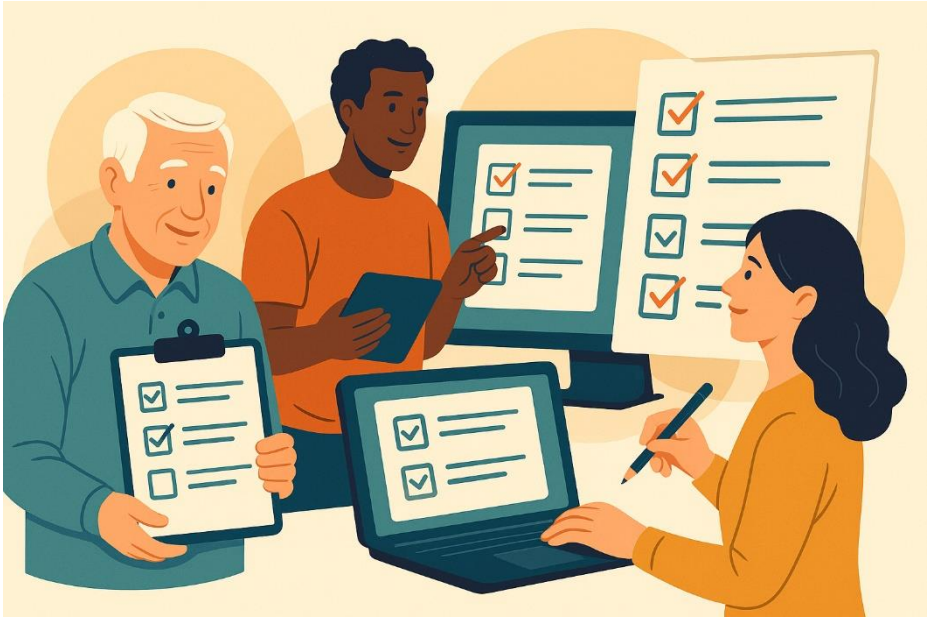
Capacity building on sustainable and motivational training design enhanced by smart technologies for senior citizens.

Silver Assessment Tool Bank

Deliverable 3.3

Work package 3



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1. Introduction

The Silver Assessment Tool Bank is a systematic set of validated assessment instruments meant to assess essential aspects of older individuals' health, well-being, and digital readiness during physical activity interventions. This tool bank is a basic resource for assessing the efficacy of training programs designed to improve motivation, digital literacy, physical fitness, and general well-being among people aged 55 and up.

The assessment methods provided were carefully selected as part of a larger program to promote active ageing, based on their scientific validity and suitability to the target audience. These methods allow for a full assessment prior to and during the structured five-week intervention programs, guaranteeing that measurable data supports program efficacy and long-term impact. The key objectives of this assessment tool bank are:

- Evaluating motivation for physical activity.
- Assessing digital preparedness and willingness to use technology for fitness and well-being.
- Assessing physical activity levels and perceived effort.
- Analyzing subjective well-being improvements.
- Understanding attitudes and challenges to regular physical exercise.

Project facilitators, trainers, and researchers can use these assessments to systematically track participants' progress, identify areas for improvement, and design future interventions to enhance engagement and effectiveness. The primary objective of these tests is not strictly scientific, although they can contribute to research and evidence-based practice. They are meant to give a reflection and feedback to trainers and trainees on the progress/efficiency of the interventions. The Silver Assessment Tool Bank is hosted on the project's website making it easily accessible.

Within the framework of the project, the following questionnaires represent the minimum required assessments to be conducted by partners in each intervention:

- **Wellbeing**: WHO-5 questionnaire for well-being.
- **Motivation**: Physical Activity Leisure Motivation Scale (PALMS)
- **Digital readiness**: UTAUT2 model

For measuring physical **fitness**, partners should utilize data from the implemented smart tool. Additionally, optional instruments such as the International Physical Activity Questionnaire (IPAQ) and the Borg Scale may be incorporated to assess changes in fitness levels.

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2. Initial Health Assessment

Before engaging older people in physical activities, it is advisable to map their health status and physical readiness for exercising. The best solution is to ask participants to provide a paper from their GPs that they can, with no health risk results take part in the activity described. In case some participants are of younger age (<69) and in a perceived good physical condition, you can conduct a baseline health assessment to explore if the candidate might face some health hazards. In the form of an easy-to-fill questionnaire, The Physical Activity Readiness Questionnaire (PAR-Q) can be implemented (Bredin, 2023).

3. Pre- and post-implementation data collection

Aiming at the evaluation of the Silver Smart Training Programs effectiveness, pre- and post-data collection is essential. This data collection phase will help measure changes in participants' physical activity levels, digital readiness, motivation, well-being, and attitudes toward regular exercise. This section provides on selecting and using validated tools for assessing these constructions, as well as suggestions for structuring data collection to ensure comparability across partners.

The primary objective of the data collection phase is to evaluate program outcomes by comparing baseline data (collected pre-intervention) with final data (collected post-intervention). Key assessment areas include:

- Motivation for Physical Activity
- Digital Readiness
- Subjective Well-being
- Attitudes toward Physical Exercise
- Fitness/Physical Activity Level

Each area contributes to a comprehensive understanding of participants' engagement and the program's impact on their physical and mental health. Below, recommended tools are detailed for assessing these constructs.

3.1 Assessment tools of Physical Fitness and Physical Activities

3.1.1 Physical Activity Questionnaire

Instrument: International Physical Activity Questionnaire (IPAQ Short version)

Description: The International Physical Activity Questionnaire Short Form (IPAQ-SF) is a widely used tool for assessing physical activity.

IPAQ evaluates the time spent on four intensity levels of physical activity over the past 7 days:

- Vigorous-intensity activities (e.g., aerobics)
- Moderate-intensity activities (e.g., leisure cycling)
- Walking
- Sitting time

Although IPAQ-SF is a cost-effective tool for assessing PA its validity is questionable due to overestimation PA levels (Lee, 2011).

- Available translations: https://sites.google.com/view/ipaq/download?authuser=0

3.1.2 Senior Fitness Test

Instrument: Rikli and Jones Senior Fitness Test (SFT)
Description: The Rikli and Jones Senior Fitness Test (SFT) is a widely used tool for assessing the functional fitness of older adults. It evaluates physical capabilities relevant to daily activities and independent living. The test consists of six components measuring different aspects of physical fitness:

- **Chair Stand Test**: Assesses lower-body strength by counting the number of full stands completed in 30 seconds.
- **Arm Curl Test**: Evaluates upper-body strength by counting the number of bicep curls completed in 30 seconds using a specified weight (2 kg for women, 3.6 kg for men).
- **Chair Sit-and-Reach Test**: Measures lower-body flexibility by assessing the distance between fingertips and toes while seated.
- **Back Scratch Test**: Evaluates upper-body flexibility by measuring the overlap or gap between hands reaching behind the back.
- **8-Foot Up-and-Go Test**: Assesses agility and dynamic balance by timing how quickly a participant can stand up, walk 8 feet, turn, and return to the chair.
- **6-Minute Walking Test**: Measures aerobic endurance by assessing the total distance a participant can walk in 6 minutes. This test is a standard measure for evaluating cardiovascular fitness and functional capacity.
- **2-Minute Step Test (Alternative to 6-Minute Walking Test)**: An alternative measure of aerobic endurance, where participants raise their knees to a midpoint for 2 minutes. This test is suitable when space is limited or when the walking test is impractical.

The SFT is considered a practical, reliable, and valid method for measuring physical fitness in older adults and is commonly used in clinical and community settings. (Rikli, 2013)

3.2 Motivation of physical activity

3.2.1 Physical Activity Motivation

Instrument: Physical Activity Leisure Motivation Scale (PALMS). (Refer to Annex I)
Description: The Physical Activity and Leisure Motivation Scale (PALMS) is a comprehensive instrument designed to measure motives for participating in physical activity and leisure. It consists of eight sub-scales, each containing five items:

- Mastery
- Enjoyment
- Psychological condition

- Physical condition
- Appearance
- Others' expectations
- Affiliation
- Competition/ego

Responses are recorded on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) (Molanorouzi, 2014).

3.2.2 Types of motivation in exercise

Instrument: Behavioral Regulation in Exercise Questionnaire-3 (BREQ-3)
Description: The BREQ-3 is a validated tool used to assess different types of motivation in exercise settings. It captures intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation, providing a broad spectrum of motivational factors that can affect adherence to regular physical exercise (Wilson, 2006).

3.3 Digital readiness

3.3.1 Digital readiness

Instrument: Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and Technology Readiness Index (TRI). (Refer to Annex II)
Description: This tool assesses participants' readiness and willingness to adopt wearable devices, focusing on factors such as perceived usefulness, ease of use, social influence, and facilitating conditions. The UTAUT2 and TRI frameworks are well-suited to evaluating older adults' attitudes toward technology adoption, critical for tracking digital literacy progress. (Wu, 2024)
Respondents typically rate their agreement with each item on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree.

These items can be adapted to fit the specific technology or context being studied. For instance, if assessing the acceptance of wearable fitness devices among older adults, the term "the technology" can be replaced with "the wearable fitness device."

3.3.2 System usability

Instrument: System Usability Scale (SUS)
Description: The system usability scale (SUS) is a simple, ten-item attitude Likert scale giving a global view of subjective assessments of usability. The scale consists of ten statements that respondents rate on a five-point scale from "Strongly Disagree" to "Strongly Agree." These statements cover various aspects of system usability, such as complexity, ease of use, integration of functions, and confidence in using the system. The SUS generates a single score ranging from 0 to 100, which can be used to compare the usability of different systems (Hyzy, 2022).

- ❖ SUS translation tool https://pdf.sus.tools/

- Calculator: https://stuart-cunningham.github.io/sus/
- SUS Analysis toolkit: https://sus.mixality.de/

Instrument: Technology Acceptance Model
Description: The technology acceptance model (TAM) explains the acceptance of information systems by individuals. TAM postulates that the acceptance of technology is predicted by the users' behavioral intention, which is, in turn, determined by the perception of technology usefulness in performing the task and perceived ease of its use. (Marikyan, 2022)

3.3.3 Perceived exertion

Instrument: BORG Rating of Perceived Exertion
Description: The Borg Rating of Perceived Exertion (RPE) is a widely used scale for measuring perceived exertion during physical activity. The original Borg RPE scale ranges from 6 to 20, where 6 indicates "no exertion at all" and 20 indicates "maximal exertion". This scale correlates with heart rate, as multiplying the RPE by 10 gives an approximate heart rate value. The Borg RPE scale is extensively used in sports, health, and rehabilitation settings to monitor exercise intensity and progress. It has been validated across various populations and conditions, showing strong correlations with physiological measures under certain conditions (BORG).

3.4 Subjective well-being

3.4.1 WHO Well-Being Index (WHO -5)

Instrument: The World Health Organization-Five Well-Being Index (WHO -5). (Refer to Annex III)

Description: WHO-5 is a self-report tool for assessing mental health and well-being. It consists of 5 statements about the previous two weeks. A 6-point rating system is used for each statement, with higher scores denoting greater mental health. Note: It has been translated into over 30 languages. ((WHO-5), 2024).

3.4.2 Mental Well-being Scale

Instrument: Warwick-Edinburgh Mental Well-being Scale (WEMWBS)
Description: The WEMWBS measures subjective well-being and positive mental health through 14 positively worded items covering aspects such as optimism, feeling good about oneself, and social relationships. It is particularly relevant for assessing the mental health impacts of physical activity and social engagement within the training program (Tennant, 2007).

3.5 Attitudes toward physical exercise/activity

3.5.1 Exercise Benefits/Barriers Scale

Instrument: Exercise Benefits/Barriers Scale (EBBS)
Description: The EBBS is a validated tool that measures attitudes towards physical activity by assessing perceived benefits and barriers. It evaluates physical, psychological, and social aspects of exercise, providing insights into participants'

attitudes and likelihood to adhere to regular physical exercise routines (Sechrist, 1987).

3.5.2 Commitment to Physical Activity

Instrument: Commitment to Physical Activity Scale (CPAS)
Description: The Commitment to Physical Activity Scale (CPAS) is a tool designed to assess an individual's psychological commitment to maintaining physical activity. It evaluates motivational aspects and the degree of dedication toward sustaining regular physical activity.

The CPAS provides insights into the psychological factors influencing adherence to physical activity and is useful in both research and practical settings to guide interventions aimed at increasing long-term physical activity participation (DeBate, 2009).

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Annexes

Annex I. PALMS Questionnaire

No.	ITEM	SUBSCALE	1	2	3	4	5
5	To get better at an activity	Mastery					
16	To improve existing skills	Mastery					
19	To do my personal best	Mastery					
24	To obtain new skills/activities	Mastery					
31	To keep current skill level	Mastery					
3	Because it is interesting	Enjoyment					
13	Because it makes me happy	Enjoyment					
25	Because it is fun	Enjoyment					
34	Because I enjoy exercising	Enjoyment					
37	Because I have a good time	Enjoyment					
4	Because I enjoy spending time with others	Affiliation					
8	To do activity with others	Affiliation					
20	To do something in common with friends	Affiliation					
30	To talk with friends exercising	Affiliation					
38	To be with friends	Affiliation					
6	Because I perform better than others	Competition/ Ego					
17	To be best in the group	Competition/ Ego					
27	To work harder than others	Competition/ Ego					
29	To compete with others around me	Competition/ Ego					
39	To be fitter than others	Competition/ Ego					
1	To earn a living	Others' expectations					

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7	Because I get paid to do it	Others' expectations					
18	To manage medical condition	Others' expectations					
21	Because people tell me I need to	Others' expectations					
26	Because it was prescribed by doctor, physio	Others' expectations					
10	Because it helps maintain a healthy body	Physical condition					
12	Be physically fit	Physical condition					
15	To maintain physical health	Physical condition					
28	Because it keeps me healthy	Physical condition					
33	To improve cardiovascular fitness	Physical condition					
2	Because it helps me relax	Psychological condition					
9	To better cope with stress	Psychological condition					
14	To get away from pressures	Psychological condition					
22	Because it acts as a stress release	Psychological condition					
35	To take mind off other things	Psychological condition					
11	To define muscle, look better	Appearance					
23	To improve body shape	Appearance					
32	To improve body appearance	Appearance					
36	To lose weight, look better	Appearance					
40	To maintain trim, toned body	Appearance					

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Annex II. UTAUT2 Questionnaire

Main Category	Category	1	2	3	4	5
Performance expectancy	**PE1** I find that using smart wearable devices makes my daily life more convenient.					
	PE2 Smart wearable devices improve work efficiency and help complete tasks faster.					
	PE3 I find smart wearable devices very useful in daily life.					
Effort expectancy	**EE1** Learning to use smart wearable devices is easy for me.					
	EE2 I find smart wearable devices easy to understand and operate.					
	EE3 I find using smart wearable devices simple.					
	EE4 It is easy for me to become proficient in using smart wearable devices.					
Social influence	**SI1** People around me support my use of smart wearable devices.					
	SI2 People important to me believe I should use smart wearable devices.					
	SI3 People around me think I should use smart wearable devices					
Facilitating conditions	**FC1** I have the necessary knowledge and skills to use smart wearable devices.					
	FC2 I have the resources needed to use smart wearable devices, such as a smartphone and internet access.					
	FC3 Smart wearable devices are compatible with other systems, making them convenient for daily use.					
	FC4 When I encounter difficulties using smart wearable devices, I can receive help from others.					
Hedonic motivation	**HM1** Using smart wearable devices is very interesting.					
	HM2 Using smart wearable devices is very pleasant.					

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	HM3 Using smart wearable devices is very enjoyable.					
Optimism	**OP1** Smart wearable devices help me achieve a higher quality of life.					
	OP2 Smart wearable devices give me more freedom in choosing locations.					
	OP3 Smart wearable devices enable me to better control my daily life.					
	OP4 Smart wearable devices make my life more productive.					
Innovativeness	**INN1** People around me ask for my advice about new smart wearable device products/services.					
	INN2 Generally, I am one of the first among my friends to use smart wearable device products.					
	INN3 Without others' help, I can usually quickly familiarize myself with smart wearable device products/services.					
	INN4 In areas that interest me, I keep up with the latest technological developments.					
Discomfort	**DIS1** When seeking help from others for smart wearable device support, I sometimes feel like I am being controlled.					
	DIS2 Online support for smart wearable devices does not adequately clarify my issues.					
	DIS3 Sometimes I feel that smart wearable device systems are too complex for general use.					
	DIS4 The user manuals for smart wearable device products/services are not easy to understand.					
Insecurity	**INS1** In my daily life, I feel overly dependent on some smart wearable device products/services.					
	INS2 I believe smart wearable devices are not secure and worry about my privacy.					
	INS3 I am concerned that the information from smart wearable devices may be inaccurate.					
Digital health literacy	**DHL1** I am able to use smart wearable devices to find the information I need.					

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	DHL2 I know how to find useful health resources on smart wearable devices.					
	DHL3 I know how to use the health information from smart wearable devices to help myself.					
	DHL4 I am confident in making health-related decisions based on information from smart wearable devices.					
	DHL5 I have the skills to distinguish between good and bad information from smart wearable device resources.					
Behavioral intention	**BI1** I frequently use smart wearable devices.					
	BI2 I will share my experiences with smart wearable devices with others.					
	BI3 I will continue to use smart wearable devices.					

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Annex III. WHO-5 Questionnaire

	All of the time	Most of the time	More than the half of the time	Less than the half of the time	Some of the time	At no time
I have felt cheerful and in good spirits	5	4	3	2	1	0
I have felt calm and relaxed	5	4	3	2	1	0
I have felt active and vigorous	5	4	3	2	1	0
I woke up feeling fresh and rested	5	4	3	2	1	0
My daily life has been filled with things that interest me	5	4	3	2	1	0

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Life has a meaning

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