

## AHA innovation assessment framework

### IN-4-AHA Project - *Innovation Networks for Scaling Active and Healthy Ageing*

Work Package: WP5  
Deliverable: 5.2  
Dissemination level: Public  
Version: 2.0, 23.03.2022

2022



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017603

<http://ec.europa.eu/digital-single-market/ehealth>

*Innovation Networks for Active and Healthy Ageing* (IN-4-AHA) is a project funded by the European Commission under the Horizon 2020 programme Coordination and Support Action (CSA), Grant Agreement No. 101017603.

This document has been prepared within work package 5 [WP5] task 5.2 of the project.

More information about the project can be found on the IN-4-AHA webpage and social media pages:

<https://innovation4ageing.eu/>

<https://www.facebook.com/IN4AHA>

[https://twitter.com/EIP\\_AHA](https://twitter.com/EIP_AHA)

<https://www.linkedin.com/groups/8912125/>

More information about the EIP on AHA community and FUTURIUM platform:

<https://futurium.ec.europa.eu/en/active-and-healthy-living-digital-world>

<https://digital-strategy.ec.europa.eu/en/policies/eip-aha>

#### **Disclaimer**

The document reflects only the author's view, and the European Commission is not responsible for any use that may be made of the information it contains.

#### **Authors**

Gerli Paat-Ahi, Anni Kurmiste, Priit Purge, Hille Hinsberg

#### **Revised and contributed by**

<b>Organisation</b>	<b>Name</b>
Praxis Centre for Policy Studies	Marielis Öeren
CSG, Project partner	Lucia Saborido

#### **History of changes**

<b>Version</b>	<b>Date</b>	<b>Modifications</b>
1.0	28.12.2021	
2.0	23.03.2022	Revised Chapter 3

## Contents

<b>GLOSSARY</b> .....	<b>4</b>
<b>INTRODUCTION</b> .....	<b>6</b>
<b>1. OVERVIEW OF EVALUATION IN PERSON-CENTREDNESS APPROACH IN HEALTH AND WELFARE CARE AND EVALUATION FRAMEWORK</b> .....	<b>7</b>
1.1. THE IMPORTANCE OF PERSON-CENTREDNESS.....	7
1.2. IMPACT ASSESSMENT FOR HEALTH AND WELL-BEING INNOVATIONS WITH A PERSON-CENTREDNESS FOCUS.....	8
1.3. PERSON-CENTREDNESS IMPACT ASSESSMENT AT DIFFERENT LEVELS.....	12
1.4. CONCEPTS OF PERSON-CENTREDNESS IN THE AHA PROJECT .....	14
1.4.1. <i>Autonomy</i> .....	15
1.4.2. <i>Coordination and cooperation</i> .....	16
1.4.3. <i>Empowerment</i> .....	17
1.4.4. <i>Personalization</i> .....	18
<b>2. DEVELOPED INDICATORS AND QUESTIONS</b> .....	<b>20</b>
2.1. METHODOLOGY .....	20
2.2. INDICATORS AND QUESTIONS PER DOMAINS .....	20
2.2.1. <i>Autonomy</i> .....	20
2.2.2. <i>Coordination and cooperation</i> .....	22
2.2.3. <i>Empowerment</i> .....	22
2.2.4. <i>Personalization</i> .....	23
<b>3. VALIDATION</b> .....	<b>25</b>
3.1. TESTING WITH PILOTS .....	25
3.2. EVALUATION OF PILOTS.....	26
3.3. VALIDATION OF QUESTIONNAIRES .....	28
<b>CONCLUSION AND SUMMARY</b> .....	<b>30</b>
<b>BIBLIOGRAPHY</b> .....	<b>31</b>
<b>ANNEX 1. QUESTIONNAIRE FOR END-USERS</b> .....	<b>35</b>
<b>ANNEX 2. QUESTIONNAIRE FOR FACILITATORS</b> .....	<b>37</b>
<b>ANNEX 3. QUESTIONNAIRE FOR SERVICE PROVIDERS</b> .....	<b>39</b>
<b>ANNEX 4. SCALING THE RESULTS OF THE QUESTIONNAIRES</b> .....	<b>41</b>

## Glossary

### Acronyms

AHA	Active and healthy ageing
AI	Artificial Intelligence
CSG	Cluster Saude Galicia, project partner
DiGA	Digital Health Applications
EIP on AHA	European Innovation Partnership on Active and Healthy Ageing
EQ-5D	The European quality-of-life instrument
HCD	Human-centred design
HTA	Health Technology Assessment
ICT	Information and Communications Technology
IN-4-AHA	Innovation Network for Active and Healthy Ageing
IT	Information Technology
MAFEIP	Monitoring and Assessment Framework for the European Innovation Partnership on Active and Healthy Ageing
MAST	Model for Assessment of Telemedicine
NASSS	Non-adoption, Abandonment, Scale-up, Spread, Sustainability Framework
NHS	National Health Services (United Kingdom)
PCC	Person-centred care
PCC-AM	Person-centred Care Planning Assessment Measure
PDC	Person-directed Care
P-CAT	The Person-centered Care Assessment Tool
TRL	Technology readiness level
XAMK	South-Eastern Finland University of Applied Sciences, project partner
WHO	World Health Organization

## Abbreviations

<i>Definition</i>	<i>Description</i>
Care	Health and care
Digital health and care	Digital health applications, which consist of certain essential elements such as wireless devices, hardware and software sensors, microprocessors and integrated circuits, the internet, social networking, mobile and body area networks, health IT, genomics, and personal genetic information
eHealth	eHealth encompasses the field of medical informatics, that organises and delivers health services and information using the internet and its associated technologies
Health IT	Information technology applied to health and care, which supports the management of health information across computerised systems and the secure exchange of health information between patients, health care providers and various other health and care stakeholders
mHealth	Mobile communication devices for health services and information, a sub-field of eHealth
Medical device	Any device intended to be used for medical purposes
Solution	In this project, solution means innovation that makes users' lives better/more comfortable. In some places, it may be synonymous with service
Person-centredness	In the context of this project, person-centredness is synonymous with human-centredness, person-centred, personal centred and patient-centredness

## Introduction

The number of people over the age of 65 is constantly rising worldwide, creating a large-scale shift in demographics. It is necessary to find ways to meet people's demands to ensure them a happy, active, and healthy lifestyle while ageing. Ageing populations will lead to the urgent need to expand access to health and care services and innovative solutions. Innovative solutions are necessary to ensure sustainable health and care systems and to create services and products that meet people's needs to create a more person-centredness and cohesive community.

The field of European Innovation Partnership on Active and Healthy Ageing (EIP on AHA) has been supported for a long time by the European Commission to promote scaling up innovative digital solutions. This support is done by conducting research and providing funding under Horizon 2020, with previous programmes and contributions from different partnerships like EIP on AHA. While several different measures were set out for the use of digital tools which are relevant for AHA, the main challenge is to facilitate contributions from all stakeholders to scale-up their innovative solutions for AHA. The aim is to create tested and ready-to use solutions in the field of health and care that can be scaled across borders. The project involves different stakeholders – end-users of the solutions, support and demand sides, local and regional ecosystems, and organizations. Through involvement and other project activities, AHA systems, innovative solutions, and policy recommendations in the field of health and care will be further developed.

This report provides an overview of the person-centredness evaluation framework in the context of health and care and suggests possible indicators to assess this issue with questions. The third chapter also provides an overview of the results of the validation of the questionnaires. These were used to conduct evaluation of the five service providers participating in the project as pilots. Although this report focuses on evaluation in a person-centredness context, as it has not done before, the authors emphasize the need for other evaluations (economic, cost-effectiveness, etc.). Many different toolkits have been developed to evaluate these components and are therefore not specifically emphasized in this report. However, we have reviewed a selection of evaluation toolkits in our previous report: "Overview of evaluation toolkits: Innovation Networks for Scaling Active and Healthy Ageing (IN-4-AHA)"(1).

The results of this report can be primarily used in the daily work of service providers and developers. On the one hand, this report helps to decipher the people-centred approach to the end-user of the service in general, and on the other hand, it helps to realistically assess the results based on the service user. In general, we have considered this evaluation framework to be used in its entirety by service providers whose service technology readiness level (TRL) is at least 5–6, as the indicators and questions require a certain degree of maturity of the service and a formed user base. At the same time, services that are still under development could also benefit by this framework, as it will help to better focus the service on the person-centredness from the very beginning.

In developing (and validating) the indicators and questions, we proceeded from three aspects: the end-users of the service, the facilitators, and the service provider. By the end-users of the service, we mean the end-users for whom the service or solution has been developed. Due to the general objectives of IN-4-AHA, we assume that the service user is 65+ years of age. Facilitators in the context of this report are the intermediate layer between the service user and the service provider, including healthcare professionals, carers, family members, etc., without whom the service or solution may not reach the end-user. By service provider we mean specifically service / solution developers or service providers.

# 1. Overview of evaluation in person-centredness approach in health and welfare care and evaluation framework

## 1.1. The importance of person-centredness

Person-centred care (PCC) is a broad concept including patient-centredness, family-centredness, customer-centredness, personal medicine, person's health, individuality, coordination of the treatment process and the person's involvement and close ones. While the concept of person-centredness, for example, a patient-centred medical home, or patient-centred care more broadly, is not entirely new and has its roots in multiple fields, for example ergonomics, implementing patient-centred care systems is still full of challenges. However, new trajectories for treatment and ways of thinking about person-centredness have recently appeared. The person-centredness concept and approach address the needs of the person, identify different stakeholders and contexts of use, and empathize, communicate, interact, and stimulate all the people involved. This kind of approach of human-centred design (HCD) is very different from many traditional design practices because the focus lies on the people for whom the solution is intended, rather than in the designer's creative process or the technology or material solution itself. It means the human is at the centre of the design process and the solution (1). The concepts of person-centredness and HCD are more thoroughly described in the report "Overview of evaluation toolkits: Innovation Networks for Scaling Active and Healthy Ageing (IN-4-AHA)"(1).

Governments across the Western world, together with private enterprises, healthcare providers and patient organisations, are emphasising the need for health and care to be more explicitly centred on the needs of the individual user, prioritising the philosophy and practice of PCC as the core of new and effective models of care delivery (2,3). The hallmark of PCC is a partnership between users and health and care providers to increase patients' active and daily participation in their health. Such communication does not require a face-to-face visit but can be provided by computer technology (4). In fact, health information technologies may be important facilitators for PCC (5,6). Although few would argue about the overall philosophy of the PCC or the potential of information technology (IT), there is less agreement on how to make technology-supported PCC a reality in everyday clinical practice. Research can better inform decisions about health policies, programs and practices and help those who want to design and implement such initiatives to identify and address key challenges (7). Seemingly well-functioning technology trials still tend to fail in the day-to-day practice of final implementation, and the failure to introduce technology is often not just a matter for individuals. Therefore, research must examine the dynamic interplay between healthcare professionals, patients, the technology used, team functioning and economic, managerial, and regulatory factors.

It is necessary to thoroughly understand different impact evaluation toolkits for assessing innovation in the field of AHA and there are essential principles that good evaluation must comply with. PCC sounds like an obvious thing to aim for in health and care, always and everywhere. However, its implementation is not always a straightforward matter. Persistent bureaucracy, increasingly complicated diagnosis, and treatment processes may be complicated. PCC is about treating or caring for the person, not the disease. A person should be involved in decision-making about their own health or care. To accomplish this, it is important that understandable information is available, on both the disease as well as the treatment or care process (8). Preferred way of interacting, diagnosis method, and optimal treatment or care choice can differ for every person.

At the very core of health and care innovation are the needs of patients and the healthcare practitioners and providers who deliver care. Quite often, service providers arrive at innovation by relying on new or existing IT. When successful, health and care innovation focuses on three areas the most – a) how the human is seen, b) how the human is heard, and c) how the human's needs are met (9,10).

## 1.2. Impact assessment for health and well-being innovations with a person-centredness focus

### Impact assessment importance for health and well-being innovation

Health technologies, in the widest meaning of the word, have changed continuously ever since the early stages of medicine. Increasing knowledge and diagnostic, preventive, treatment, and rehabilitation possibilities have altered the content of health care systems. In turn, health and social systems have also evolved into complex entities with changing roles and responsibilities for humans, health professionals, carers, payers, and regulators. The ‘new solutions (or innovations) of health and social services’ is seen as an important and influential process, that has already had a substantial impact on current health and care and health and social systems and is expected to have a further fundamental impact on health and care and its delivery in the future.

Although much of the innovation process has yet to take place, it is expected that the impact of innovation on health, health and care delivery and health and social systems can and will be profound. It will likely (further) affect the different phases of health and care delivery, including health promotion, prevention, primary care, specialised care, long-term care, social care, and self-care. Evidence suggests that current forms of digital health and social services can already impact the health and wellbeing of patients and the functioning of the health and care system in profound ways (e.g., (11)).

Impact evaluations of health and wellbeing innovations, and guidance on how to perform such evaluations, are complex and hampered by several fundamental issues (12–14):

- First, solution of health and care takes many forms. This makes (providing general guidance on) evaluating its impact difficult. Some evaluation strategies may be feasible and desirable in some cases, but not in others.
- Second, innovation takes place in many different areas of the health and social system, on the level of individual treatments (e.g., eHealth solutions to treat mild depression) to the system level (standardised treatment and care guidelines). Depending on how one interprets the definition of health and social services, such system level or organisational level aspects may or may not be seen as services. Here, we will take a broad view, including those types of technologies as at least indirectly influencing health and wellbeing services. The diversity in technologies can make the development, implementation, and decision processes (and actors) completely different for different digital health and social services, as well as their informational needs.
- Third, the (intended and unintended) impacts of innovation can differ substantially from case to case. While some innovations may directly affect human health, others may facilitate exchange of information or reduce administrative burden. Evaluations are ideally tailored in such ways that they capture the relevant impacts of an intervention, both those intended and those unintended.
- Fourth, some elements that may be intrinsic to innovative health and wellbeing services (such as the generation, transformation, and transportation of information), which may be less prominent in the evaluation of non-digital health services, such as privacy and data-leakage, need to receive sufficient attention in an evaluation of innovation health services.

The focus in this report will not be on a particular technology or on the set of technologies as available today, but on the essential features that technologies have. Thus, we aim to contribute to a framework to evaluate and monitor whether the uptake and use of innovation in health and wellbeing services contribute to the overall goals of the health and care system, such as person-centredness, which has been collectively chosen as a focus of the IN-4-AHA project. This is important because some future developments and technologies may not be foreseeable at this moment. Moreover, the developments in innovative health services coincide with the general developments of health and social systems, which is also enhanced by using new technology, towards providing proactive, predictive, prospective, preventive, participative and personalized health, and care / services (15).

### Person-centredness focus for impact assessment



Like for other services, it is important to evaluate the impact of social and health care services. Decisions to adopt, use or reimburse new health and social services, at different levels of the health and care system, are ideally based on evidence regarding their performance in the light of health and social system goals. Systematic assessment and evaluation of the impact of innovative health and social services is therefore needed.

The evaluation framework focuses on evaluating person-centredness. World Health Organization (WHO) (16) highlights the framework for the different stages of evaluation that correspond to the various stages of maturity of the health and care intervention, including:

- Feasibility: Assessment on whether the innovations in the health and social system work as intended in individual contexts.
- Usability: Assessment on whether the innovations in health and social system are used as intended.
- Efficacy: Assessment on whether the health and care innovations achieve the intended results in a research setting.
- Effectiveness: Assessment on whether the health and care innovations achieve the intended results in non-research (uncontrolled) setting.

The proposed framework does not include assessment for the uptake, institutionalization and sustainability of evidence-based health and social interventions in each context, including policies and practices.

Models and toolkits for assessing the value of health and care innovations, like MAST, NASSS, MAFEIP, have been developed and used, but their use may still be considered limited, and these models do not focus on the person-centredness aspect. All the above three toolkits are helpful for fulfilling their stated purposes and can give sufficient feedback to innovation providers. However, studies have shown that only around 1–3 domains are mainly used in the evaluation process and usually no toolkit is considered as a whole, to address all domains. Even though the area of person-centredness has been topical for quite some time, the importance of person-centredness and HCD related assessment has become increasingly important just recently.

#### Person-centredness impact assessment dimensions and domains

PCC is about treating or caring for the person, not the disease. Human should be involved in decision-making about his or her own health or care. To accomplish this, it is important that understandable information is available, on both the disease as well as the treatment or care process (8). Preferred way of interacting, diagnosis method, and optimal treatment or care choice can differ per human. In general, the nature of person-centredness treatment can be summarized and classified under eight main points presented on Figure 1 (17).

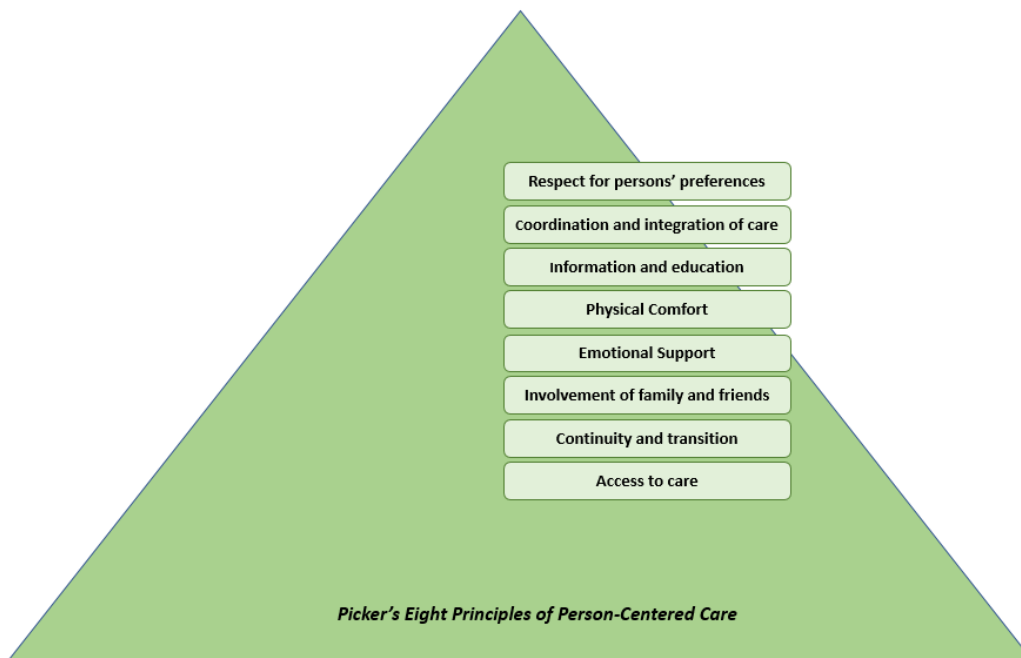


FIGURE 1. PRINCIPLES OF PATIENT-CENTRED CARE (17)

WHO (2016) has provided an important practical guide for the monitoring and evaluation of digital health interventions (18). We adopt some of the elements in this framework and report. The WHO report distinguishes between monitoring and evaluating, which is an important distinction, although the two can be strongly related.

Monitoring is defined as “the continuous process of collecting and analysing data to compare how well an intervention is being implemented against expected results”(18,19). Monitoring the impacts of an intervention can provide input into the evaluation of an intervention. Hence, this entails routine collection, review, and analysis of data which are collected or generated by digital systems, and which measure progress towards achieving intervention’s objectives (16). The role and content of both monitoring and evaluating changes with the maturity of an intervention and it is shown in Figure 2. Monitoring and evaluating internal and external context is shown in Figure 3.

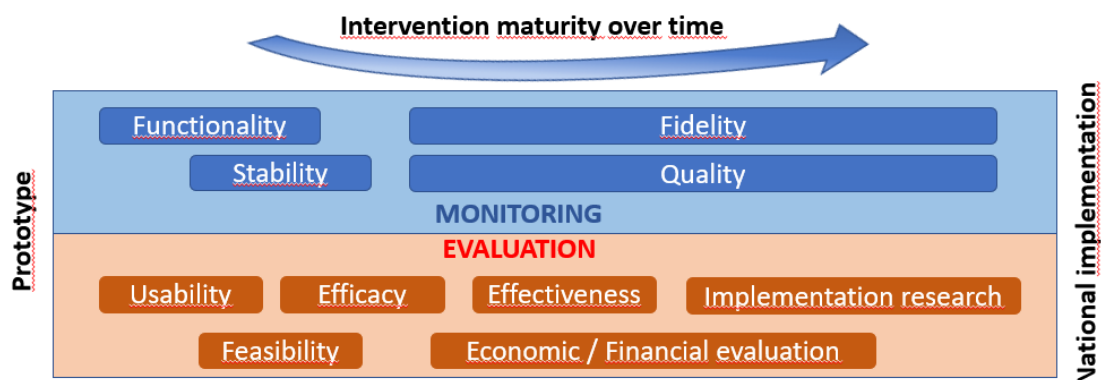


FIGURE 2. MONITORING AND EVALUATION IN RELATION TO INTERVENTION MATURITY (18)

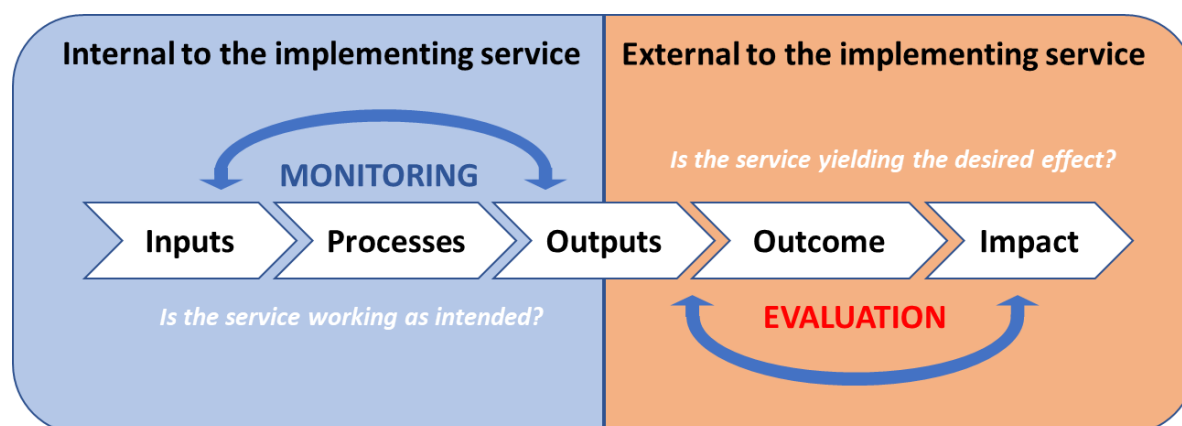


FIGURE 3. MONITORING AND EVALUATION: INTERNAL AND EXTERNAL (18)

### Impact assessment used by service providers

As part of the project, a survey was conducted to map current practices in measuring the impact of innovative solutions, see report on “Overview of innovation toolkits: Innovation Networks for Scaling Active and Healthy Ageing (IN-4-AHA)” (1). The survey was conducted among the IN-4-AHA network of innovative solution providers with a purpose of collecting current practices in using evaluation frameworks and tools, and challenges in evaluating impact in general. 40 service providers answered the questionnaire.

Respondents confirmed that they had most adequately assessed the following topics: person-centredness, need for care, and quality of life (see Table 1). This shows clearly, that the person-centredness focus is important for service providers as well. However, some solution providers stated they had not assessed any or some of the outcomes.

Table 1. Adequately and realistically assessed outcomes (service provider perspective)

	Yes	No	Partly
Quality of life	56,7 %	16,7 %	26,7 %
Need for care	63,3 %	10,0 %	26,7 %
Cost-effectiveness	43,3 %	16,7 %	40,0 %
Investment needs	3,3 %	86,7 %	10,0 %
Person-centredness	<b>70,0 %</b>	10,0 %	20,0 %
Health system involvement	43,3 %	16,7 %	40,0 %

While analysing why the solution-providers conduct impact assessment, respondents feel that impact assessment makes it possible for the organization to receive support for scaling up the service in new markets or target groups (29%), while it was also a very important input for solution development (23%). 19% of respondents use impact assessment results as input for marketing and sales activities and 15% use them to apply for funding. On the 17<sup>th</sup> of June 2021 the focus group for service providers “Evaluating the impact of innovative services. Data governance practices” also discussed this question and the aim of analysing the effectiveness, usability, and accessibility of the solution was brought out additionally.

Most (65%) innovation providers answered that they had not used any innovation evaluation toolkits to assess their innovation. The remaining 14 providers who had used any innovation assessment toolkits said they mainly used the MAFEIP toolkit, while MAST and NASSS toolkits were also used by some providers, by 36%, 22%, and 21%

respectively – the remaining used other toolkits. The reasons for not using any toolkits for impact assessment were discussed during the focus group for service providers – the main reasons were:

- Toolkits can be quite complex and contain multiple different domains, which creates the need for customization.
- Toolkits have different specific aims and since evaluation needs are different, the toolkits cannot be used universally.

The responses from the questionnaire, discussion during the focus group, and previous theoretical research clearly show that there is a specific need for service providers to evaluate impact on person-centredness, but there is no toolkit or framework available for this focus. There is a certain need for a person-centredness framework, which is easy to use and has a specific aim. An overview of the different assessment toolkits in health and care is also provided in our previous report: “Overview of evaluation toolkits: Innovation Networks for Scaling Active and Healthy Ageing (IN-4-AHA)” (1).

### 1.3. Person-centredness impact assessment at different levels

#### END-USER EVALUATION

Evaluation of health and care is evolving, with the human perspective increasingly sought to provide a more person-centredness service. Self-report questionnaires are being used to gather information about service user’s health and wellbeing-related quality of life, outcomes and experience of a care, and perceptions of the care delivered by the service provider team. Patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) are measures that provide a person-centric view of health and care (20). Both PREMs and PROMs are mainly used to obtain ratings from service end-users (21). When PROMs and PREMs are developed for macro-level purposes, it is important to involve end-users in the development and implementation of measures to ensure the relevance and applicability of the measures (22).

For this project, we consider users to be: 1) professional users (including health and care professionals) if the service is meant to benefit their work with persons aged 65+, and/or 2) end-users (persons aged 65+) if the service aims to improve their health and living condition or help receive care/assistance.

**PROMs** are self-reported questionnaires, completed by patients, which seek to measure the patient’s perceptions of their health status and health-related quality of life. They will be familiar as research tools but are now increasingly used to manage individual patients and to provide patient-related comparative data across service providers. Although variable in application to a population or to a specific condition, the content tends to focus on one or more of the following: physical functioning, symptoms, social wellbeing, psychological wellbeing, cognitive function, and role activities. Service users score their perceived status against a statement with a scale. The European quality-of-life instrument, EQ-5D (23,24), is an example of a generic PROM and the Oxford Knee Score (25), a condition-specific tool. For PROMs to be used in routine clinical practice, they must be simple to complete and contain few items concentrating on those relevant to the patient.

**A PREM** is a measure of service user's perception of their personal experience of the service they have received. PREM instruments should focus on the aspects of the service that matter to the person (26). PREM results can be used to improve services and provide a person-centredness view on the improvements that move away from the technological or economic model that is often employed in service design (20). A PREM examples include time spent waiting, access to and ability to navigate services, involvement (consumer and carer) in decision making, knowledge of care plan and pathways, quality of communication, support to manage long-term condition, and recommending the service to family and friends.

The use of person-centredness measurement data in health and care has been a robust area of research at individual, organizational, and system levels around the world. Considerable emphasis has been placed on the use of aggregated patient-centred measurement data to inform program evaluation, quality improvement, value-based healthcare, and to some degree managerial decisions. Although structures and processes exist to support

the use of aggregated patient-centred measurement data, the integration of individual-level patient-centred measurement data by service providers in daily practice is challenging worldwide for various reasons, with calls for additional research to understand needs, influential factors, and best practices for effective implementation with a focus on end-users (27).

### FACILITATOR EVALUATION

Combining qualitative and quantitative methods can provide valuable information regarding how facilitators (e.g., medical staff, carer) are prevalent and what is their relationship regarding PCC. This may lead to a more specific and effective implementation plan to support facilitators, for example nursing staff (28). There are several ways in which facilitators can assess the different components of person-centredness. One of the most common measures in the US is PCCP-AM (Person-Centred Care Planning Assessment Measure). The PCCP-AM was created by the practice developers as a competency-based measure to evaluate the extent to which facilitators incorporate person-centredness content within their required service plan. In Europe, for example, popular measures at facilitators level are Person-Directed Care (PDC) and The Person-centered Care Assessment Tool (P-CAT). The PDC tool was designed to evaluate the level to which PCC is provided in a facility as assessed by professionals directly involved in care. The dimensions include for example autonomy, knowing the person, comfort care and support relations, personal environment for residents and so on. The P-CAT is a questionnaire, which contains 13 items that measure the level of development of PCC delivered by a facility according to the personnel directly involved in care (29).

For this project, we consider the facilitators to be: 1) professionals in health and care institutions (hospitals, social and healthcare centres, assisted living communities, etc.) who provide professional support for the elderly person (65+) in connection of service which is being evaluated, and/or 2) family members, relatives, or other informal care givers who assist the elderly person to improve their health condition and/or help in general, or 3) any other person (i.e., volunteers) who directly assists the elderly person to improve their health conditions and/or helps in general.

### SERVICE PROVIDER EVALUATION

PCC has been conceptualized as one aspect of service quality. When considering how to capture the implementation of an evidence-based practice, some researchers have posited that service quality is an aspect of fidelity, referring to the extent to which a service provider adheres to techniques and the theoretical ideal of an intervention (30). A common critique of fidelity measures is that they have focused more on structure than process, even though the less tangible elements of a service may be their most essential aspects (31). Part of the challenge lies with how intuitive and self-evident the idea of person-centredness can be for service providers. Many providers feel that they are already considering person-centredness and are resistant to efforts to make their practice even more person-centred. In turn, when providers are asked to self-report their person-centredness, they tend to endorse high levels of PCC even when objective indicators suggest otherwise (32) undermining efforts to accurately evaluate PCC.

For this project, service providers are thought to be representatives of the team or company who have developed the solution (technological device or service) and have designed its delivery process. The service provider is a product owner or part of the product owner's team that has put the service on the market and has defined the target group(s) of users.

Despite extensive research, there is no single valid and reliable measurement tool that can be recommended for general use. Instruments focused on patients' perceptions of person-centredness practice may be more useful in outcomes' research, whereas instruments of learning completed by peers or facilitators may be more useful in teaching. The applicability, implementation, and measurement of person-centredness practice (PCP) need to be carefully considered as part of a drive towards quality services, as it brings several benefits (see Table 3.), particularly improved users health outcomes, as well as a reduction in facilitators' workload and service delivery costs. To ensure that these benefits are realised, there is a need to accurately measure PCP and that such measurement is based on a well-understood conceptual framework (33).

TABLE 2. BENEFITS OF PERSON-CENTREDNESS PRACTICE

For the service end-user	For the service provider	For the facilitator
Higher service user satisfaction (34)	Better adherence to treatment, recommendations, and follow-up visits (38)	More satisfaction (40)
Improved service user health (35)		Better use of time (40)
Improved quality of care (36)	Increased efficiency of care (39)	Fewer complaints from service user (40)
Increased use of preventative care (35)	Less hospitalisations (35)	
Better functional performance (37)	Shorter hospital stays (37)	
Increased service user engagement (34)		

#### 1.4. Concepts of person-centredness in the AHA project

As the IN-4-AHA project excludes clinical aspects, the focus of this framework is on health and wellbeing related innovations. We exclude clinical aspects, because there are specific tools for evaluating clinical outcomes and they place very clear constraints on the research framework. In the concept, the premise that all innovations developed must be of high quality, efficient, effective, and person-centredness is followed. This should be prerequisite for any solution, and ideally each solution should also have indicators in place based on which to measure the above components. As was discussed in the previous report (1), the components of effectiveness, efficiency, and quality of care have all been described and involved in many ways and in many frameworks. The concept of person-centredness though, not so much. Therefore, the concept is the focus of this framework and project overall – to bring more attention to the topic and to further disseminate the knowledge.

When we talk about technological solutions in the field of AHA with an emphasis on person-centredness, we need to also consider applications, which is a fast-growing market. Some of the apps fall under specific medical device regulations, but most are promoted directly to consumers through app stores without going through any formal evaluation. The apps often collect sensitive personal, health related information and provide advice, which may, or may not be supported by any evidence. Therefore, it is of rising concern to conduct more evaluation of these kinds of apps and establish standards for safety, legitimacy, and so on.

There are already multiple international standards (ISO) (41–46) related to this topic – in 2021, the ISO standard for health software quality and reliability (44) was released, which defines and requires information about the specification of the app’s quality and reliability. User-centred evaluation is brought out as a very important aspect – necessary to find out if the technology meets the necessary requirements. Additionally, many topics, which are important in the overall person-centredness concept, are emphasized in the standard as well. These are discussed below in chapters 1.4.1. – 1.4.4.

When talking about person-centredness, it is assumed that the following aspects of human’s life have been considered in the service:

- mental and emotional aspects;
- physical and structural aspects;
- environmental aspects (including social aspects);
- nutritional and chemical aspects.

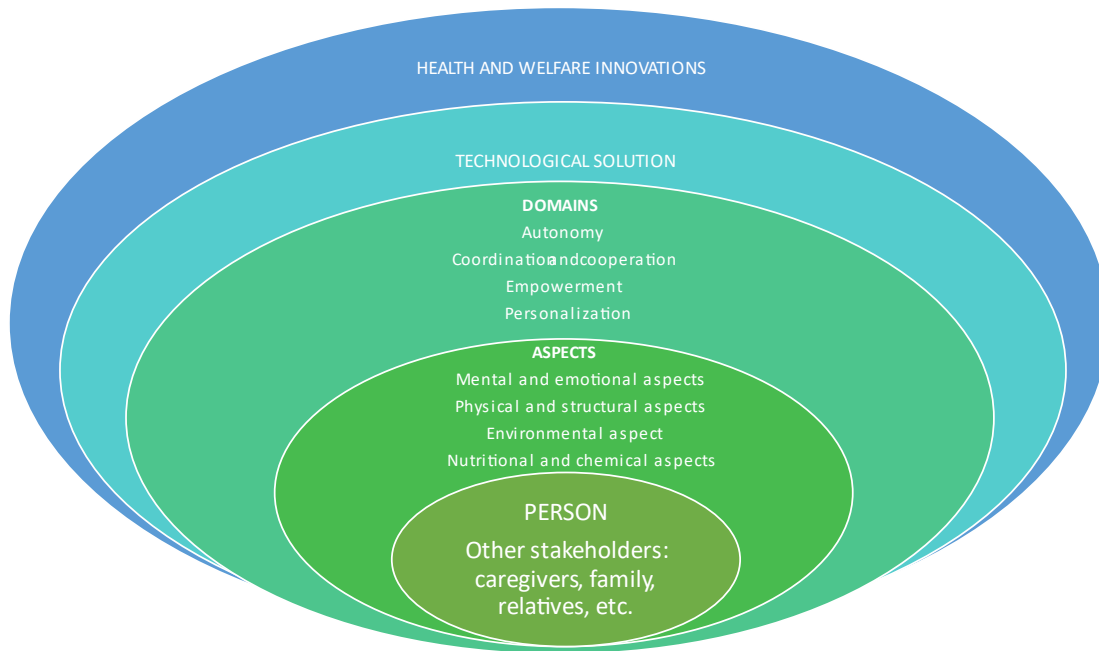


FIGURE 4. PERSON-CENTREDNESS EVALUATION CONCEPT

Depending on the service, not all components may be present at the same time, but the WHO has pointed out that at least three out of four should generally be covered. The concept of person-centredness in this framework is based on four domains on which the impact evaluation should be based on. These are autonomy, coordination and cooperation, empowerment, personalization. The domains' content with indicators and questions was formulated in collaboration with project partners, in particular discussions with Work Package 4 team. The following subchapters 1.4.1. – 1.4.4. focus on each of the domains separately and outline the main themes that also formed the basis for the development of indicators and questionnaires (see Chapter 2.).

#### 1.4.1. Autonomy

Service end-users (incl. patients) are important contributors to their own health. Their experience and knowledge hold great potential for improving all areas of the health and care system, which must be used. Through service user orientation and participation, the prevention of diseases, but also the health status and quality of life of patients can be improved. For example, Digital Health Applications (DiGA) can enable and strengthen the patients' autonomous health behaviour and effectively support their involvement in decision making processes concerning their health (47).

In recent years, new forms of care have been introduced to guarantee safe and high-quality care. Many of these approaches focus on organizational optimization and the needs and values of the stakeholders (48). Person-centred design, with its systemic approach and creativity towards humane change, plays an essential role in dealing with today's complex care challenges (6). The field of HCD revolves around discovering human needs to design products or services that meet these needs. The resulting design is understandable and usable, it accomplishes the desired tasks, and the experience of use is meaningful and pleasurable (49).

#### Health outcomes

Health outcomes derived from PCC need to be real and tangible, to show the value of implementing innovation. A person-centred access model acknowledges the structures that may result in physical or financial barriers, as well as other determinants of health-care access; it can help patients secure appropriate and preferred health care at the right time to promote improved health outcomes while reducing costs to the health-care system. Improving effective health and care innovation access has the potential to reduce hospital admissions, decrease utilization of

health-care services (e.g., emergency department visits and hospital length of stay) and may help to reduce morbidity and mortality for both acute and chronic disease (50).

In the domain of autonomy, it is most important that the person is prepared to take responsibility for their own health and is willing to cooperate (communicate, provide feedback, etc.) to improve their health and has the option to do so (51). This means that the person has a sense of responsibility on their own, but also has sufficient information and guidance to understand their health and prevent its deterioration. It is equally necessary for the person to set their own goals related to health (52,53).

Adequate information is also brought out in ISO standards (43,44) as well – it is necessary to share information with relevant stakeholders to help them decide whether the app is suitable, helpful, and so on. The information provided should include main functionalities, intended use, payment amount, contacts, and so on. Additionally, in case of problems, a system of feedback and help/support should be available.

### **Involvement**

Engagement of service users with service providers is important, as it effectively influences both the overall health-care experience, but also improves health and care provision. Additionally, users, facilitators, and service providers feel respected, listened to, and empowered. Engagement includes co-designing care plans, which includes aspects of shared decision making, goal setting and support, all of which assist care management and contribute to better health outcomes, improved quality of care and improved service users' safety (50).

User involvement shall be active, whether by participating in design, acting as a source of relevant data, or evaluating solutions. The people who are involved shall have capabilities, characteristics and experience that reflect the range of users for whom the health app is being designed. The nature and frequency of this involvement can vary throughout design and development, depending on the type of health app. The effectiveness of user involvement increases as the interaction between the developers and users increase (44).

### **Responsibility**

Self-management is not new. People have always adapted behaviour to take account of health and illness. Health and care professionals have also contributed to supporting these adaptations – albeit, not necessarily using the term 'self-management support'. The difference required is in embedding these concepts into routine practice, so that they are more highly valued and service users are more effectively and consistently supported. It is important that self-management is not seen as an entire transfer of health responsibility to the service users, without support from facilitators or service provider. Instead, the ongoing role for service providers is to enable users to be effective self-managers. This role may require adjustments to align with a different role of the user as facilitator in the care process (54).

As mentioned under health outcomes, responsibility for person's own health is very important. It is necessary to provide support for people to be responsible for their health – provide needed information, raising health awareness, and provide overall support throughout the service delivery process. It is necessary that the information given is useful and accessible for the person.

#### **1.4.2. Coordination and cooperation**

As many stakeholders might be involved in the delivery of care, it is important to select the relevant stakeholders at the start of a design project. In person-centred design, the stakeholders involve the envisioned end-user(s) and people who influence the end-user(s) in some way and are part of their sociotechnical system. Vice versa, the work or life of these people may be influenced by the new intervention and therefore their needs to be considered throughout the design process.

### **Service coordination**

Service coordination involves deliberately organizing service user care activities and sharing information among all the participants concerned with the person's care to achieve safer and more effective care. This means that the



person's needs and preferences are known ahead of time and communicated at the right time to the right people, and that this information is used to provide safe, appropriate, and effective care to the service user (55).

To ensure quality, ethical, and overall purposeful service provision, different stakeholders should be involved to consider different points of view. It is also important to bring out the necessary cooperation between service providers and health and care system, to ensure accordance to needs and standards. Other stakeholders who should be involved are, but not limited to, formal caregivers, informal caregivers, facilitators, family members, and so on.

### **Target group coordination**

To ensure a completely person-centredness service, end-users need to be involved in service provision and design processes as well. The communication methods between stakeholders should be in place and be appropriate, while consent needs to be asked as well. In addition, as with the autonomy domain, necessary information should be made available for end-users. Feedback, which is necessary to consider user experiences, should also be captured through an appropriate system.

This is also internationally standardized. ISO 9241:2019 states that the user should be actively involved to act as a source for relevant data for improvement and design (43).

### 1.4.3. Empowerment

Practicing empowerment within the PCC frame means reducing or ameliorating 'inequitable' social conditions. It is also considered to be an approach to health promotion involving patient autonomy, ensuring the patient is actively involved in their care, relying on the achievement of self-efficacy, or having a sense of control in one's life. Empowerment is seen to involve a change in the power relations that currently generally exist between the patient/person and the health professional (56). This can be understood as a human rights or social justice approach to empowerment (57). Despite some agreement that the term empowerment is not correctly defined, it is common to see definitions incorporating an element of self-efficacy or being in control of one's life. This can be understood as an individual being able to see a 'relationship between their efforts and the outcomes thereof'. It is also understood as 'an enabling process' for decision making to 'achieve change' (56).

Service user's empowerment and health literacy go hand in hand. If they have access to information about their health but no means to understand it, the information is basically useless (58). Similarly, digital literacy is an important component of service user empowerment. Using technology to empower service user isn't much good if patients can't access or understand it (59).

### **Targeted service**

It is important to know, if the service aims to improve the well-being of people aged 65+, therefore the service should be as purposeful as possible and targeted at benefitting the end-users. In this subdomain, it is necessary to point out that the need for using the service is an important indicator of whether the service fulfils the purpose of improving the user's wellbeing. Another goal in long-term health and care is to help a person live in the place they are currently residing for as long as possible, which is also aimed to benefit the human. This means the empowerment, as well as autonomy of the person, has increased too.

Another important aspect of person-centred design is that the services are provided to the right target group. This means that the development of services must be based on person's needs and adapting the service should be in accordance with their needs, not adapting the person to the service. It is also important that a suitable and tailored service helps the person to live at home for a longer time and does not require institutional care. This is more person-centred and less costly (for both the individual and the health system).

### **Early detection**

With early detection, it is most necessary to point out the preventive side of the solution. If the solution helps to prevent illness or disease progression and prevents the need for further hospital treatment, it enables the person

to improve their wellbeing. In relation to prevention, is early detection as well, which means innovation might be a more effective way to react to sudden changes in health conditions and improve further treatment.

Expenditures for prevention and early detection vary by country and typically range between 1–5% of total health expenditures (60). During the 2008 global financial crisis, many countries reduced preventive spending. In the past few years, however, several countries have introduced reforms to strengthen and promote prevention and early detection. New early detection technologies can improve the ability to identify symptoms and diseases early:

- Advances in medical monitoring devices and wearable health technology, such as ECG and blood pressure monitors and biosensors, enable patients to take control of their own health and physical condition. This is an important trend that is expected to positively contribute to early detection, for example of atrial fibrillation and Alzheimer’s disease.
- Diagnostic tools, using new biomarkers such as liquid biopsies or volatile organic compounds, together with the implementation of machine learning, can play an increasing role in areas such as oncology or infectious diseases (61).

### **Decision-making**

A very important aspect of empowerment is decision-making regarding the decision to use the service. This also overlaps with the autonomy domain since a person or other stakeholders cannot be forced to use a service.

#### 1.4.4. Personalization

The functions of a service should meet the needs of the target group, with an assessment of those needs, using applied epidemiological methodology, taken as a basis for service planning and provision. Personalization in service planning and provision is similarly the core idea in autonomy. The special needs of people aged 65+ and other social groups and, indeed, the whole population, should be taken into consideration when designing and providing the service. Identified priorities for solutions and activities may relate to various functions of care services, such as health promotion and disease prevention, or to problems outside the usual reach of health services, such as those related to the environment and social conditions in the community.

### **Accordance to needs**

Put in the simplest way possible, the service must meet a person’s needs and solve the specific problems of the individual. The person does not have to adapt to the service. In this subdomain, it is necessary to consider defined needs and evaluate if the service provider is ready to customize the service if needed. Also, as with some previous domains, it is important to assess if the solution has improved quality of life.

As underlined by the ISO standards, if the technology aims to be person-centred, it needs to define all related and relevant stakeholders, gather continuous information about user experience (UX), behaviour change and so on. This information is necessary input for establishing usability requirements. (43)

### **Usability and accessibility**

In addition to considering the general needs of the user, the service should also be usable and accessible, with also considering the learning process. If necessary, adequate instructions to enable autonomous use should also be provided. It is important to consider physical and cognitive needs and impairments, user’s safety, and access to the service, mainly affordability.

All relevant user and stakeholder groups should be identified (43) and up to date knowledge on aspects like user experience, behaviour change techniques, availability of type of devices and access to Wi-Fi and electricity should be used to promote real world continued usage of the health app. The extent to which health apps are usable (and accessible) depends on the context, i.e., the specified intended users having specified goals, performing specified tasks in a specified environment. The characteristics of the users, tasks, and environment, also known as the

context of use, is a major source of information for establishing usability requirements and an essential input to the design process.<sup>1</sup>

### **Trust and respect**

The trust and respect subdomain also slightly overlaps with other subdomains as its main point is to ensure trust and respectful relationships between different stakeholders. This also includes communication methods between stakeholders. In addition, the assessment of the end-user is important regarding the data they provide – do they feel their data is handled securely.

Personal autonomy refers to an understanding of human beings as being worthy of respect. This includes respecting a person's dignity, privacy, and their choices. Respect for autonomy is important in the context of health and care, as it is central to person-centredness care. The purpose of quality assessment is to help services to demonstrate how they show respect for human dignity, how they provide person-centredness care, and how they ensure an informed consent process that values personal choice and decision-making. By ensuring that people's autonomy is respected, service providers will improve the quality of care, safety, and quality of life of people who use health and care services (51,62).

---

<sup>1</sup> The European Blueprint on Digital Transformation of Health and Care for the Ageing Society (provides information on 12 personas, i.e., how different ages and severity of health issues can affect requirements)

## 2. Developed indicators and questions

### 2.1. Methodology

While innovation as a concept was defined and explained in the previous report (1), it is now important to focus on evaluating innovation. How exactly to evaluate innovation, is a question constantly asked by academics, policymakers, and leaders. One important aspect of innovation concerns the use of appropriate indicators for the measurement of its effectiveness, quality, person-centredness, and other features. An indicator is considered as a specific measurable value that provides information about a concrete phenomenon. Borrás and Edquist considered innovation related indicators as the source of information from which one can detect problems in the innovation system (63). This means that indicators can be the first source of knowledge about the features brought out previously.

Based on the concept in Chapter 1., indicators and questionnaires from four different domains were developed with corresponding questions as well. The domains were: 1) autonomy, 2) coordination and cooperation, 3) empowerment, and 4) personalization. The domains were decided upon previous research (see Chapter 1.), project reports and deliverables, and discussion with project consortium partners. In the next Chapters 2.2.1. – 2.2.4., the domains and specific indicators are discussed in detail. Questionnaires were developed for three groups: service providers, service users and facilitators, which are described below. The target groups were developed based on the usual care pathways and the persons with various roles in a pathway. The end-users may interact directly with the health application or be assisted by health professionals or informal caregivers. The questions were designed depending on the target group to which they were directed. The questionnaires for the senior people were different to those for the facilitators to ensure comprehension.

#### Description of target groups

Service providers are representatives of the team or company who has developed the solution (technological device or service) and has designed its delivery process. The service provider is a product owner or part of the product owner's team that has put the service on the market and has defined the target group(s) of users.

Service users are: 1) professional users (including health and care professionals) if the service is meant to benefit their work with persons aged 65+, and/or 2) end-users (persons aged 65+) if the service aims to improve their health and living condition or help receive care/assistance.

Facilitators are: 1) professionals in health and care institutions (hospitals, social and healthcare centres, assisted living communities, etc.) who provide professional support for the elderly person (65+) in connection with service, which is being evaluated, 2) family members, relatives, or other informal care givers who assist the elderly person to improve their health condition and/or help in general, or 3) any other person (i.e., volunteers) who directly assists the elderly person to improve their health conditions and/or helps in general.

The indicators that are proposed for the evaluation of AHA solutions were developed based on a literature review and the consensus principle of the project partners. To find a way to evaluate the indicators, the questionnaire methodology is proposed. As described in Chapter 1., there are multiple ways of gathering information about indicators and the specific methodology should be decided by the person/company conducting impact evaluation. For this report, impact evaluation questionnaires are proposed as the data collection method, since this is a well-known, reliable, and prevalent method for impact evaluation. Questions were developed in cooperation with project consortium partners, especially the organizations leading Work Package 4 (XAMK and CSG) that designed and conducted user testing with 5 piloting services. In compiling the questionnaires via discussion and consultation, we proceeded from the framework of person-centredness evaluation (see Chapter 1.4).

### 2.2. Indicators and questions per domains

#### 2.2.1. Autonomy

As brought out in Chapter 1.4.1., autonomy is an understanding that human beings are worthy of respect for a person's dignity, privacy, and their choices, among other things. Respect for autonomy is important in the

context of health and care, as it is central to person-centeredness care. Under this domain the following indicators and corresponding questions are set up:

#### Health outcomes

- 1) Proportion of users who, in addition to using the service, are willing to communicate, complete questionnaires, take tests, provide feedback, etc. (related to the service).  
**QUESTION:** Is the 65+ aged person and other stakeholders actively involved in developing a plan to improve their health status while using the service?
- 2) Proportion of 65+ aged persons who actively participate in the development of an outcome plan with their health care provider/service provider.  
**QUESTION:** How actively do the 65+ aged persons participate in setting outcomes regarding their health for using the service?
- 3) Presence of guidance (training materials, help-desk, training, etc.) for 65+ aged persons to help them participate in decisions related to their health/care.  
**QUESTION:** Is it ensured that the 65+ aged person has access to guidance to manage their health outcomes?

#### Involvement

- 1) Proportion of users who declared they were given the right amount of easily understandable information to enable them to participate actively in decision-making.  
**QUESTION:** Do 65+ aged persons have enough understandable information to make the right decisions regarding their health?
- 2) Proportion of users and other stakeholders (caregivers, family, etc.) who declared they were involved in development or improvement of the service.  
**QUESTION:** Are users and other stakeholders (caregivers, family, etc.) involved in the development or improvement of the service?

#### Responsibility

- 1) Availability of different guidelines and protocols of the service.  
**QUESTION:** Are necessary guidelines available for the user?
- 2) Proportion of users who report those different guidelines and protocols of the service are useful.  
**QUESTION:** Are the available guidelines useful for the user?
- 3) Proportion of 65+ aged persons who mark their role with the highest score for responsibility on health.  
**QUESTION:** Does the 65+ aged person take responsibility for their own health?
- 4) Proportion of 65+ aged persons who are better informed about their condition after using the service.  
**QUESTION:** How much does the service provider support the user in raising health awareness?
- 5) Proportion of users who reported comprehensive support throughout the service delivery process.  
**QUESTION:** Has the service provider provided support for the user throughout the service delivery process?

The examples of questions that correspond to the indicators and presumably give an answer to the indications, are listed in Annex 1 under the respective domain. These questions are created for the purpose of validating the indicators and are specific to the piloting and testing done by Work Package (WP) 4 – Service testing and adoption. More information about the validation process is given in Chapter 3.

General questions that could be used to receive indications of autonomous practices are given below. These questions are general, and every service provider should adapt the questions to their service. It is important to emphasize that all questions should be modified according to the specifics of the service and the actual care pathway.

Since the user can be a person aged 65+ or a health or care professional, the following questions above use these terms: 65+ aged person – end-user who is 65 or older; user – either a person aged 65+ or a professional user or both.

### 2.2.2. Coordination and cooperation

Coordination and cooperation involve organizing the patient’s care activities in a way that enables sharing information among all the stakeholders concerned. The aim of this is to achieve person-centeredness practices: safer and more effective care. This means that the person's needs and preferences are known ahead of time and communicated at the right time to the right people (see Chapter 1.4.2.). Under this domain the following indicators are set up:

#### Service coordination

- 1) Number of users involved in service design process.
- 2) Number of formal caregivers involved in service design process.
- 3) Number of informal caregivers involved in service design process.
- 4) Number of family members involved in service design process.  
**QUESTION:** Do the service providers involve different stakeholders in the service design process?
- 5) Number or active cooperation activities between service providers and health and care system representatives.  
**QUESTION:** Is there active cooperation between the service providers and the health and care system?

#### Target group coordination

- 1) Regular use of ways of communication with the users and related stakeholders in place.
- 2) Regular use of ways for the users to actively participate in their care.  
**QUESTION:** Are 65+ aged persons actively participating in their care?
- 3) Meaningful informed consent properly regulated and applied in service provision processes.  
**QUESTION:** Is there possibility for users to give informed consent, which is properly regulated and applied into the service provision processes?
- 4) Presence of guidance (training materials, help-desk, training, etc.) for users to help them participate in decisions related to their health.  
**QUESTION:** Is guidance (training materials, help-desk, etc.) ensured for the user?
- 5) User experiences are regularly considered (captured through a feedback system and used as a learning and improvement source).  
**QUESTION:** Can the user give feedback regarding the service?

The examples of questions that correspond to the indicators and presumably give an answer to the indications, are listed in Annex 1 under the respective domain. These questions are created for the purpose of validating the indicators and are specific to the piloting and testing done by WP4 Service testing and adoption. More information about the validation process is given in Chapter 3.

General questions that could be used to receive indications of coordination and cooperation practices are brought out below. These questions are general, and every service provider should adapt the questions to their service. It is important to emphasize that all questions should be modified according to the specifics of the service and the actual care pathway.

Since the user can be a person aged 65+ or a health or care professional, the following questions use these terms: 65+ aged person – end-user who is 65 or older; user – either a person aged 65+ or a professional user or both.

### 2.2.3. Empowerment

Empowerment involving patient autonomy, ensuring the patient is actively involved in their care, relying on an achievement of self-efficacy, or having a sense of control in one’s life (see Chapter 1.4.3.). Under this domain the following indicators are set up:

### Targeted service

- 1) Proportion of 65+ aged end-users.  
**QUESTION:** How many 65+ aged persons are the users of the service?
- 2) Proportion of 65+ aged persons whose service needs have increased.
- 3) Proportion of 65+ aged persons whose service needs have decreased.  
**QUESTION:** Has the user's need for the service increased or decreased over time?
- 4) Proportion of 65+ aged persons, who lived at home before the service, living at home after the end of the service.  
**QUESTION:** If living at home, does the service help 65+ aged persons to live longer at home?
- 5) Proportion of 65+ aged persons who can maintain their state of support by using the service.  
**QUESTION:** Does using the service enable to maintain the current state of support of the 65+ aged person?
- 6) Proportion of 65+ aged persons whose need for support has decreased by using the service.
- 7) Proportion of 65+ aged persons whose need for support has increased by using the service.  
**QUESTION:** Does the service help prevent the disease progression/health deterioration of the 65+ aged person?

### Early detection

- 1) Proportion of 65+ aged persons who reported having better control over their disease/health after using the service.
- 2) Number of 65+ aged persons who required medical interventions after using the service.  
**QUESTION:** Does the service help prevent the need for medical interventions of 65+ aged persons?

### Decision-making

- 1) Proportion of users who decided to start using the service by themselves.  
**QUESTION:** Can the user choose to use the service themselves?
- 2) Proportion of other stakeholders who decided to start using the service by themselves.  
**QUESTION:** Can other stakeholders (family, caregivers, etc.) choose to use the service themselves?

The examples of questions that correspond to the indicators and which should give an answer to the indications, are listed in Annex 1 under the respective domain. These questions are created for the purpose of validating the indicators and are specific to the piloting and testing done by WP4 Service testing and adoption. More information about the validation process is given in chapter 3.

General questions which could be used to receive indications of empowering practices are given below. These questions are general, and every service provider should adapt the questions to their service. It is important to emphasize that all questions should be modified according to the specifics of the service and the actual care pathway.

Since the user can be a person aged 65+ or a health or care professional, the following questions use these terms: 65+ aged person – end-user who is aged 65+; user – either a person aged 65+ or a professional user or both.

#### 2.2.4. Personalization

As seen in Chapter 1.4.4., personalization is necessary to meet the specific needs of the target group to provide a person-centeredness approach to care. Under this domain the following indicators are set up:

##### Accordance to needs

- 1) Reported readiness to accommodate users' needs in the service delivery and design processes.  
**QUESTION:** Is the service provider ready to customize the service according to the user's needs?

- 2) Proportion of 65+ aged persons whose personal care or assistance needs have been defined by formal or informal care systems.

**QUESTION:** Have the user's service needs been defined by formal or informal care systems?

- 3) Proportion of users who report an increase in the satisfaction with their quality of life and/or use of the service.
- 4) Proportion of users who report a decrease in the satisfaction with their quality of life and/or use of the service.

**QUESTION:** How has the use of the service changed the user's perceived quality of life?

#### **Usability and accessibility**

- 1) Number of users who have not been able to use the service because of their different physical needs (registered by the service provider).

**QUESTION:** Does the service consider different physical needs (blindness, deafness, etc.) of the user?

- 2) Number of users who have not been able to use the service because of their different psychological needs (registered by the service provider).

**QUESTION:** Does the service consider different psychological needs (need for orientation, need for self-esteem enhancement, etc.) of the user?

- 3) Number of users who have not been able to use the service because of their different social needs (registered by the service provider).

**QUESTION:** Does the service consider different social needs (need for social isolation, need for interactions, etc.) of the user?

- 4) Number of users who have not been able to use the service because of their different environmental needs (registered by the service provider).

**QUESTION:** Does the service consider different environmental needs (need for home services, need for reasonable living conditions, etc.) of the user?

- 5) Proportion of users who feel safe while using the service.

**QUESTION:** Does the user feel safe while using the service?

- 6) Proportion of users who have thought of discontinuing the service because of its complexity.

**QUESTION:** Has the user considered discontinuing the service because of its complexity?

- 7) Proportion of users who report the price of the service as reasonable for them.

**QUESTION:** Does the user feel the price of the service is reasonable for them?

#### **Trust and respect**

- 1) Proportion of users who experience respect and dignity when using the service.

**QUESTION:** Does the user feel dignified and respected while using the service?

- 2) Proportion of users who know and trust that their data is collected and handled in a secure way.

**QUESTION:** Does the user feel that their data has been collected and handled securely?

The examples of questions that correspond to the indicators and which should give an answer to the indications, are presented in Annex 1, in each respective domain. These questions are created for the purpose of validating the indicators and are specific to the piloting and testing done by WP4 Service testing and adoption. More information about the validation process is given in Chapter 3.

General questions that can be used to indicate personalization practices are brought out below. These questions are general, and every service provider should adapt the questions to their service. It is important to emphasize that all questions should be modified according to the specifics of the service and the actual care pathway.

Since the user can be a person aged 65+ or a health or care professional, the following question use these terms: 65+ aged person – end-user who is aged 65+; user – either end-user aged 65+ or a professional user or both.



### 3. Validation

To get feedback on whether the developed framework, questions and indicators are valid and purposeful for evaluating person-centeredness, a validation process was conducted using the questionnaires. This is a necessary step in all impact evaluation method development processes to gain insight on whether the indicators and methods help us to receive the information needed to further develop and design the solution. This is especially important regarding the person-centeredness focus, since the human needs to be included in every step of the solution design and provision, as proven before.

The validation process was done in cooperation with WP4 – Service testing and adoption – which incorporated the questionnaires for three stakeholder groups into their testing period during D4.1. and D4.2. For the D4.1, five pilots were selected for the project to be tested and evaluated regarding person-centeredness. Testing of pilots is described in Chapter 3.1., where a short description of the testing process and pilots is given.

#### 3.1. Testing with pilots

During the testing process for D4.1, WP4 partners tested the innovative health and care solutions through development and experimentation. The tests for pilots were conducted in Living labs where the participants test the pilots in a real-life environment where they can also receive help from professionals if necessary. The objective of this testing was to understand the reactions and attitudes of the users of the proposed products (solutions), as well as to capture their behaviours.

During the testing period, specific questionnaires for each pilot were disseminated. The questionnaires were carried out for previously specified stakeholder groups:

- The questionnaires that addressed the 65+ aged persons were distributed and collected by the professionals of the testing organizations (Living Labs). The reason for this is that the 65+ aged participants have a relationship of trust with the Living Lab representative (the testing facilitator) and the responses collected will have more value.
- The questionnaires addressing Living Lab professionals, service providers, and other relevant stakeholders were answered individually. They were sent beforehand by email. An ad hoc testing guide was made for each pilot where the link to the questionnaires was accessed through a QR code. The answers were then returned to the testing organization for evaluation.

The pilots that participated in the testing and evaluation process:

#### **Tecnologias Plexus SL, AVECEN**

**AVECEN** is the virtual assistant for active aging of people with neurodegenerative mental illnesses. The objective of the service is the development of a distributed platform that allows self-management of neurodegenerative diseases by patients as well as decision-making by medical professionals and caregivers of their environment. For this, the creation of a dynamic virtual assistant is proposed that continuously monitors and evaluates the execution of certain clinical and lifestyle routines. The assistant is also making recommendations adapted to the patient's condition and always evaluating their frequent or habitual behaviour, allowing to understand its evolution over time.

#### **Novos Sistemas SI, Coquus**

**Coquus** is a software for integrating menus with user-specific information for healthy eating. The goal of Coquus is better nourished and happier elderlies. Coquus is a software integrating different menus with their technical sheets, allergens, costs, and nutritional assessments with the characteristics of diners such as allergies and tastes, and by combining both, it decides what each person should take.

#### **uCare, ENNA**

**ENNA** (previously lilo+) is an operating concept for tablets to facilitate independent digital communication for beginners. ENNA enables digital beginners to communicate independently digitally and to access and use digital content such as entertainment and support. For this purpose, tablet is extended with a haptic operating concept.

**Myontec**

**Myontec** utilizes muscle activation technology in smart clothes for active ageing. Myontec develops smart clothes to motivate elderly people to keep their muscles activated and maintain good balance. Myontec is the cutting-edge wearables company which takes muscle activation technology – electromyography – out of the lab, for a new dimension in understanding muscles behaviour and their objective is to control sufficient blood flow and metabolism to prevent blood clots.

**TempID Smart Patch**

**TempID Smart Patch** is a body temperature logger with mobile application. It is a reusable body temperature logger with mobile application (with NFC technology) for early detection of health risks, potential infection, and other health related issues. The aim is to support remote care and increase efficiency.

### 3.2. Evaluation of pilots

Depending on the stakeholder profile to whom the questionnaire was aimed at, there were 27–29 questions in the questionnaire. The received responses contained some questions that were not answered at all.

The questionnaires were responded by 5 service providers i.e., all the pilots, 77 facilitators, and 70 users. Note that the respondent's total number may not correspond to the total number of participants in user testing. Service providers proposing 5 different services (solutions) were included. Facilitators evaluated four different services, Myontec (16), Avecen (31), Enna (10) and TempID (20) (Coquus was excluded because they could not be tested during the evaluation period). The user responses were on five different services – Avecen (18), Enna (18), Myontec (16), Coquus (7) and TempID (11).

Next, we will present the results by stakeholder groups.

**Service providers**

The service providers estimated that 70% of 65+ aged end-users were actively involved in defining their health outcomes. They estimated, that 60% of end-users give feedback to the services and, in addition, 100% of the service-providers encourage the end-user to take responsibility for their own health and aim to improve the end-user's awareness on their own health.

Three service providers reported that they involved people aged 65+ in the service development process and four services involved formal caregivers in service development process. Only 2 service providers reported that they also involved family members in the service development process. Generally, service providers have channels to communicate with end-users to get feedback and it is regulated by law and standard.

The estimated proportion of the people aged 65+ whose service needs have increased during the period of using the service is about 10%. However, the service providers could not estimate the proportion of the elderly whose service needs have decreased during the period of using the service. One service provider has estimated that it is about 50%. 77% of end-users have reported to the service providers that the service has helped them to manage their health better. In addition, all of end-users have reported that they experience respect and dignity when using the service. The service providers estimated, that about a quarter of end-users were unable to use the service due to individual physical needs, 12% due to individual psychological needs, 1,6% due to individual social needs and 12,5% due to individual environmental needs. The service providers have no information if the users have declined or discontinued the service because the service has proven to be too costly. This is due to the fact that during testing, the users had not had any previous usage experience with the service and therefore could not estimate the cost (nor were they informed of the cost). All the service providers reported that they use adequate information security measures for technology to handle personal data in a secure way.

Answers to these questions indicate that the questions and indicators proposed are purposeful, since the answers from service providers give enough insight on the chosen indicators. It is a signal that the indicators and questions can be used to evaluate the aspects where the service is designed to be person-centered, or where there is room for improvement.

The service providers also gave further feedback on the suitability of the questionnaire to assess person-centeredness. The main thing we noticed, is that the definition of “end-user” was not unequivocally understood. For example, one service provider defined the end-user as only the person aged 65+, but according to our definition, we also include people who work with or help the 65+ person or someone whom the service is aimed at as the end-user. The pilot services are aimed at 65+ persons with the exception of Coquus which is aimed at professionals (formal caregivers). Therefore, the service providers did not understand the questionnaire in the same way. This shows that there is a need to clearly present definitions before respondents start answering the questionnaire.

Furthermore, we also wanted to know, if the service providers perceived the questions as appropriate and relevant. Regarding this, differences in opinions were also present on whether a question is appropriate or not. For example, one service provider answered that the question “How many elderly persons (65+) are involved in service development process?” is not appropriate for them since they receive information about the 65+ aged people from caregivers and other health professionals. The answer may suggest that the question is indeed appropriate for the service, since it points out that the solution may not be as person-centered as it could be when not involving 65+ aged people - there is a possibility for improvement with involving the end beneficiaries. However, regarding the peculiarities of each individual service, involvement of 65+ aged people may not be possible and then the question may be assessed as not relevant for a specific case.

In general, it was found that if the service is at an early development or provision stage or has recently started working with new users, the questionnaire can be useful, as well for services that have been on the market longer. In addition, we saw that since services can be very different, it is important for service providers who will be conducting the person-centredness assessment to critically analyse the questions and indicators and decide on which aspects and domains are more relevant and applicable for the service. Therefore, it might happen, that some questions could be left out or modified to some extent.

### **Facilitators**

The facilitators reported that they have actively guided the end-users to participate in the development of an outcome plan. Only around a quarter of facilitators reported that guidelines and adequate information materials are available for the end-user to help them participate in their health/care related decisions. In addition, 29% of facilitators responded that end-users have indicated how they would like to engage in making decisions on their health and care and all facilitators are guided to give feedback to the end-user on the service. Again, only a quarter of the facilitators feel, that end-users are better informed about their health after using the service. However, they feel that they offered full support to the end-user throughout the service and this input was valuable to the improvement of this service.

Majority of the facilitators responded (83%) that if the end-user is currently living at home, these services will not prolong the time the end-user lives at home (not in need for institutional care). 50% of facilitators feel that all the different needs of the end-user were considered when providing the service, but the overall quality of life for the end-users after using the service did not change or only improved a bit. In facilitators' opinion, the services were difficult to provide, as 43% of the end-users have psychological needs and 53% have environmental needs, that make it difficult for them to use the service. However, all of the end-users reported that they felt safe using the service and were treated with respect and dignity by the facilitator during the use of the service.

Answers to these questions indicate that the questions and indicators proposed are purposeful, since the answers from service providers give enough insight on the chosen indicators. It is a signal that the indicators and questions can be used to evaluate the aspects where the service is designed to be person-centered, or where there is room for improvement.

## Users

30% of users reported that they are actively involved in developing a plan to improve their health status while using the service. 69% reported that the service gives enough information to help make decisions about their health status and a quarter reported that use of the service enables them to take responsibility for their health status. Almost all end-users (99%) are involved or are motivated to be involved in the development or improvement of the service and 94% have given feedback on the use of the service. Almost all (97%) of the respondents felt they received full support throughout the service, but only 41% of them feel better informed about their health after using the service.

The need to use the service increased for 35% of users, decreased for 3% of users, and did not change for 62% of users during the period of using the service. Even though 40% of users think that the service will not help to live longer at home, 34% of users think that using the service will enable to maintain their current state of support. Answers to these questions may indicate that there is a misunderstanding of the questions or there were many end-users, who were not living at home. The majority of testing participants live in care homes.

The service has helped 43% of users to better manage their health, however, for 77% of users it has not helped to reduce need for other medical interventions. Majority (81%) of users feel that all their different needs were considered when providing the service. The fact that the respondents' need for help was met only through the formal care system was mentioned by 71% of the respondents, and only 5% of the respondents said that both the formal and informal system were used to satisfy the need for care. 32% of users have physical needs that make difficult to use the service, but only 8% of users have considered discontinuing the service because it seems too complicated to use. Almost all the users feel safe using the service. Even more, 97% users feel treated with dignity and respect during using the service. However, only 20% of users were asked to give personal data (data that allows the person to be identified – e.g., name, picture, address, fingerprint, etc.) to use the service. Even though data was not gathered from all users, the ones who reported giving personal data also stated that the data was handled securely, and they have been given information about how the personal data will be used (informed consent).

With one exception, the overall answers to these questions indicate that the questions and indicators proposed are purposeful, since the answers from users give enough insight on the chosen indicators and considering this, it is possible to evaluate whether the service is person-centered enough or if there is room for improvement.

### 3.3. Validation of questionnaires

During the development of this tool, questionnaires were distributed among service providers (N = 5), service end users (N = 70) and facilitators (N = 77) with an aim to evaluation how much person-centeredness aspects are considered in the provision of the service. As there were only five service providers, it was difficult to assess their individual validity based on these responses. We also asked all service providers to provide feedback on the questionnaire, and a summary of the feedback is provided above.

However, since the users and facilitators of the service had answered the questionnaires sufficiently, it is possible to assess the validity of the questionnaire based on them. However, it must be considered that the questionnaires have been conducted in a testing environment and may not directly compare to data in real life. One of the main differences is the response rate, which is much higher in a test environment than in real user base.

There was a total of 29 end-user questionnaires and 28 from the facilitators. We calculated our score for each question. As most of the questions had “yes / no / other” answers, we considered 3 points for the “yes” answers (because these answers were also associated with a positive result and showed a greater connection with person-centeredness). We considered 1 point for the answer “no” and 2 points for “other” (because most of the time these answers fell somewhere in between “no” and “difficult to say”). There were also 2 questions in the facilitators' questionnaire that we had to define through another system. The answers to question 19 (Have the assistance needs of the end-user been defined by formal or informal care systems?) were “*Formal care system / Informal care system / Both / Neither*”. We graded the first three answers with a score of 3 and the answer

“Neither” received 1. Question 20 (Has the overall quality of life changed for the end-users after using the service?) contained five different answers and received scores 1-4 (see Appendix 4). In the user questionnaire, we scored questions 17 and 18 according to the same scheme.

After calculating the scores for the questions across domains, we added a range for each domain according to the score (see table 4 and table 5). We divided the scores into three categories:

- **Very good** - means that the answers indicate good consideration of person-centeredness aspects
- **Good** - means that the answers refer to an average person-centeredness count
- **Satisfactory** - means that the aspects of person-centeredness have not been considered sufficiently in the provision of the service.

TABLE 4. QUESTIONNAIRE SCORE VALUES

	End user				Facilitator			
	Domain 1	Domain 2	Domain 3	Domain 4	Domain 1	Domain 2	Domain 3	Domain 4
<b>Very good</b>	17 - 21	8 - 9	12 - 15	34 - 43	20 - 24	10 - 12	12 - 15	27 - 34
<b>Good</b>	12 - 16	5 - 7	8 - 11	24 - 33	14 - 19	7 - 9	8 - 11	19 - 26
<b>Satisfactory</b>	7 - 11	3 - 4	5 - 7	14 - 23	8 - 13	4 - 6	5 - 7	11 - 18

The following table shows the scoring results. Based on these questionnaires, it can be said that the person-centeredness aspects have been well or very well considered in the opinion of the service recipients. Of course, it must also be considered that since the number of questionnaires varies greatly from domain to domain, those domains with fewer questions are more likely to get better results than those with more questions. The authors considered it the same to artificially equate the number of questionnaires in the domains.

TABLE 5. RESULTS OF QUESTIONNAIRE SCORES BY DOMAINS

	End users				Facilitator			
	Domain 1	Domain 2	Domain 3	Domain 4	Domain 1	Domain 2	Domain 3	Domain 4
<b>Total score</b>	21	9	15	43	24	12	15	34
<b>Average</b>	16,5	7,8	8,9	28,1	18,1	10,6	8	22,2
<b>Compliance</b>	Good	Very good	Good	Good	Good	Very good	Good	Good
<b>Number of questions</b>	7	3	5	14	8	4	5	11

We did not calculate scores for the service provider questionnaire in this study. The main reason was that as there were only 5 respondents (equal to pilots), it was not possible to establish average trends. The second reason was that since the questionnaire contained different types of questions, not all of which were related to the person-centeredness, it is also difficult to assign values to the domain, for example the question about the amount of 65+ aged users. However, the authors emphasize that the more “yes” answers the service provider can give and the higher the numbered answers, the more and better the service provider has been able to think about the person-centredness aspect.

## Conclusion and summary

This report describes the proposed evaluation framework in a person-centeredness context, and presents the indicators and questions developed for this purpose. This is the first time an evaluation framework has been so thoroughly focused on the person-centeredness aspect. In compiling the indicators and questionnaires, the authors assumed that the process of conducting the survey would be managed primarily by the service providers themselves and no external assistance is necessary. This would be an important input to improve the quality of the service and increase the personal focus of the service. However, the service provider team must be able to honestly evaluate the process at the level of its activities and draw conclusions from it.

During the IN-4-AHA project, we have developed indicators and questions only specifically in the context of person-centeredness focus based on the service and its impact on the end-user. At the same time, we have built in flexibility in the questionnaires so that service providers can adapt it to their service and target group if necessary (by skipping some questions rather than changing them completely).

During the development of this framework, a questionnaire was tested among service providers, service users and facilitators. As we only had 5 service providers during the pilot, it is unfortunately not possible to thoroughly assess the validity of the questionnaire based on these results, so there is a need for further validation. However, there were almost 150 respondents among service users and facilitators, which allows preliminary conclusions to be drawn. The following are the main conclusions that can be drawn from the facilitator and user questionnaires:

- The number of questions in the questionnaire is sufficient to assess the aspects of the person-centeredness when using the service. Although the number varied greatly across domains (3-14), the authors did not consider it necessary to equate domains artificially. Each domain had an objective, and they were achieved as a result of this pilot.
- Most of the questions had “yes / no / other” answer options. This structure of the question is convenient for the respondent of the questionnaire, but it may not provide sufficient information to the evaluators of the results of the answer for all questions. However, given the relatively low number of “other” answers, this suggests fairly high clarity of the question and the possibility to answer “yes / no” on a scale.
- Based on the results of the questionnaires, the service providers who participated in this pilot have taken good or very good account of person-centeredness. However, the question remains whether these results are due to the fact that the survey was conducted in a test situation or whether the results would be the same in a real-life assessment. For example, we are not able to assess whether and to what extent the respondents understood the question or whether the respondents had to explain the questions in addition nether, explanations were given.

The feedback from the service providers to the questionnaire was also generally good and the questions were answered. At the same time, it must be considered that we had only five service providers involved in the pilot, which meant that we could not create scores like the user and facilitator questionnaires. However, given that the service providers may be very different, and the questionnaire may be used to evaluate different levels of maturity (recommended TRL 5-9), the service provider should aim to answer as many yes answers as possible and to be able to answer numerical questions as highly as possible to make sure that they have a good level of person-centeredness.

In conclusion, the person-centeredness focused questionnaire developed within the framework of this project fulfils its purpose and gives both the service provider and its user an evaluation of the service's person-centeredness. As tools with this focus have not been developed before, it has new value. However, from the service provider's point of view, other aspects of evaluation (economic, cost-effectiveness, efficiency, etc.) cannot be overlooked, and this evaluation framework and questionnaire would only be an additional method of assessing and improving one's service. So, the service provider must consider that it must also use other evaluation tools (e.g., MAFEIP, NASSS, MAST, etc.).

## Bibliography

1. Paat-Ahi G, Kurmiste A, Purge P, Randväli A, Hinsberg H. Overview of innovation toolkits: Innovation Networks for Scaling Active and Healthy Ageing IN-4-AHA. Tallinn: PRAXIS Centre for Policy Studies; 2021.
2. Berntsen G, Høyem A, Lettrem I, Ruland C, Rumpsfeld M, Gammon D. A person-centered integrated care quality framework, based on a qualitative study of patients' evaluation of care in light of chronic care ideals. *BMC Health Serv Res*. 2018 Dec;18(1):479.
3. Kitson A, Marshall A, Bassett K, Zeitz K. What are the core elements of patient-centred care? A narrative review and synthesis of the literature from health policy, medicine and nursing: *Core elements of patient-centred care*. *J Adv Nurs*. 2013 Jan;69(1):4–15.
4. Parker S, Prince A, Thomas L, Song H, Milosevic D, Harris MF. Electronic, mobile and telehealth tools for vulnerable patients with chronic disease: a systematic review and realist synthesis. *BMJ Open*. 2018 Aug;8(8):e019192.
5. Abimbola S, Patel B, Peiris D, Patel A, Harris M, Usherwood T, et al. The NASSS framework for ex post theorisation of technology-supported change in healthcare: worked example of the TORPEDO programme. *BMC Med*. 2019 Dec;17(1):233.
6. Wildevuur SE, Simonse LW. Information and Communication Technology–Enabled Person-Centered Care for the “Big Five” Chronic Conditions: Scoping Review. *J Med Internet Res*. 2015 Mar 27;17(3):e77.
7. Greenhalgh T, Wherton J, Papoutsis C, Lynch J, Hughes G, A’Court C, et al. Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies. *J Med Internet Res*. 2017 Nov 1;19(11):e367.
8. Jo Delaney L. Patient-centred care as an approach to improving health care in Australia. *Collegian*. 2018 Feb;25(1):119–23.
9. Reiling J, Hughes RG, Murphy MR. The Impact of Facility Design on Patient Safety. In: Hughes RG, editor. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses* [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 [cited 2021 Nov 29]. (Advances in Patient Safety). Available from: <http://www.ncbi.nlm.nih.gov/books/NBK2633/>
10. Thimbleby H. Technology and the future of healthcare. *J Public Health Res*. 2013 Dec 1;2(3):28.
11. Deloitte Centre for Health Solutions. Connected health: how digital technology is transforming health and care. [Internet]. 2015. Available from: [https://ec.europa.eu/health/sites/default/files/expert\\_panel/docs/022\\_digitaltransformation\\_en.pdf](https://ec.europa.eu/health/sites/default/files/expert_panel/docs/022_digitaltransformation_en.pdf)
12. European Commission. Opinion on assessing the impact of digital transformation of health services. [Internet]. LU: Publications Office; 2019 [cited 2021 Nov 29]. (Directorate General for Health and Food Safety.). Available from: <https://data.europa.eu/doi/10.2875/644722>
13. Gertler PJ, Martinez S, Premand P, Rawlings LB, Vermeersch CMJ. *Impact Evaluation in Practice, Second Edition* [Internet]. Washington, DC: Inter-American Development Bank and World Bank; 2016 [cited 2021 Feb 28]. Available from: <http://hdl.handle.net/10986/25030>
14. Leeuw FL, Vaessen J, Banque mondiale, Independant evaluation group. *Impact evaluations and development: NONIE guidance on impact evaluation*. Washington, Dc: Network of networks on impact evaluation; 2009.
15. Moutzoglou A, editor. *Design, Development, and Integration of Reliable Electronic Healthcare Platforms*: [Internet]. IGI Global; 2017 [cited 2021 Nov 29]. (Moutzoglou A, editor. *Advances in*



- Healthcare Information Systems and Administration). Available from: <http://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/978-1-5225-1724-5>
16. WHO. Monitoring and evaluation of health systems strengthening: An operational framework [Internet]. 2009. Available from: [https://www.who.int/healthinfo/HSS\\_MandE\\_framework\\_Nov\\_2009.pdf](https://www.who.int/healthinfo/HSS_MandE_framework_Nov_2009.pdf)
  17. O’Neill N. The Eight Principles of Patient-Centered Care [Internet]. 2015. Available from: <https://www.oneviewhealthcare.com/blog/the-eight-principles-of-patient-centered-care/>
  18. WHO. WHO | Monitoring and evaluating digital health interventions [Internet]. WHO. World Health Organization; 2016 [cited 2021 May 6]. Available from: <http://www.who.int/reproductivehealth/publications/mhealth/digital-health-interventions/en/>
  19. WHO. Transforming and scaling up health professionals’ education and training: World Health Organization guidelines 2013. [Internet]. 2013. Available from: [http://apps.who.int/iris/bitstream/10665/93635/1/9789241506502\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/93635/1/9789241506502_eng.pdf)
  20. Hodson M, Andrew S, Michael Roberts C. Towards an understanding of PREMS and PROMS in COPD. *Breathe*. 2013 Sep 1;9(5):358–64.
  21. Sawatzky R, Laforest E, Schick-Makaroff K, Stajduhar K, Reimer-Kirkham S, Krawczyk M, et al. Design and introduction of a quality of life assessment and practice support system: perspectives from palliative care settings. *J Patient Rep Outcomes*. 2018 Dec;2(1):36.
  22. Desomer A, Van den Heede K, Paget J, De Boer D, Kohn L, Cleemput I. Use of patient-reported outcome and experience measures in patient care and policy. *Health Services Research (HSR)* [Internet]. : Belgian Health Care Knowledge Centre (KCE); 2018. Available from: [https://www.nivel.nl/sites/default/files/bestanden/KCE\\_use\\_of\\_PROM\\_PREM.pdf?](https://www.nivel.nl/sites/default/files/bestanden/KCE_use_of_PROM_PREM.pdf?)
  23. Jahagirdar D, Kroll T, Ritchie K, Wyke S. Patient-Reported Outcome Measures for Chronic Obstructive Pulmonary Disease: The Exclusion of People with Low Literacy Skills and Learning Disabilities. *Patient*. 2013 Mar;6(1):11–21.
  24. McClure NS, Sayah FA, Xie F, Luo N, Johnson JA. Instrument-Defined Estimates of the Minimally Important Difference for EQ-5D-5L Index Scores. *Value in Health*. 2017 Apr;20(4):644–50.
  25. Dakin H, Gray A, Murray D. Mapping analyses to estimate EQ-5D utilities and responses based on Oxford Knee Score. *Qual Life Res*. 2013 Apr;22(3):683–94.
  26. Coulter A, Fitzpatrick R, Cornwell J. The Point of Care Measures of patients’ experience in hospital: purpose, methods and uses [Internet]. The King’s Fund; 2009. Available from: [https://www.kingsfund.org.uk/sites/default/files/Point-of-Care-Measures-of-patients-experience-in-hospital-Kings-Fund-July-2009\\_0.pdf](https://www.kingsfund.org.uk/sites/default/files/Point-of-Care-Measures-of-patients-experience-in-hospital-Kings-Fund-July-2009_0.pdf)
  27. Wolff AC, Dresselhuis A, Hejazi S, Dixon D, Gibson D, Howard AF, et al. Healthcare provider characteristics that influence the implementation of individual-level patient-centered outcome measure (PROM) and patient-reported experience measure (PREM) data across practice settings: a protocol for a mixed methods systematic review with a narrative synthesis. *Syst Rev*. 2021 Dec;10(1):169.
  28. Kloos N, Drossaert CHC, Trompetter HR, Bohlmeijer ET, Westerhof GJ. Exploring facilitators and barriers to using a person centered care intervention in a nursing home setting. *Geriatric Nursing*. 2020 Nov;41(6):730–9.
  29. Martínez T, Suárez-Álvarez J, Yanguas J, Muñiz J. The Person Centered approach in Gerontology: New validity evidence of the Staff Assessment Person-directed Care Questionnaire. *International Journal of Clinical and Health Psychology*. 2016 May;16(2):175–85.



30. Bond GR, Drake RE. Assessing the Fidelity of Evidence-Based Practices: History and Current Status of a Standardized Measurement Methodology. *Adm Policy Ment Health*. 2020 Nov;47(6):874–84.
31. Teague GB, Mueser KT, Rapp CA. Advances in Fidelity Measurement for Mental Health Services Research: Four Measures. *PS*. 2012 Aug;63(8):765–71.
32. Matthews EB, Stanhope V, Choy-Brown M, Doherty M. Do Providers Know What They Do Not Know? A Correlational Study of Knowledge Acquisition and Person-Centered Care. *Community Ment Health J*. 2018 Jul;54(5):514–20.
33. Louw JM, Marcus TS, Hugo J. How to measure person-centred practice – An analysis of reviews of the literature. *Afr j prim health care fam med [Internet]*. 2020 Mar 4 [cited 2021 Nov 30];12(1). Available from: <https://phcfm.org/index.php/phcfm/article/view/2170>
34. McMillan SS, Kendall E, Sav A, King MA, Whitty JA, Kelly F, et al. Patient-Centered Approaches to Health Care: A Systematic Review of Randomized Controlled Trials. *Med Care Res Rev*. 2013 Dec;70(6):567–96.
35. Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ Open*. 2013;3(1):e001570.
36. Morgan S, Yoder LH. A Concept Analysis of Person-Centered Care. *J Holist Nurs*. 2012 Mar;30(1):6–15.
37. Olsson L-E, Jakobsson Ung E, Swedberg K, Ekman I. Efficacy of person-centred care as an intervention in controlled trials - a systematic review. *J Clin Nurs*. 2013 Feb;22(3–4):456–65.
38. Arbuthnott A, Sharpe D. The effect of physician–patient collaboration on patient adherence in non-psychiatric medicine. *Patient Education and Counseling*. 2009 Oct;77(1):60–7.
39. Stewart M, Brown JB, Donner A, McWhinney IR, Oates J, Weston WW, et al. The impact of patient-centered care on outcomes. *J Fam Pract*. 2000 Sep;49(9):796–804.
40. Stewart M. Reflections on the doctor-patient relationship: from evidence and experience. *Br J Gen Pract*. 2005 Oct;55(519):793–801.
41. ISO STANDARD. Iso DIS: 9241–210:2010: ergonomics of human-system interaction—part 210: human-centred design for interactive systems (formerly known as 13407). Switzerland: International Standards Organization; 2010.
42. ISO STANDARD. SO 13940:2015, Health informatics-System of concepts to support continuity of care. 2015.
43. ISO STANDARD. ISO 9241-210:2019, Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems. 2019.
44. ISO STANDARD. Health software - Part 2: Health and wellness apps - Quality and reliability (ISO/TS 82304-2:2021). 2021.
45. ISO/IEC/TR. ISO/IEC/TR 20007:2014, Information technology - Cultural and linguistic interoperability - Definitions and relationship between symbols, icons, animated icons, pictograms, characters and glyphs. 2014.
46. ISO/TS. ISO/TS 27790:2009, Health informatics- Document registry framework. 2009.
47. BfArM. The Fast-Track Process for Digital Health Applications (DiGA) according to Section 139e SGB V A Guide for Manufacturers, Service Providers and Users [Internet]. Bonn: Federal Institute for Drugs and Medical Devices; 2020. Available from: [file:///C:/Users/gerli/Downloads/DiGA\\_Guide.pdf](file:///C:/Users/gerli/Downloads/DiGA_Guide.pdf)

48. Tseklevs E, Cooper R. Emerging Trends and the Way Forward in Design in Healthcare: An Expert's Perspective. *The Design Journal*. 2017 Jul 28;20(sup1):S2258–72.
49. van der Bijl-Brouwer M, Dorst K. Advancing the strategic impact of human-centred design. *Design Studies*. 2017 Nov;53:1–23.
50. Santana MJ, Manalili K, Jolley RJ, Zelinsky S, Quan H, Lu M. How to practice person-centred care: A conceptual framework. *Health Expect*. 2018 Apr;21(2):429–40.
51. Health Information and Quality Authority. Supporting people's autonomy: a guidance document [Internet]. 2016. Available from: <https://www.hiqa.ie/sites/default/files/2017-01/Supporting-Peoples-Autonomy.pdf>
52. Grady PA, Gough LL. Self-Management: A Comprehensive Approach to Management of Chronic Conditions. *Am J Public Health*. 2014 Aug;104(8):e25–31.
53. NHS. Statutory guidance Care and support statutory guidance [Internet]. 2021. Available from: <https://www.gov.uk/government/publications/care-act-statutory-guidance/care-and-support-statutory-guidance>
54. Ahmad N, Ellins J, Krelle H, Lawrie M. Person-centred care: from ideas to action Bringing together the evidence on shared decision making and self-management support [Internet]. London: Health Foundation; 2014. Available from: <https://www.health.org.uk/sites/default/files/PersonCentredCareFromIdeasToAction.pdf>
55. Horner K. Care Coordination: Reducing Care Fragmentation in Primary Care. In: Phillips KE, Weir V, eds. Safety Net Medical Home Initiative Implementation Guide Series [Internet]. Health and The MacColl Center for Health Care Innovation at the Group Health Research Institute; 2013. Available from: <https://www.safetynetmedicalhome.org/sites/default/files/Implementation-Guide-Care-Coordination.pdf>
56. Pulvirenti M, McMillan J, Lawn S. Empowerment, patient centred care and self-management: Empowerment, patient centred care and self-management. *Health Expectations*. 2014 Jun;17(3):303–10.
57. Ife JW, Tesoriero F. Community development: Community-based alternatives in an age of globalisation. 2006;
58. Schulz PJ, Nakamoto K. Health literacy and patient empowerment in health communication: The importance of separating conjoined twins. *Patient Education and Counseling*. 2013 Jan;90(1):4–11.
59. Calvillo J, Román I, Roa LM. How technology is empowering patients? A literature review. *Health Expect*. 2015 Oct;18(5):643–52.
60. Colombo F. How to build a better health system: 8 expert essays [Internet]. 2020. Available from: <https://www.weforum.org/agenda/2020/10/how-to-build-a-better-health-system/>
61. WHO. Delivering Quality Health Services: A Global Imperative for Universal Health Coverage. 2018.
62. Entwistle VA, Carter SM, Cribb A, McCaffery K. Supporting Patient Autonomy: The Importance of Clinician-patient Relationships. *J GEN INTERN MED*. 2010 Jul;25(7):741–5.
63. Borrás S, Edquist C. The choice of innovation policy instruments. *Technological Forecasting and Social Change*. 2013 Oct;80(8):1513–22.

## ANNEX 1. Questionnaire for end-users

### **Facilitator – profile description**

*Professionals in health and care institutions (hospitals, social and healthcare centres, assisted living communities, etc.) who provide professional support for the elderly person (65+) in connection of service which is being evaluated.*

*Family members, relatives, or other informal care givers who assist the elderly person to improve their health condition and/or help.*

*Living Lab coordinators who assist the elderly in the process of testing the service.*

*Any other person who directly assists the elderly person to improve their health conditions and/or helps.*

### **Service provider – profile**

*Service provider is a representative of the team (company) who has developed the service (technology, solution) and has designed its delivery process. The service provider has put the service on the market and has defined the target group(s) of users.*

### **User – profile**

*People who use or are intended to use the service:*

- *Professional users (including health and care professionals) if the service is meant to benefit their work with the elderly (persons aged 65+).*
- *End-users (persons aged 65+) if the service aims to improve their health condition or help receive care/assistance.*

### **DOMAIN 1: Autonomy**

#### Health outcomes

1. Are you actively involved in developing a plan to improve your health status while using the service?

*Yes/No/Other*

2. Does the service give enough information to help you make decisions about your health status?

*Yes/No/Other*

3. Does the use of the service enable you to take responsibility for your health status?

*Yes/No/Other*

#### Involvement

4. Are you involved (are you motivated to be involved) in the development or improvement of the service (e.g., giving feedback)?

*Yes/No/Other*

5. Would you like to give feedback on the use of the service (e.g., by questionnaires, tests)?

*Yes/No/Other*

#### Responsibility

6. Do you feel better informed about your health after using the service?

*Yes/No/Somewhat informed*

7. Do you feel that you received full support throughout the service?

*Yes/No/Other* Page Break

### **DOMAIN 2: Coordination and cooperation**

#### Service coordination

8. Do you feel like your input is valuable to the improvement of this service?

*Yes/No/Other*

9. Have your family members/caregivers been involved in developing or improving the service?

*Yes/No/Other*

#### Target group coordination

10. Have you (or a family member) signed a written consent to use the service?

*Yes/No/Other*Page Break

### **DOMAIN 3: Empowerment**

#### Targeted service

11. Has your need to use the service increased or decreased during the period of using the service?

*Increased/Decreased/Has not changed*

12. If living at home, do you think the service will help you to live longer at home?

*Yes/No/Other*

13. Do you think that using the service will enable you to maintain your current state of support longer?

*Yes/No/Other*

Early detection

14. Do you feel that using the service has helped you better manage your health?

*Yes/No/Other*

15. Do you feel that the service has helped to reduce your need for other medical interventions?

*Yes/No/Other*

**DOMAIN 4: Personalization**

Accordance to needs

16. Do you feel that all your different needs were considered when providing the service?

*Yes/No/Other*

*If no, please specify*

17. Have your assistance needs been satisfied by formal (health and social care professionals) or informal caregivers (family, volunteers, etc.)?

*Formal care system/Informal care system/Both/Neither*

18. Has your overall quality of life changed after using the service?

*Has improved very much/Has improved a bit/Has not changed/Has become worse a bit/Has worsened very much*

Usability and accessibility

19. Do you have any physical needs (for example blindness, hearing loss, etc.) that make it difficult for you to use the service?

*Yes/No/Other*

20. Do you have any psychological needs (for example the need for orientation, need for self-esteem enhancement, etc.) that make it difficult for you to use the service?

*Yes/No/Other*

21. Do you have any social needs (for example need for social isolation, need for interactions, etc.) that make it difficult for you to use the service?

*Yes/No/Other*

22. Do you have any environmental needs (for example need for availability of home services, need for reasonable living conditions, etc.) that make it difficult for you to use the service?

*Yes/No/Other*

23. Have you considered discontinuing the service because it seems too complicated to use?

*Yes/No/Other*

24. Did you feel safe while using the service?

*Yes/No/Other*

*If no, please specify*

25. Would you be willing to pay for this service?

*Yes/No/Other*

*If yes, sum in EUR*

Trust and respect

26. Did you feel that you were treated with dignity and respect during using the service?

*Yes/No/Other*

27. Have you been asked to give personal data (data that allows you to be identified – e.g., name, picture, address, fingerprint, etc.) to use the service?

*Yes/No/Other*

28. Did you feel that your data was handled securely?

*Yes/No/Other*

29. Have you been given information about how your personal data will be used?

*Yes/No/Other*

## ANNEX 2. Questionnaire for facilitators

### **Facilitator – profile description**

*Professionals in health and care institutions (hospitals, social and healthcare centres, assisted living communities, etc.) who provide professional support for the elderly person (65+) in connection of service which is being evaluated.*

*Family members, relatives, or other informal care givers who assist the elderly person to improve their health condition and/or help.*

*Living Lab coordinators who assist the elderly in the process of testing the service.*

*Any other person who directly assists the elderly person to improve their health conditions and/or helps.*

### **Service provider – profile**

*Service provider is a representative of the team (company) who has developed the service (technology, solution) and has designed its delivery process. The service provider has put the service on the market and has defined the target group(s) of users.*

### **User – profile**

*People who use or are intended to use the service:*

- *Professional users (including health and care professionals) if the service is meant to benefit their work with the elderly (persons aged 65+).*
- *End-users (persons aged 65+) if the service aims to improve their health condition or help receive care/assistance.*

Please insert the name of the service that you are evaluating:

*Enna / Myontec / Coquus / TempID / AVecen*

Please insert the name of the testing site/Living Lab:

*Atendo / Saraiva / Ategal / Afaga / Red Cross / Domusvi / O Lecer*

### **DOMAIN 1: Autonomy**

#### Health outcomes

1. Have you actively guided the end-users to participate in the development of an outcome plan (to improve their health condition or address the need for assistance)?

*Yes/No/Other*

2. While using the service, are guidelines and adequate information materials available for the end-user to help them participate in their health/care related decisions?

*Yes/No/Other*

3. Has the end-user indicated how they would like to engage in making decisions on their health and care?

*Yes/No/Other*

#### Involvement

4. Are you involved in the development or improvement of the service (e.g., by giving feedback)?

*Yes/No/Other*

5. Have you guided the end-user to give feedback on the service (e.g., by questionnaires, tests)?

*Yes/No/Other*

#### Responsibility

6. Do you consider the end-user to be the most responsible person for their own health?

*Yes/No/Other*

7. Do you feel the end-user is better informed about their health after using the service?

*Yes/No/Somewhat informed*

8. Do you feel that you offered full support to the end-user throughout the service?

*Yes/No/Other* Page Break

### **DOMAIN 2: Coordination and cooperation**

#### Service coordination

9. Do you feel like your input is valuable to the improvement of this service?

*Yes/No/Other*

10. Has there been any service-related cooperation activities with the health and social care system representatives and service providers during the service design and/or delivery phases?

*Yes/No/Other*

#### Target group coordination

11. Are channels provided for end-user communication and feedback?

*Yes/No/Other*

12. Has the user given informed consent to use the service?

Yes/No/OtherPage Break

**DOMAIN 3: Empowerment**

Targeted service

13. Have the needs of end-users increased or decreased over time of using the service?

*Increased/Decreased/Have not changed*

14. If the end-user is currently living at home, do you see that using this service will help the end-user live longer at home?

Yes/No/Other

15. Do you think that using the service will enable the end-user to maintain their current state of support longer?

Yes/No/Other

Early detection

16. Has using this service helped to better manage the health of the end-user?

Yes/No/Other

17. Does the service have potential for the end-user to reduce the need for other medical interventions?

Yes/No/Other

Page Break

**DOMAIN 4: Personalization**

Accordance to needs

18. Do you feel that all the different needs of the end-user were considered when providing the service?

Yes/No/Other

*If no, please specify*

19. Have the assistance needs of the end-user been defined by formal or informal care systems?

*Formal care system/Informal care system/Both/Neither*

20. Has the overall quality of life changed for the end-users after using the service?

*Has improved very much/Has improved a bit/Has not changed/Has become worse a bit/Has worsened very much*

Usability and accessibility

21. Does the end-user have physical needs (for example blindness, hearing loss, etc.) that make it difficult to use the service?

Yes/No/Other

22. Does the end-user have psychological needs (for example the need for orientation, need for self-esteem enhancement, etc.) that make it difficult to use the service?

Yes/No/Other

23. Does the end-user have social needs (for example the need for social isolation, need for interactions, etc.) that make it difficult to use the service?

Yes/No/Other

24. Does the end-user have environmental needs (for example need for availability of home services, need for reasonable living conditions, etc.) that make it difficult to use the service?

Yes/No/Other

25. Has the end-user reported not feeling safe while using the service?

Yes/No/Other

*If yes, please specify*

26. Do you consider the cost of the service appropriate for the end-user? What price would you consider appropriate for the service?

Yes/No/Other

*If no, sum in EUR*

Trust and respect

27. Do you feel that you were treated with dignity and respect during using the service?

Yes/No/Other

28. Do you feel that the end-user was treated with respect and dignity during using the service?

Yes/No/Other

## ANNEX 3. Questionnaire for service providers

### **Facilitator – profile description**

Professionals in health and care institutions (hospitals, social and healthcare centres, assisted living communities, etc.) who provide professional support for the elderly person (65+) in connection of service which is being evaluated.

Family members, relatives, or other informal care givers who assist the elderly person to improve their health condition and/or help.

Living Lab coordinators who assist the elderly in the process of testing the service.

Any other person who directly assists the elderly person to improve their health conditions and/or helps.

### **Service provider – profile**

Service provider is a representative of the team (company) who has developed the service (technology, solution) and has designed its delivery process. The service provider has put the service on the market and has defined the target group(s) of users.

### **User – profile**

People who use or are intended to use the service:

- Professional users (including health and care professionals) if the service is meant to benefit their work with the elderly (persons aged 65+).
- End-users (persons aged 65+) if the service aims to improve their health condition or help receive care/assistance.

Please insert the name of the service that you are evaluating:

*Enna / Myontec / Coquus / TempID / AVecen*

Please insert the name of the testing site/Living Lab:

*Atendo / Saraiva / Ategal / Afaga / Red Cross / Domusvi / O Lecer*

**Introduction:** Define all the end-user groups who will benefit from the service. What is the share of 65+ aged users out of all service users?

*0 – 100%, step by 5%*

### **DOMAIN 1: Autonomy**

#### Health outcomes

1. What is the estimated share of 65+ aged end-users who are actively involved in defining their health outcomes?

*0 – 100%, step by 5%*

2. How many different guidelines and information materials are available regarding the service, that help the end-user make health/care related decisions?

*Nr*

3. Have you asked end-users how they want to engage in decision-making concerning their health?

*Yes/No/Other*

#### Involvement

4. What share of end-users give feedback (questionnaires, tests, etc.) to the service?

*0 – 100%, step by 5%*

#### Responsibility

5. Does your service encourage the end-user to take responsibility for their own health?

*Yes/No/Other*

6. Is the service aiming to improve the end-user's awareness on their own health?

*Yes/No/Other*

7. Do you feel that you offer comprehensive support for the end-users throughout the service?

*Yes/No/Other*

### **DOMAIN 2: Coordination and cooperation**

#### Service coordination

*Nr*

8. How many elderly persons (65+) are involved in service development process?

*Nr*

9. How many formal caregivers are involved in service development process?

*Nr*

10. How many informal caregivers (family, volunteers, etc.) are involved in service development process?

*Nr*

11. How many family members are involved in service development process?

Nr

12. Please list service-related cooperation activities with health and social care system representatives (institutions, individuals) during the service development.

Add text

Target group coordination

13. Are channels provided for end-user communication and feedback?

Yes/No/Other

14. Is the informed consent given by the end-user and integrated in the service delivery process, as regulated by law?

Yes/No/Other

Page Break

**DOMAIN 3: Empowerment**

Targeted service

15. What is the estimated proportion of the elderly whose service needs have increased during the period of using the service?

0 – 100%, step by 5%

16. What is the estimated proportion of the elderly whose service needs have decreased during the period of using the service?

0 – 100%, step by 5%

17. What share of end-users live in their homes while using the service? What share of users live at home after having completed using the service?

While using the service: 0 – 100%, step by 5%

After completing using the service: 0 – 100%, step by 5%

Early detection

18. What percentage of end-users have reported that thanks to the service they manage their health better?

0 – 100%, step by 5%

**DOMAIN 4: Personalization**

Accordance to needs

19. Are you willing to customize the service according to the person's needs?

Yes - please indicate potential modification that you are willing to undertake/No/Other

20. Which needs are you ready to customize for?

Add text

Usability and accessibility

21. What is the estimated share of 65+ aged end-users who are unable to use the service due to individual physical needs (for example blindness, hearing loss, etc.)?

0 – 100%, step by 5%

22. What is the estimated share of 65+ aged end-users who are unable to use the service due to individual psychological needs (for example need for orientation, need for self-esteem enhancement, etc.)?

0 – 100%, step by 5%

23. What is the estimated share of 65+ aged end-users who are unable to use the service due to individual social needs (for example need for social isolation, need for interactions, etc.)?

0 – 100%, step by 5%

24. What is the estimated share of 65+ aged end-users who are unable to use the service due to individual environmental needs (for example need for availability of home services, need for reasonable living conditions, etc.)?

0 – 100%, step by 5%

25. What share of end-users (including 65+ age group and other users) have declined or discontinued the service because the service has proved to be too costly?

0 – 100%, step by 5%

Trust and respect

26. What share of end-users have reported that they experience respect and dignity when using the service?

0 – 100%, step by 5%

27. What safeguards do you provide to handle personal data in a secure way?

1) Using adequate information security measures for technology

2) Using relevant data protection safeguards

3) Other security measures, please specify



## ANNEX 4. Scaling the results of the questionnaires

End users				Facilitator			
Points	1	2	3	Points	1	2	3
<b>Domain 1 (Autonomy)</b>							
Q1	No	Other	Yes	Q1	No	Other	Yes
Q2	No	Other	Yes	Q2	No	Other	Yes
Q3	No	Other	Yes	Q3	No	Other	Yes
Q4	No	Other	Yes	Q4	No	Other	Yes
Q5	No	Other	Yes	Q5	No	Other	Yes
Q6	No	Somewhat informed	Yes	Q6	No	Other	Yes
Q7	No	Somewhat informed	Yes	Q7	No	Other	Yes
				Q8	No	Other	Yes
<b>Domain 2 (Coordination and cooperation)</b>							
Q8	No	Other	Yes	Q9	No	Other	Yes
Q9	No	Other	Yes	Q10	No	Other	Yes
Q10	No	Other	Yes	Q11	No	Other	Yes
				Q12	No	Other	Yes
<b>Domain 3 (Empowerment)</b>							
Q11	Decreased	Have not changed	Increased	Q13	Decreased	Have not changed	Increased
Q12	No	Other	Yes	Q14	No	Other	Yes
Q13	No	Other	Yes	Q15	No	Other	Yes
Q14	No	Other	Yes	Q16	No	Other	Yes
Q15	No	Other	Yes	Q17	No	Other	Yes
<b>Domain 4 (Personalization)</b>							
Q16	No	Other	Yes	Q18	No	Other	Yes
Q19	No	Other	Yes	Q21	No	Other	Yes
Q20	No	Other	Yes	Q22	No	Other	Yes
Q21	No	Other	Yes	Q23	No	Other	Yes
Q22	No	Other	Yes	Q24	No	Other	Yes
Q23	No	Other	Yes	Q25	No	Other	Yes
Q24	No	Other	Yes	Q26	No	Other	Yes
Q25	No	Other	Yes	Q27	No	Other	Yes
Q26	No	Other	Yes	Q28	No	Other	Yes
Q27	No	Other	Yes				
Q28	No	Other	Yes				
Q29	No	Other	Yes				

End users					Facilitator				
Points	1	2	3	4	Points	1	2	3	4
Q17	Neither		Formal/Informal/Both		Q19	Neither		Formal/Informal/Both	
Q18	Has become worse a bit	Has not changed	Has improved a bit	Has improved very much	Q20	Has become worse a bit	Has not changed	Has improved a bit	Has improved very much