveys, interviews and workshops — can capture more nuanced perspectives. Strengthened collaboration between implementers and evaluators can help flag issues early, while flexible monitoring windows can account for unexpected delays without compromising data quality.

These experiences highlight the need for robust, adaptive evaluation strategies, especially in transnational and multi-institutional settings.

F3.1 Limitations

While the evaluation of Pilot Action 2 across the DigiCare4CE partnership offers valuable insights into the integration of physical solution systems in long-term care, several limitations must be acknowledged when interpreting the results and drawing broader conclusions.

Variability in Pilot Scope and Maturity

The pilots differed significantly in scale, technological complexity and timing. Some partners implemented low-threshold tools with rapid rollout, while others deployed advanced AI-supported systems requiring extended onboarding. In some cases, the pilots had only just entered full operation by the time of evaluation, limiting the ability to assess long-term effects.

Incomplete or Uneven Data Sets

Not all project partners were able to provide comprehensive and balanced monitoring data. For some pilots, management feedback was more prevalent than end-user input (or vice versa) and response rates varied across languages and institutions. This limited the comparability and statistical depth of the evaluation across regions.

Timing and External Constraints

The overall timeline of the evaluation was affected by delayed procurement, internal restructuring and redefinition of pilot activities — particularly in the cases of DIT and EGTC. As a result, the monitoring periods varied and some systems were still in early usage phases when data was collected.

Language and Translation Effects

Monitoring tools were designed in multiple languages and translated using AI-supported methods. While this allowed for broad participation, subtle shifts in meaning or terminology may have affected how questions were understood and how answers were interpreted in the analysis.

Lack of Longitudinal Data

Given the pilot-focused nature of the evaluation, the available data reflects early-stage implementation rather than long-term integration. It is not yet possible to assess sustained effects on care quality, organizational culture, or economic outcomes. Follow-up studies would be necessary to address these dimensions.

Limited Integration into Systemic Contexts

While the evaluation focused on implementation at facility level, the broader health and social care systems in which the pilots were embedded were not part of the analytical scope. This limits insights into systemic barriers such as funding models, regulatory frameworks, or workforce policies.

These limitations do not diminish the value of the evaluation but rather underscore the importance of **contextual interpretation** and **continued monitoring**. They also highlight the need for future projects to invest in longer observation periods, standardized data practices and multi-level analysis to fully understand the transformative potential of physical technologies in long-term care.

G CONCLUSION

The DigiCare4CE project, through its two pilot actions, offers a comprehensive picture of how digital technologies can be implemented in long-term care (LTC) facilities to address sector-specific challenges — ranging from administrative overload to safety, cognitive engagement, and staff well-being.

Pilot Action 1 focused on digital information and management systems, such as mobile documentation tools, digital planning platforms, and communication interfaces. The evaluation showed that these systems can significantly improve efficiency, reduce administrative burden, and enhance coordination across care teams — *provided they are intuitive, well-integrated into existing workflows, and co-designed with staff*. Pilots that emphasized simplicity, staff ownership, and compatibility with daily routines experienced higher levels of acceptance and sustainability. Conversely, technically promising solutions with usability gaps or weak system integration faced resistance, even when well-intentioned.

Pilot Action 2, in contrast, explored the integration of physical technologies such as smart sensors, VR tools, and AI-based monitoring systems. These tools were designed to support direct care delivery, enhance resident safety, and promote cognitive and emotional well-being. Here, the results showed that even small-scale, standalone systems can yield meaningful outcomes — *if introduced through inclusive, ethically sound, and adaptive implementation strategies*. Technologies that supported care goals without overwhelming staff were particularly well-received.

<u>Across both pilot actions, several shared success factors emerged:</u>

- **User-centered design** and early involvement of care staff and residents
- **Seamless integration** into existing systems and routines
- **Clear communication**, transparency, and leadership support
- **Ongoing training** tailored to diverse digital literacy levels
- **Flexible, iterative implementation**, responsive to real-time feedback

<u>At the same time, both pilots highlighted persistent barriers:</u> digital literacy gaps, interoperability issues, and concerns around data privacy and surveillance. These must be addressed structurally and strategically if digital transformation in LTC is to be scaled up sustainably.

Ultimately, DigiCare4CE confirms that digital innovation in care is not a one-size-fits-all solution. It is a **context-sensitive, socio-technical journey** that must begin with a deep understanding of care realities. Whether implementing a mobile documentation app or introducing AI-based fall detection, the same principle applies: technologies succeed when they are <u>anchored in human needs, embedded in organizational practice, and aligned with care values.</u>

By synthesizing the experiences of ten diverse pilot sites across Central Europe, the project delivers not only evidence-based guidance for practitioners and policymakers but also a compelling vision:

“A digital transformation of care that is inclusive, ethical, and purpose-driven.”
- *DigiCare4CE Conclusion*

H Future perspectives and recommendations

DigiCare4CE demonstrated that transnational cooperation significantly enhances digital health innovation. Harmonized methodologies, peer learning and shared implementation strategies enriched all pilots. Cross-border collaboration enabled knowledge exchange, strengthened interoperability and aligned local actions with EU priorities.

H1.1 Key Reflections for Future Implementations

The DigiCare4CE pilot actions have demonstrated that digital transformation in long-term care is not merely a technical challenge but a deeply cultural and organizational process. Across all pilot sites, it became clear that success hinges on how technologies are embedded into real care environments, how staff are engaged and how systems are supported over time.

- **Digital transformation in LTC must be understood as a cultural, not just technical, process.** Implementation is most successful when care professionals feel empowered, heard and supported — not simply trained to operate devices. Digital tools must be understood as enablers of care — not as replacements for human interaction.
- **Technology must follow care needs, not the other way around.** Solutions that clearly respond to daily challenges — such as safety risks, isolation, or staff shortages — are more likely to be accepted, used and sustained.
- **Flexibility and modularity enhance adaptability.** Systems that are low-threshold, mobile, or stand-alone can be integrated more easily, especially in resource-limited or structurally diverse care settings. Equally important was the flexibility and modularity of the systems deployed. In contrast, systems that required complex integration or organizational restructuring tended to encounter more resistance and delays.
- **Monitoring and evaluation should be embedded from the start.** Capturing not only technical outcomes but also human experiences is essential for understanding impact and guiding iterative adaptation. Monitoring and evaluation mechanisms should be embedded from the outset. Successful pilots combined technical metrics with qualitative insights to understand how technologies were experienced by staff, residents and families. This iterative learning approach allowed systems to be adapted during implementation, rather than only after problems arose.
- **Long-term success depends on structural and policy-level alignment.** Sustainable integration of digital tools requires not only facility-level readiness, but also supportive legal frameworks, funding mechanisms and data infrastructure. Ultimately, long-term success depends not only on institutional readiness but also on supportive policy frameworks, stable funding mechanisms and access to shared digital infrastructure.

While detailed, actionable recommendations will follow in the project's **Practitioner Guides**, the following themes have emerged as particularly relevant across pilot contexts:

- **Early involvement of care staff** in the planning and selection of digital tools
- **Ongoing digital skills training** tailored to different roles and levels of experience
- **Dedicated onboarding and follow-up support**, especially for night-shift and part-time staff
- **Resident and family communication protocols** to build trust and transparency

- **Use of peer review** and transnational exchange formats to enhance learning and quality
- **Clarity in defining ownership and maintenance responsibilities** post-implementation
- **Combining qualitative and quantitative evaluation methods** for richer insights

In addition to these operational lessons, the evaluation raised important open questions for future research and project design, pointing toward valuable directions for future research and project design:

- **How can physical systems be better integrated into existing care documentation and IT infrastructures** without overburdening staff or requiring major structural changes?
- **What are the long-term effects** of digital physical tools on staff well-being, care quality and resident outcomes — beyond initial implementation?
- **How can we develop scalable, flexible evaluation frameworks** that accommodate different stages of readiness and contextual diversity, while ensuring comparability?
- **What mechanisms can support inter-organizational learning**, not just within but across regions, to promote uptake of tested solutions at system level?

The DigiCare4CE pilots offer strong foundations for answering these questions in future project cycles. Building on these experiences, stakeholders across care systems, technology development and policy can work toward an LTC ecosystem that is digitally supported, ethically grounded and deeply human-centered.

H1.2 Policy Recommendations

While detailed implications will be outlined in the Practitioner Guidelines, several core recommendations can be highlighted:

- **Institutionalize Digital Needs Assessments in Elder Care**

  Before introducing digital solutions, all LTC facilities should be encouraged or mandated to perform standardized digital needs assessments. These assessments should evaluate infrastructure readiness, digital literacy levels, care gaps and stakeholder expectations. Policy instruments can support this through templates, guidelines, or funding-linked requirements.

- **Mandate Inclusive and Participatory Implementation Practices**

  EU-funded initiatives should embed requirements for participatory planning — including co-creation workshops, feedback cycles and staff-resident-management alignment. Policies should reward organizations that demonstrate inclusive implementation through dedicated impact reporting.

- **Strengthen Digital Literacy in the Care Workforce**

  Digital transformation policies must include provisions for continuous training. Policymakers should fund lifelong learning programs, create certification modules and support the development of digital “ambassadors” in care teams to promote peer-to-peer learning.

- **Ensure Ethical and Legal Safeguards are Built-In**

  Digital monitoring and AI systems raise legitimate privacy concerns. Policies must require data minimization, clear consent mechanisms and accessible explanations of how systems work. Stronger alignment with GDPR, including care-specific guidelines, is necessary to build trust and transparency.

- **Develop EU-Wide Technical Standards for Care Technology**

  The absence of interoperability standards remains a major barrier. EU institutions should accelerate the development of unified standards for sensor data, communication protocols and care documentation systems. Funding calls could favor interoperable solutions that meet these criteria.

- **Establish Regional Support Hubs for Digital Care**

  Many care providers lack the internal capacity to manage digital transitions. Policymakers should support the establishment of regional hubs that offer consulting, technical support and shared infrastructure. These could be embedded within health agencies or digital innovation centers.

- **Link Funding to Long-Term Sustainability Plans**

  To avoid pilot fatigue, EU and national funders should require sustainability scenarios in all digital care proposals. These should include post-project support models, service contracts and ownership agreements to ensure continuity beyond the project lifetime.

- **Promote Cross-Border Knowledge Exchange and Policy Alignment**

  DigiCare4CE showed the value of coordinated learning. EU policy should incentivize cross-national collaborations, joint procurement models and shared regulatory frameworks for emerging care technologies. This includes regular EU-level review conferences and open access pilot databases.

- **Recognize Digital Care as a Pillar of Health Equity**

  Access to smart care tools should not depend on geography or budget. EU cohesion policy and national social insurance models must explicitly fund digital inclusion in elder care. This includes subsidized infrastructure, targeted rural deployment and support for marginalized populations.

Together, these policy recommendations form a roadmap for creating a digital care landscape that is scalable, ethical, resilient and centered on human dignity. Implementing these measures will enable Europe’s long-term care systems to evolve toward a future of smarter, safer and more person-centered care.

I LIST OF TABLES

J LIST OF FIGURES

K APPENDIX

K1.1 Pilot Action Output Factsheet

OUTPUT FACTSHEET						
Project index number		**Acronym**				
Output type *("x" to be included)*	Strategy/ action plan		Pilot action	x	Solution	
Output number (O.xx)		**Output title**				
If the output target is > 1 in the AF, please specify the output(s) described in the factsheet						
Output delivery date						
Project website						
Summary description of the output *Please present the output by addressing the following topics.*						
Territorial challenges and needs in the regions specifically addressed by the output (max. 700 characters)						
Main aim(s) of the output and how it contributes to tackle the identified challenge(s) (max. 500 characters)						
Technical description of the output (e.g. scope, main features, innovative elements etc.) (max. 1500 characters)						
Involvement of target groups during output development and/or implementation (max. 700 characters)						
Cooperation dimension of the output, i.e. joint development within the partnership and, if applicable, joint implementation (see output indicator definitions in chapter I.3.3 and Annex 2 of the programme manual) (max. 700 characters)						

Results - expected change and lasting effects in the territories generated specifically by the output, its uptake by relevant organisations and benefits for target groups (max. 1000 characters)
Ownership and durability of the output after the project end, considering financial and institutional support including, if applicable, maintenance (max. 700 characters)
Transferability of the output to other territories, sectors or target groups and planned measures for supporting such transfer (max. 700 characters)