Grant Agreement: 101016453

D8.3 – Final study protocol (proof of concept), wave 2

Deliverable D8.3		
Authors and institution	INRCA, NCGG + Others	
Date	M24 – Date	
Dissemination level		
PU	Public, fully open, e.g. web	
CO	Confidential, restricted under conditions set out in Model Grant Agreement	CO
CI	Classified, information as referred to in Commission Decision 2001/844/EC	

Document change history			
Date	Version	Authors	Description
11/10/2022	V.00	Roberta Bevilacqua and Vera Stara (INRCA), Eiko Takano (NCGG)	First Content Draft with integrations of previous material
24/10/2022	V1.1	C.Palmier (APHP)	Study design
30/10/2022	V2.1	C.Palmier	Update information
24/11/2022	V3.1	C.Palmier (APHP)	Update information
15/12/2022	V4.1	C.Palmier (APHP)	Update information
19/12/2022	V4.2	Keiko Homma (AIST); Johanna Moeller (Caritas); Toshimi Ogawa (Tohoku)	Update information
20/01/2023	V5	Jerome Boudy (IMT)	Peer review
23/01/2023	V6	Cécilia Palmier (AP-HP)	Final updates
23/01/2023	V6.1	Rainer Wieching (USI)	Finalization of the deliverable

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Disclaimer

[Full project title] E-VITA – **European-Japanese Virtual Coach for Smart Ageing**

[Short project title] E-VITA (**EU PROJECT NUMBER 101016453**)

[Number and title of work-package] **WP8 – Evaluation (Proof of Concept)**

[Document title] **D8.3 Final study protocol (proof of concept), wave 2**

[Editor: Name, Partner] **Cecilia Palmier [APHP], Roberta Bevilacqua [INRCA], Vera Stara [INRCA], Eiko Takano [NCGG], Izumi Kondo [NSGG], Johanna Moller [Caritas], Ryan Browne [Tohoku], Toshimi Ogawa [Tohoku], Rainer Wieching [USI]**

[Work-package leader: Name, Partner] **Cécilia Palmier [APHP], Toshimi Ogawa [TOHOKU]**

Copyright notice

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Executive Summary

This deliverable has been written with the help of all the project partners: content and technical partners. This document includes new information from the development of the technology.

The aim of the deliverable is to provide the protocol for the second wave of experimentation of the e-VITA platform. During the last six months of the project, the partners discussed on a weekly basis about the procedure, aims and devices to adopt during the second experimental wave, taking into consideration the results from the first experimental wave. The results of the meeting group constituted the basis for the national ethical board approvals and for this document. The overall study planning is as follows:

Aim:	To measure user adherence to a virtual coach and the improvement in quality of life.
Methodology:	The study is a multicentre Proof-of-Concept. The general objective of the e-VITA project is to develop a personalized virtual coach capable of interacting with its interlocutor. The experimentation will be carried out in 4 sites: Italy, France, Germany and Japan.
Population	240 older adults aged 65 and more, retired, living independently at home, wishing to participate in the study and meeting the inclusion and exclusion criteria.
Inclusion Criteria:	• Aged 65 and over. • Capacity to consent. • Able to stand and walk unaided. • No acute or untreated medical problems. • MoCA ≥ 22. • GDS < 9. • SPPB ≥ 7. • Clinical Frailty Scale score between 2 and 4.
Exclusion criteria:	• Failure to meet the inclusion criteria. • Use of active implant or not-implant medical devices. • Allergy to nickel. • Concomitant participation in other studies. • Lack of written informed consent. • A myocardial infarction or stroke within 6 months. • Painful arthritis, spinal stenosis, amputation, painful foot lesions or neuropathy limiting balance and mobility. • Uncontrolled hypertension. • Pacemaker or implantable cardioverter defibrillator.

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

- advanced Parkinson's disease or other neuromuscular disorder;
- Metastatic cancer or immunosuppressive therapy;
- Significant visual or hearing impairment.

Duration:	6 months

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Table of contents

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Lists of Figures and Tables

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Acronyms and Abbreviations

Acronym/Abbreviation	Explanation
ADL	Activity of daily living
AHA	Active and healthy Ageing
APHP	Assistance Publique – Hôpitaux de Paris
ATDPA-5	Assistive Technology Device Predisposition Assessment
CARITAS	Diocesan Caritas Association for the Archdiocese of Cologne, Diözesan-Caritasverband für das Erzbistum Köln e.V.
D	Deliverable
DE	Germany
EQ-5D-5L	European Quality of Life Five Dimension
FR	France
GDS	Geriatric Depression Scale
IC	Intrisic Capacity
ICF	International Classification of Functioning, Disability and Health
ICT	Information and Communications Technology
IGOU	J.F. Oberlin University – Institute of Gerontology and Geriatrics
INRCA	Istituto Nazionale di Riposo e Cura per Anziani INRCA
IT	Italy
JP	Japan
MoCA	Montreal Cognitive Assessment
NCGG	National Center for Geriatrics and Gerontology
SPPB	Short Physical Performance Battery
TOHOKU	Tohoku University - Smart-Aging Research Center
USI	University of Siegen
WHO	World Health Organization
WP	Work Package

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

1 Introduction

Europeans are living longer and longer. According to INED (Institut national d'études démographiques, n.d.) the life expectancy of a European woman is 83.7 years and 78.3 years for a man in 2018. Japan is the country with the highest life expectancy. Women live on average 88.1 years and men 81.9 years (Institut national de la statistique et des études économiques, 2020). However, the increase in life expectancy is not necessarily accompanied by an increase in healthy life expectancy. In Europe, a woman can expect to live in good health for an average of 64.5 years and a man for an average of 63.4 years (Vie publique, 2019). Indeed, the incidence of certain chronic pathologies increases with ageing while other functions decline (Forette, 2012; Rae, 2010, cited by Andrieu, 2012) which can lead to a loss of autonomy and frailty. The care of elderly people with a loss of autonomy is therefore becoming a major social, medical and economic issue due to the insufficient number of family or professional carers enabling elderly people to live at home as long as possible and to delay institutionalisation (Wrobel et al., 2014). But ageing is not the same for all individuals. It is dependent on many factors such as genetic factors that cannot be modified and environmental factors including lifestyle (World Health Organization, 2016). It is on the latter that preventive actions can be carried out, and this, throughout life (Forette, 2012). In addition to preventive action, the development of new care solutions is important (Cameirão et al., 2016) to reduce or minimise the consequences of these age-related pathologies, to support the health system and to promote active and healthy ageing. Active and healthy ageing refers to the maintenance and development of functional abilities that enable older people to live well (World Health Organization, n.d) in terms of physical, mental, and social health, while actively participating in society.

With the emergence of the concept of healthy and active ageing and the identification of factors that contribute to the development of age-related diseases and loss of autonomy, health organisations have tried to improve their strategies to prevent these risk factors and diseases (Kyriazakos et al., 2020). Different structures, organisations or professionals offer prevention services such as physical, cognitive, emotional, or social activities. However, access to private professionals for prevention targeted to individual needs and preferences is expensive. Whereas the offer of public organisations is only slightly customisable and may not be accessible to all seniors. This inequality of access is reinforced by the current health context linked to the Covid-19 crisis which has led to the cessation or postponement of workshops or face-to-face activities in sports, intergenerational or cultural clubs. A range of videoconference activities has been developed over the past year. However, this remote format does not facilitate the personalisation of interventions. With the development of technology, new tools have appeared, including virtual coaches, which seem to be of interest in supporting the behaviour of individuals. A virtual coach is defined by Siewiorek et al. (2012) as a personalised system that continuously monitors the activities and environment of its users. Virtual coaches detect situations where an intervention would be desirable and propose this intervention to the user. To this end, coaches take the form of activity sensors combined with a coaching application located on the Internet, on a smartphone, on a sensor (Op Den Akker et al., 2013) or on a social assistance robot (SARs: Fasola and Mataric, 2013). Through a personalised approach, the virtual coaching system enable people to live a healthy lifestyle, identifying personal needs and goals, and providing appropriate risk predictions and individualised recommendations (Chatterjee et al., 2019; Yousuf et al., 2019). These devices cover a variety of domains and audiences (Kamphorst, 2017). There are a multitude of virtual coaches and apps for the promotion of nutrition (Boh et al., 2016), physical activity (Mostajeran et al.2019), mood, sleep,

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

(Kulyk et al., 2014) and even more clinical applications such as rehabilitation (Obdržálek et al., 2013) or monitoring of cardiovascular pathologies (de Vries et al., 2017).

There are virtual coaches for adults, for children with autistic disorders (Breiding, 2014), and for older people. These tools have attracted interest from health and care organizations as well as consumers for promoting health, wellness, physical activity (Kari and Rinne, 2018) and lifestyle improvement (Brinkschulte et al., 2018). The use of these virtual coaches and apps has great potential to help older people improve their quality of life by addressing age-related issues and the physical and social implications of ageing (Görer et al., 2013). Furthermore, the adoption of these active measures, facilitated by a virtual coach, enables older people to live independently and comfortably in their homes for as long as possible (Venning et al, 2021). This reduces the need for constant monitoring by health professionals, limits the costs that would otherwise be incurred (Görer et al., 2013), and helps mitigate the wider impact of demographic ageing on health and care (Wrobel et al., 2014).

However, the technologies developed for healthy and active ageing have some limitations. Indeed, they are mainly used for short periods of time and are poorly integrated into the daily lives of older people, thus limiting their benefits (Cameirão et al., 2016). Moreover, interactions with these technologies are not ideal since they do not lead to realistic and satisfying social interactions due to technologies that are not yet advanced enough (Cooper et al., 2020). It is therefore necessary to design and evaluate new products that consider the needs and preferences of seniors, but also of their relatives for a sustainable and optimal use of these devices (Nguyen et al., 2015), in the aim is to enable seniors to live independently in their own homes for as long as possible while actively participating in society.

In this context, the creation of an intercultural and customizable virtual coach appears interesting. Through a cooperation between European and Japanese partners, the e-VITA project proposes different technological tools adapted to the elderly and their daily life, but also adapted to different cultures. The functionalities and services available and proposed are in response to the needs of the elderly and concern social relations, physical activities, skills, autonomy, stimulation, communication, and safety.

The intelligent services proposed in the e-VITA project have several advantages. Indeed, they have intelligent algorithms and artificial intelligence capable of reasoning, autonomous learning, adapting to personal needs, emotional and behavioral patterns. They also adapt to the conditions, the living environment and the social link of the users. They are able to have an advanced interaction with the user through natural speech recognition and modelling of spoken dialogue.

1.1 Objectives of the deliverable

The objective of the deliverable is to present the methodology for the eVITA multicentre Proof-of-Concept study, to be approved by the local ethical committee of each study centre.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

2 Rationale and objectives of the wave 2

The general objective of the e-VITA project is to develop a personalized virtual coach capable of interacting with its user. The second wave of the experimentation will be carried out in four different sites: Italy, France, Germany and Japan. The study is a multicenter Proof-of-Concept study with a duration of the intervention of six months.

The research focuses on different elements such as system adherence, quality of life, acceptability and usability. Adherence is a major problem encountered when older people use technologies for active and healthy ageing. Indeed, it has been observed that there is a decrease in the rate of use of these devices for various reasons such as lack of motivation or frustration, and this low use limits the benefits (Cameirão et al., 2016). We therefore seek to see if participants' engagement with the virtual coach is maintained in the medium term.

We also seek to define the conditions of user experience and usability of the virtual coach in a context of home use for older adults. ISO9241-11:2018 defines usability as *"the degree to which a system, product or service can be used, by specified users, to achieve defined goals with effectiveness, efficiency and satisfaction, in a specified context of use"* (ISO 9241-11:2018, Ergonomics of human-system interaction - Part 11: Usability - Definitions and concepts, n.d.).

User experience is about the subjective experience of the user in relation to the interaction with an interactive system. This concerns functional aspects, but also emotional, hedonistic, or aesthetic aspects (Lallemand et al., 2013). Furthermore, the fulfilment of universal psychological needs, such as competence, relatedness, popularity, stimulation, meaning, security, or autonomy, can be a major source of positive experience with interactive technologies (Hassenzahl et al., 2010). The use of interactive technology is assumed to be driven by overarching universal psychological needs and the fulfilment thereof, which in turn improves quality of life, life satisfaction and having a meaning in life (Diener & Ryan, 2008). Consequently, interactive technologies can be conducive to subjective and psychological well-being when they fulfil psychological need.

2.1 Study objective

Primary objective

The first objective of the study is to measure people's adherence to the virtual coach system through the frequency of use of the virtual coach and the dropout rate. But also, improvement of the Quality of Life (QoL) of the participants involved in the study, by means of EQ-5D-5L.

Secondary objectives

This research will also evaluate the usability, the user experience, the acceptability and the needs' fulfillment after the use of the e-VITA system. As well as possible changes in different health-related areas (e.g., nutrition, loneliness, health literacy).

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

3 Study design and population

The general objective is to improve well-being for older adults and thereby promote active and healthy ageing, contribute to independent living, and reduce risks of social exclusion of older adults by making use a virtual coach by 240 healthy older adults recruited from Europe (France, Germany and Italy) and Japan. Each recruiting center will enroll 40 subjects.

3.1 Recruiting centers

- Hôpital Broca 54-56 rue Pascal, 75013 Paris - **France**.
- Diocesan Caritas Association for the Archdiocese of Cologne, Georgstraße 7, 50676 Cologne - **Germany**
- IRCCS INRCA, Via della Montagnola 81, 60129 Ancona - **Italy**
- Tohoku University –Smart Ageing Research Center, 4-1 Seiryo-Machi, Aoba-ku, Sendai, 980-8575, Miyagi **Japan**
- J.F. Oberlin University, 3758 Tokiwa-machi, Machida-shi, Tokyo 194-0294 **Japan**
- Misawa Homes Institute of Research and Development Co. Ltd., 1-1-19 Takaidonishi, Suginami, Tokyo168-0071 **Japan**

3.1 Study setting

The experimentation involves three different phases: Recruitment (R), First evaluation (T0) before the start of the trial, Intermediate evaluation (T1) after three months of usage, Final evaluation (T2) at the end of the trial, after 6 months.

3.2 Participants

The inclusion criteria are:

- Aged 65 and over;
- Capacity to consent;
- Able to stand and walk unaided;
- No acute or untreated medical problems;
- MoCA ≥ 22;
- GDS < 9;
- SPPB ≥ 7
- Clinical Frailty Scale score between 2 and 4.

The exclusion criteria are:

- Failure to meet the inclusion criteria;
- Use of active implant or not-implant medical devices;
- Allergy to nichel;
- Concomitant participation in other studies;

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

- Lack of written informed consent;
- A myocardial infarction or stroke within 6 months;
- Painful arthritis, spinal stenosis, amputation, painful foot lesions or neuropathy limiting balance and mobility;
- Uncontrolled hypertension;
- Pacemaker or implantable cardioverter defibrillator;
- advanced Parkinson's disease or other neuromuscular disorder;
- Metastatic cancer or immunosuppressive therapy;
- Significant visual or hearing impairment.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

4 Equipment

The multidisciplinary consortium collaborating in this project will develop an innovative ICT-based virtual coaching system to detect subtle changes in physical, cognitive, psychological and social domains of older adult's daily life. The e-VITA virtual coach will thus provide personalized recommendations and interventions, for sustainable wellbeing in a smart living environment at home.

At high level the different components of the system are:

- Coaches, consisting of social robots, that will interact with the users and are guided by apps;
- Sensors (both wearable and domestic) to detect physiological parameters, physical activities, and behavior of the users;
- Smartphones (the chatbot to provide insights, suggestion, and stimulation about healthy nutrition and physical exercise; the social platform to encourage users to share their interests);
- A cloud platform based on the "Digital Enabler" platform, developed by Engineering, that collects, store and analyses the data coming from the different devices in compliance with project privacy requirements.

The above mentioned components constitute the e-VITA coaching system. Moreover part of this system is the Use Cases Configurator (UCC) that takes into account different kind of data (both from the literature and from different devices described above together with user's personal data) to make choices in order to customize the user experience. Choices are made both on the basis of the data received and the use case considered. The UCC operates directly on the sensors, on the robots and on the chatbot.

Sensing technologies and coaching devices are so classified according to the inputs, to provide a complete and integrated sensor network capable of identifying behaviors, physiological states, and emotions of the user and to identify a coaching device accepted by the user.

We can distinguish three categories of sensors: those which are worn by the user and aim to sense physiological and actimetric parameters for accelerometry, gyroscopy and magnetometry relative to the user's cinematics (User Related Devices), those which measure physical quantities useful for assessing the level of comfort and the quality of the indoor environment and the user's localization (Environmental Devices) e.g with the PIR sensors (Deltadore and MISAWA) and those installed in the home to monitor user behavior and activities (Home-Based Devices). For the eVITA system, all these types of sensors are combined to make inference of simple user situations such as the level of activity (agitation) or by the posture in their environment, for the location in the home and the physiological states of the users. Contextual information is exploited by the interactive voice-based coaching system, the virtual coach. Each domain proposed by the coaching system (e.g. physical, cognitive or nutritional activity) requires the integration of specific sensors to acquire heterogeneous data. The coaching system requires information on cultural and religious aspects, user preferences, but also on the available technological equipment. The coaching devices can take three forms, namely Gatebox, Nao, Google Nest Hub, and Celeste or DarumaTO (for Japan). The specific mobile applications for the usage scenarios are however available on the Android smartphone provided to the user as support device.

Ministry of Internal Affairs and Communications, JAPAN

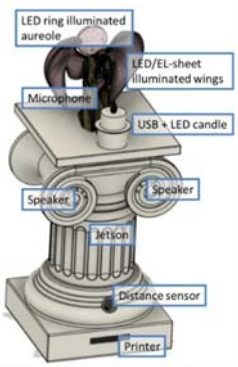
The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

4.1 Technical description of coaches

The coaching devices used in the study are Nao Robot, Gatebox, and Celeste, substituted by DarumaTO for the Japanese centers (Table 1). Such devices are in charge of interacting with the user exploiting the dialogue features provided by the platform. All the manuals and technical documentations are available in Appendix 19.1. The coaches are not medical devices.

A randomization technique based on a single sequence of random assignments is used. A list of random numbers generated by the computer is used and subject is assigned a number based on their order of inclusion in the study. According to this technique, the subjects are randomly assigned to the use of the different coaching device.

Table 1 Coaches

Name	*Type*	*Description*	*Main functionalities*
NAO robot 	Coaching device/Robot	Softbank NAO 5 and NAO 6 humanoid interactive mobile robot.	Robot platform that allows multimodal natural language interaction and robot autonomous movement.
CelesTE 	Coaching device/Robot	Prayer companion designed for Christian Catholic users.	The intended main function of CelesTE is to be a "guardian angel", especially thought for elderly people. It can be a prayer companion, and contains a vast number of teachings, including the whole Bible. Its AI is capable of keeping a short conversation, in which the user may ask and receive an answer about a sensitive topic (such as happiness, death, faith, etc.). It can also printout a selection of contents.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Gatebox 	Coaching device/Hologram	Hologram like device that projects characters with which the user can interact.	Internal sensors such as a camera and a microphone allow the user to converse with the projected character. It connects to the Internet via a wireless LAN. With infrared rays and Bluetooth, it can also be connected to household appliances and other devices.
 Google Nest Hub (2e generation)	Coaching device/Virtual assistant	Connected speaker enriched with a 7-chip touch screen	Screen whose brightness adapts to the room's atmosphere. It has a loudspeaker and 3 microphones, making interaction possible.
DarumaTO 	Coaching device/Robot	Daruma Theomorphic Operator is a social robot in the shape of Daruma that can be controlled by voice and touch.	With its familiar appearance to older generations in Japan, it can serve as a social robot that keeps company and monitors the health of the elderly. It can communicate through voice and facial expressions. DarumaTO has been introduced in homes for the elderly in Japan and has been well received. The current hardware can be extended in the current project by integrating sensors and a complex dialogue system.

4.2 Technical description of sensors

The sensors are either wearable or environmental, and they are needed to monitor physiological and environmental parameters. Table 2 summarizes the sensors available for the study. All the manuals and technical documentation are available in D9.10. The coaches are not medical devices.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Table 2 Sensors

Name Type	*Description*	*Main functionalities*	
NETATMO Smart Indoor Air Quality Monitor 	IoT Device/Sensor	Device for measuring environmental parameters such as temperature, humidity, atmospheric pressure, noise, CO_2 level.	It connects to a network via Wi-Fi to allow measurement data to be stored and visualized.
DELTA DORE Tydom platform 	IoT Device/Sensor	Set of sensors and measuring devices and IOT platform. The sensors can be used with a gateway connected to any dedicated platform.	Set of smart living sensors (motion sensors, door sensors, metering devices) and IOT platform.
ETC-PIR, ET9-OCS, ET9-RHT  	IoT Device/Sensor	PIR sensor (ETC-PIR), door sensor (ET9-OCS) and temperature/humidity sensor (ET9-RHT).	These sensors send measurement to a gateway computer using EnOcean protocol.
Smartband Huawei 	IoT Device/Sensor	Wearable smart band that tracks physiological parameters thanks to an accelerometer; a gyroscope sensor and an optical heart rate sensor.	Parameters monitored: activity level, step, calories, sleep duration, sleep quality, etc.
NEU XB-01	IoT Device/Sensor	Ultra-compact device with a butterfly-style design that bends in the middle to conform easily to any individual's forehead.	Brain activity is measured using NIRS technology and the brain's rate of

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Data is transferred via Bluetooth in real-time to any smartphone, making it possible to measure brain activity. blood flow change is measured using weak near-infrared light.

On the environmental sensors, Delta Dore motion detectors can detect the presence of a moving person in a room, which provides information on the occupancy of rooms and the movement of occupants from one room to another. This information can be of interest as a complement to the wearable sensors, especially when they are forgotten or under load. In this case, it is possible to use environmental sensors, especially motion sensors, to infer user activity. The sensor network, in particular the infrared-based presence detection sensors (PIR sensors), must be installed in such a way as to monitor the user at least in the areas of interest within the smart home environment according to a preselection of which rooms must be covered. The goal of such system is first to identify the resident's movement and possibly activities (by inference) in a given room of the apartment. All the information detected with the environmental sensors are collected by the Use Case Configurator, and will be used to feed the algorithms. Those sensors are:

- the Wireless motion detector-Delta Dore DMB TYXAL

It is a motion sensor and not a presence detector. It has a range of 12 m with a 90-degree opening angle. It generally covers one room and detection is limited to opaque walls. Its autonomy is of the order of 10 years. The detector is based on passive infrared technology. The motion detection function consists of a pyroelectric sensor, the associated electronics that process the signal and control the sensor power supply in an optimized way and finally a lens.

- the Opening magnetic sensor–Delta Dore DO TYXAL+

DO TYXAL+ is an opening sensor developed to detect intrusion into dwellings when doors or windows are opened. It consists of two parts, one of which is attached to the door or window jamb, this is the active element. The other part is a mechanical part that contains a magnet and is attached to the moving part of the door or window. These parts are attached to the doors with double-sided tape. The sensor consists of a reed switch on the active element which is closed when the magnetic part is close and opens when the magnet moves away from it, i.e., when the door is open. The technology is simple, robust and energy efficient.

- the Tydom Home

Sensors are battery powered and communicate detection and maintenance information to a central unit. The Tydom Home IP gateway will be used to collect data from the various products and transfer them to the e-VITA configurator.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

ITEC Corporation

ETC-PIR

ETC-PIR is a wireless PIR sensor which can detect the presence of a human within a radius of 5 m. Measurement is sent to a gateway computer using EnOcean protocol. The frequency of measurement is adjustable. Thanks to the ultra-low-power sensors and ultra-low-power wireless communication methods, the battery is expected to last for 10 years.

ET9-OCS

ET9-OCS is a wireless door sensor which can detect open/close of the door using magnet sensor. Measurement is sent to a gateway computer using EnOcean protocol, each time when open/close of the door is detected. This sensor is solar powered.

ET9-RHT

ET9-RHT is a wireless temperature/humidity sensor. Measurement is sent to a gateway computer using EnOcean protocol. The frequency of measurement is adjustable. This sensor is solar powered.

4.3 Technical description of the end-user's platform

The end-user's platform is composed of: the Privacy Dashboard, the smartphone app, the Chatbots and the Social Platform, as well as the Use Case Configurator. Through those applications, the end-users will be capable of managing his/her data, receive information on the health activities and social events. However, the virtual coaches represent the main interface of the system, through vocal communication with the end-users.

4.3.1 Privacy Dashboard

The privacy dashboard is provided by CaPe through the Cape Suite and can be installed on any mobile device. CaPe addresses legal requirements towards the new GDPR: consent-based data management, technical means to verify compliance with data handling prescriptions, the right to have a copy of personal data, the right to be forgotten and transparency tools on data usage. The consent record demonstrates who consented, when they consented, what was consented, how was consented and whether a consent withdrawn occurred. CaPe supports two types of consenting: (1) consenting to processing within a service for a specific purpose and (2) consenting to sharing data from a service (source) to be processed in another service (sink) for a specific purpose. The Cape Suite comprises the following frontend dashboards, which will be used by end users (data subjects) and the service providers (data controller) respectively: (1) the User Self-Service Dashboard, which is a single point for the end user to have an overview, verify and modify which data are used, how and for which purpose. In addition, it can view event logs and modify linked services and consents previously given when logged at the service ends and (2) the Data Controller Dashboard, which is the entry point for the service provider to manage the semantic descriptions and registrations of its own provided services, view and manage the service linking and consents status given by all the users of its registered services. In the Figure 1, some screenshots of the dashboard (all the screens can be found at https://www.figma.com/file/mGQve2DkN53oBRkcHOeVsy/english-final-version-CaPe?node-id=0%3A1). Pls. see also D6.10.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

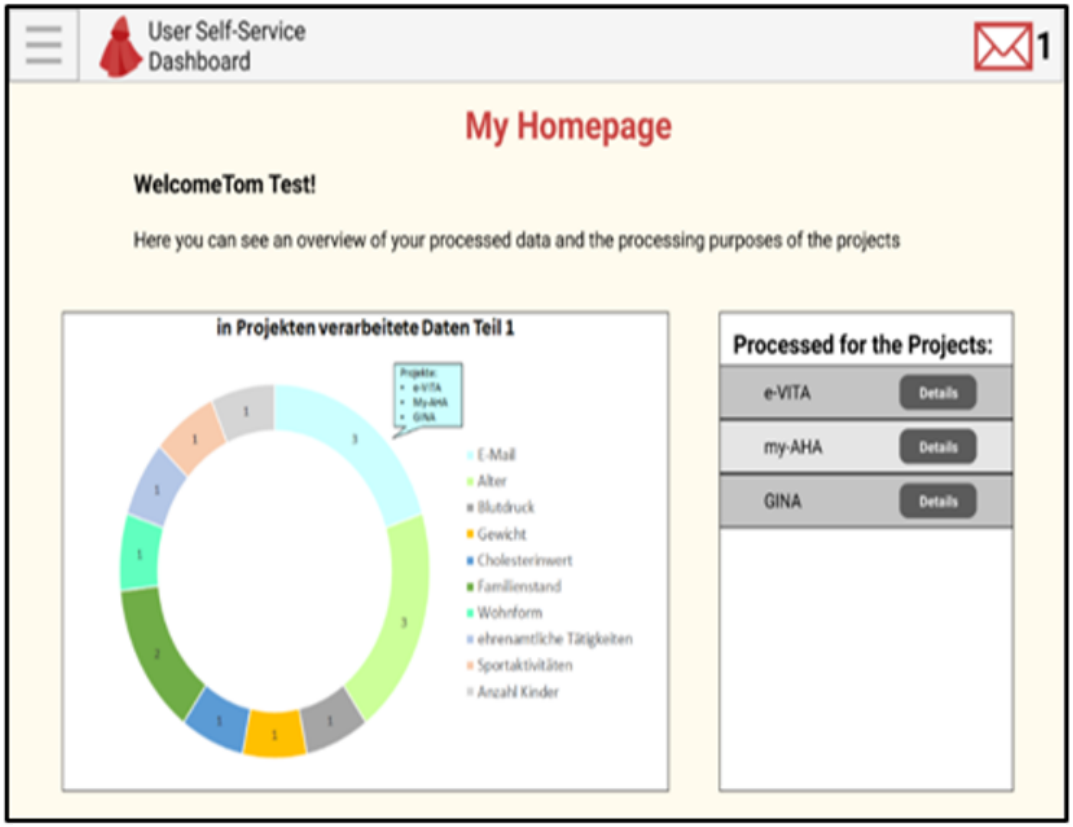


Figure 1a. Screenshot of the privacy dashboard

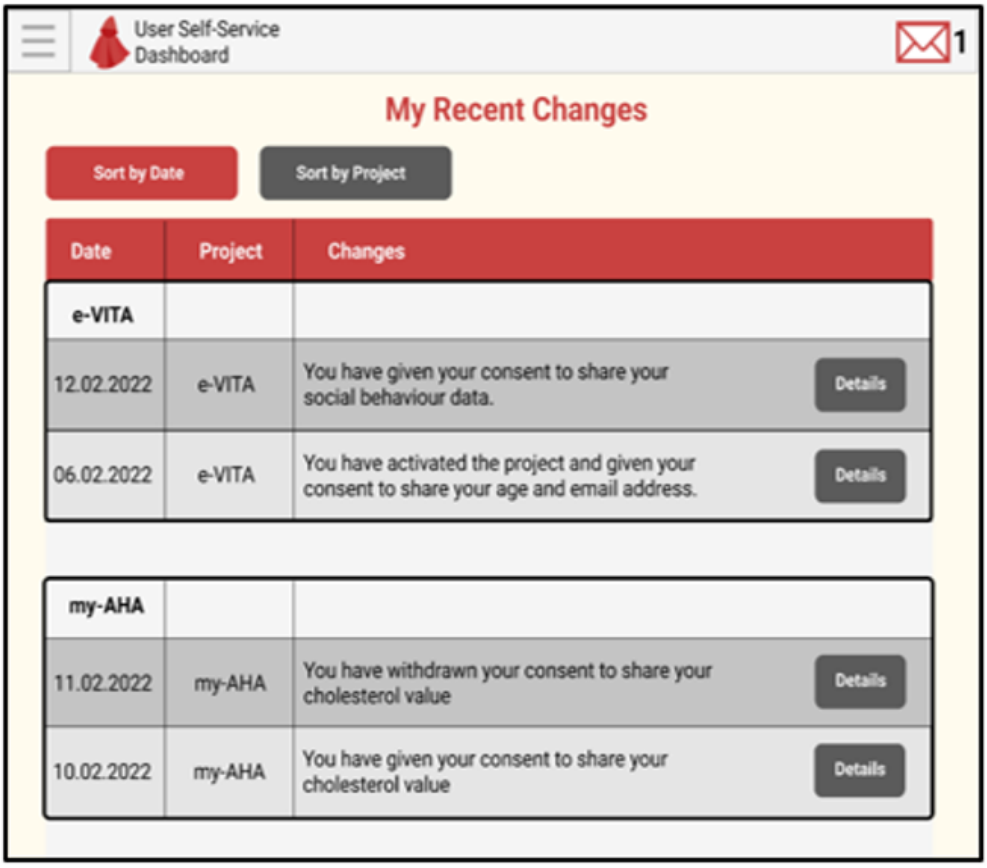


Figure 1b. Screenshot of the privacy dashboard

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

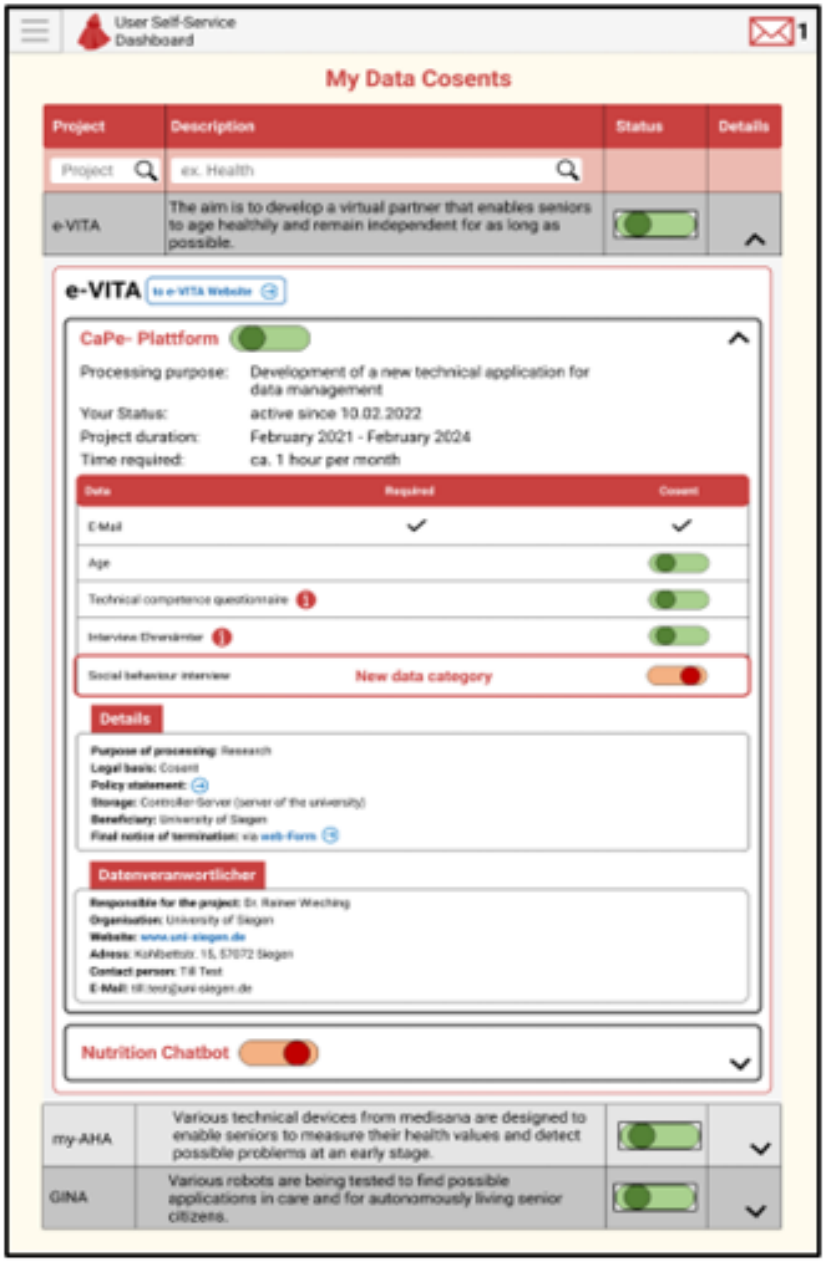


Figure 1c. Screenshot of the privacy dashboard

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

4.3.2 Smartphone App

The e-VITA project provides a smartphone App for end-users that functions as control center. From there users can access all relevant apps and interventions. Furthermore, apps that offer control over system settings, such as the privacy dashboard can be reached via the control center. Specific e-VITA apps (e.g., social platform), but also external apps are represented on the dashboard.

User Interface

The app requires a user profile to be accessed. After opening the app, users will see an introduction to app which can be skipped to the landing page (see Figure 2a). From there, e-VITA users can create a profile using their e-Mail address and a secure password (see Figure 2b). Additional information is not needed for the sign-up process. The e-Mail and password will be used to login and access the individual account (see Figure 2c).

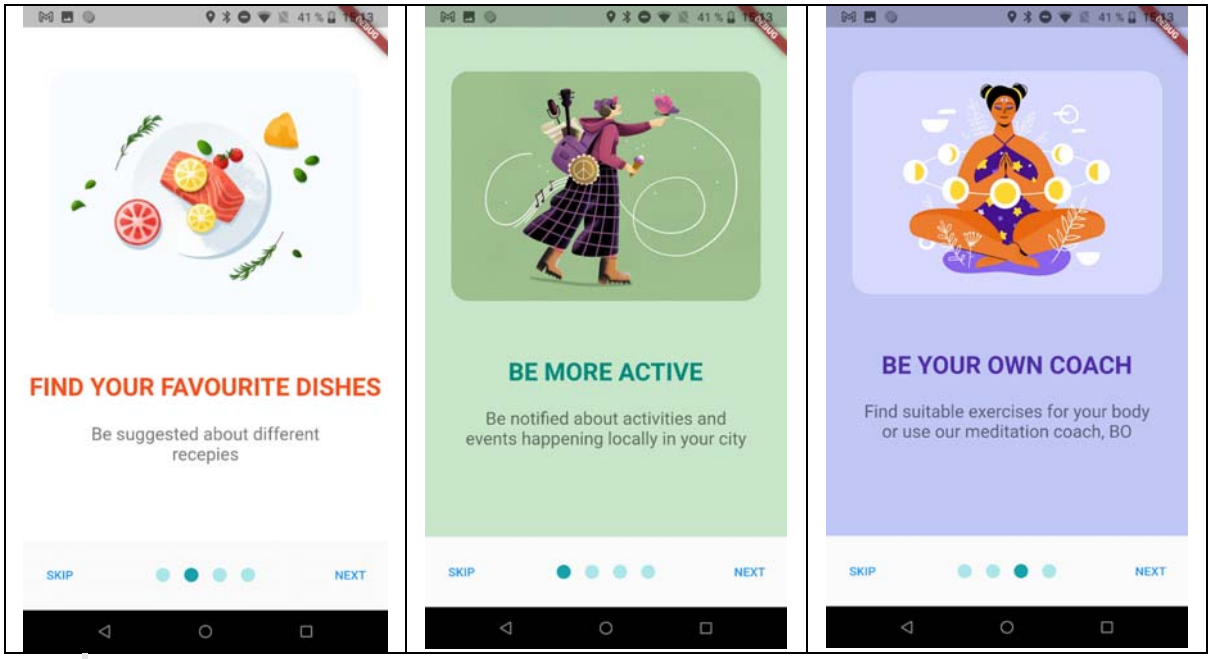


Figure 2. Functionalities of Smartphone App

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

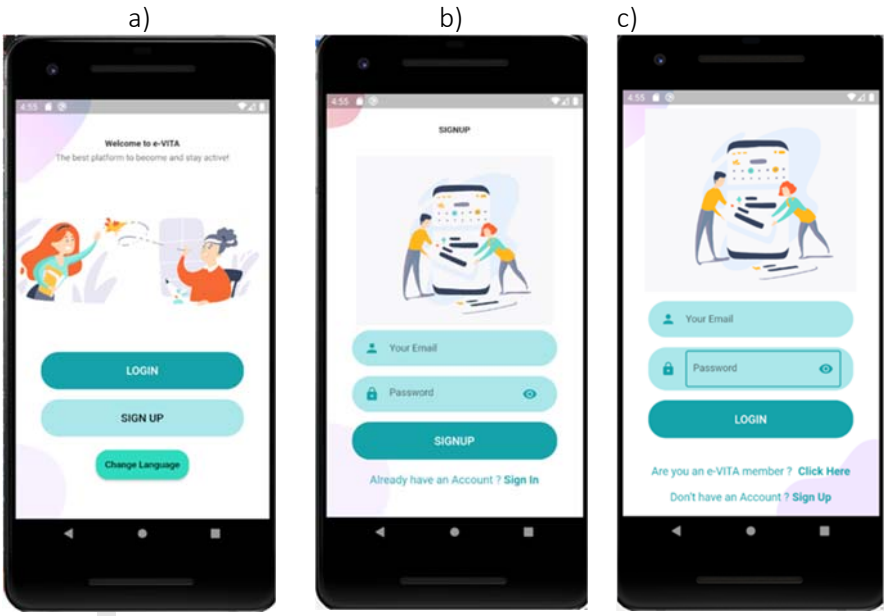


Figure 3. Login and Sign-Up a) Landing Page, b) Login Page, c) Sign Up Page

Further system control tasks, such as changing the language, password or location can also be handled via the smartphone app. The language settings can either be accessed via the landing page (see Figure a) or via the general app settings (see Figure 3b). The general app settings are always accessible via a menu icon on the top left (see Figure 3c).

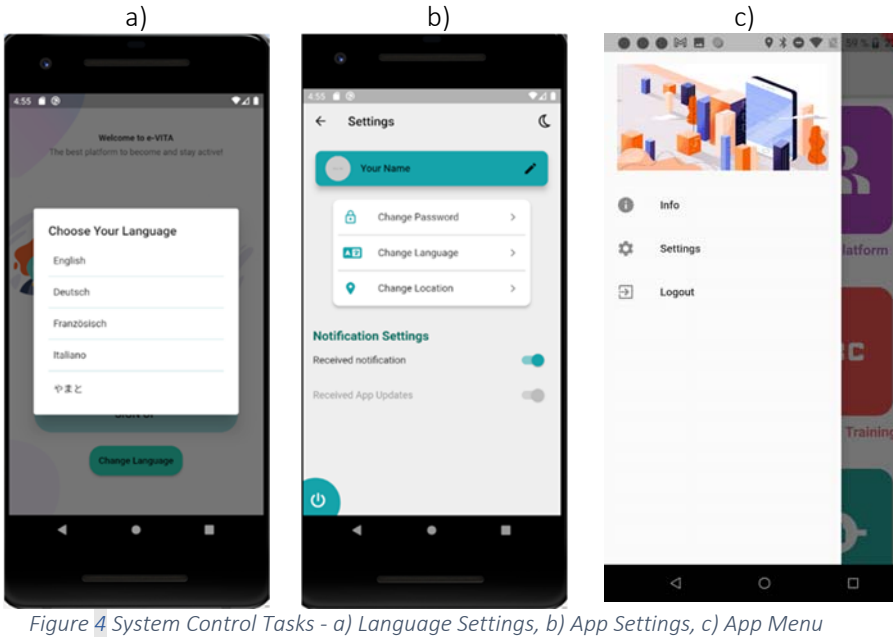


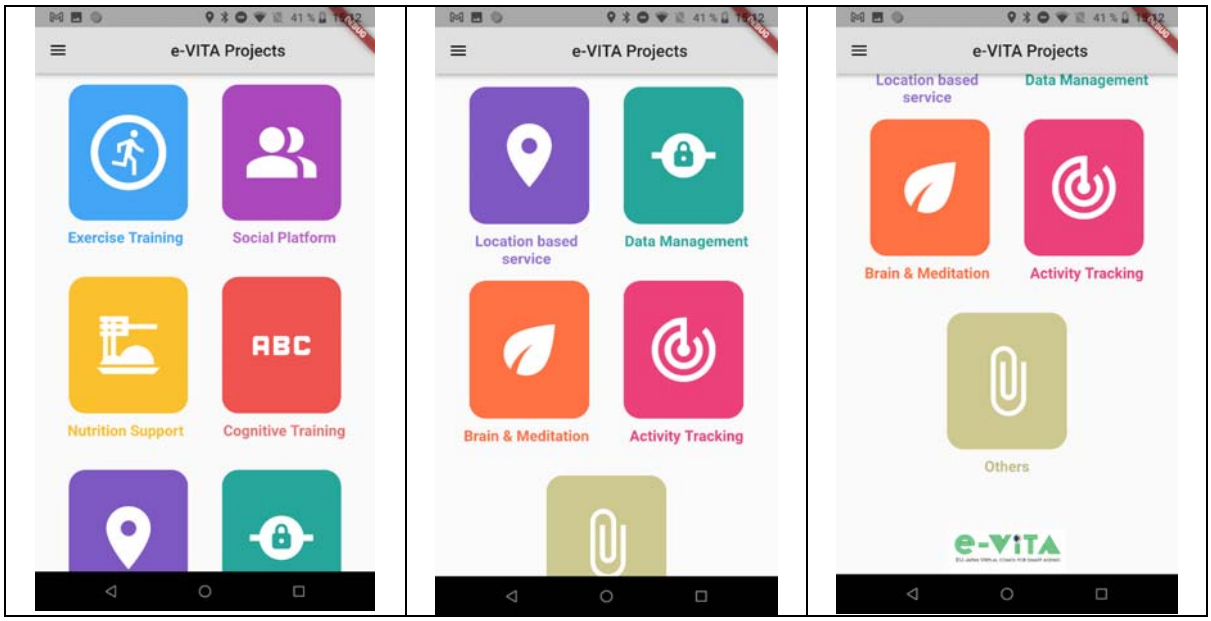
Figure 4 System Control Tasks - a) Language Settings, b) App Settings, c) App Menu

The core function of the app is a control center through which various training interventions (e.g., cognitive training) and chatbots can be started. For this, the dashboard functions as a single point of contact (see Figure 4a). From there other components of the e-VITA architecture can be accessed (see

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Figure 4b). The dashboard will provide links to, for instance, data analytics, profile data, performance indicators, status of the different interactive devices, privacy, and security.



b)

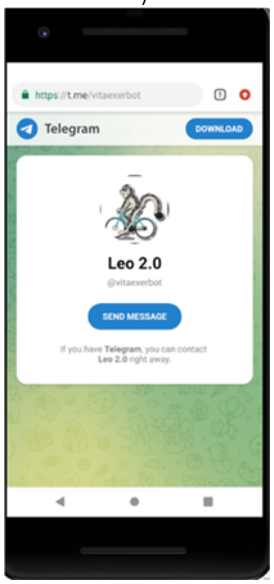


Figure 5 Control center function - a) Dashboard b) Example of a linked Telegram chatbot

Users may want to use chatbots, the social platform, privacy dashboard or other application outside their home. To enable this, components of e-VITA that can be reached via URL can be accessed from outside the home, given that an internet connection is available. The dashboard consists of a grid layout with labeled tiles that link to other components of the e-VITA architecture. It is available in all languages of the e-VITA project. Users will see this page after logging into their account. It offers a quick overview for all content that can be accessed from the app.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

4.3.3 Chatbots

Chatbots are software agents that use a dialogue function, such as a text or speech interface, and are based on natural language processing (NLP). The chatbot can be used to extract several information from a user's statement or input and is also connected to the e-VITA dashboard application. There are two chatbots available, one for exercise, and another one for nutrition.

The chatbots in itself have a Telegram account that can automatically answer the text messages sent to it. To start a conversation, the user can either type '/start' or press the start button on the screen. Once a piece of text is sent by the user to the chatbot, the message, the system starts to search for the intent and extract entities from the user's sentence. At the same time, the previous messages are also taken into consideration for extracting information that the user might have asked for before. All of this information is then returned to the middleware, where the request is further processed.

4.3.4 Social Platform

The social platform allows the users to register and enroll in groups. Groups are meant to be interest areas. Users may either contact or create groups, based on their personal interests (e.g. Nord Walking, Cooking classes, etc.) and may also get located to set up feeds based on the country. Furthermore, users may be notified by upcoming meetings from groups and agenda updates of meetings. The main purpose is to establish a bridge between youth and elderly people and to establish a bridge between individuals and communities by creating a social platform in which different range of activities (e.g., cultural, sport, cooking, repairing, sewing, gardening, etc.) to stimulate the users in remaining active. In order to make it efficient and easy to get connected, the living labs, coaches and those who offer their services will operate based on their location which will be available only for the local community. Social platform application is maintained based on the countries and different communities (more specifically the local location and helping community directly around the primary end-users) to offer user services in the interest of the area. Living labs' and international study site locations will be available to offer suitable activities to the users based on their location. For this purpose, in HumHub, Google location services will be used. Social Platform operates as website that can be accessed easily on any smartphone, tablet and computer (pls. refer also to D5.8).

Sign up. The application will ask to get permission of location to detect user's country to set up feeds based on the country. The user will enter credentials in the homepage, once registered.

Registration. Upon registration the user has designated roles such as administrator, service provider, or community organizations (secondary stakeholders). Administrators are users that have technical responsibilities on maintenance of the website while service providers are users that offer either voluntary help or coaching. Community organizers are users who arrange local activities such as meetups.

Groups. There are different interest areas based on groups. Users may contact these groups or create groups based on their interests by themselves.

Notification. In this section the system will notify upcoming meetings from groups and agenda updates of meetings. (Can update about the new updates of the app also). Notifications can be turned off in settings.

Messages. Users may contact people who initiates the activities or get contacted by manager of those activities by getting detailed information through chat system. When the users receive a message, they

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

will be notified by message such as email and it will be marked on the top of the page. When a user clicks on the "Message" button, he/she will get a short description of the message, in order to reply, users have to go to the "Conversation".

Feed. On feeds users see variety of group meeting in upcoming week. Moreover, they can review volunteer announcements offer different services. Feeds page also considered as main page and users see a review of the last activities.

Settings. Users will be able to change location, language and password and be able to log out. Furthermore, it is possible for the user to change or delete profiles on this page. Users can offer different types of services and at the same time benefit from offered services. Type of services will be offered under different categories. Users can also change their personal information on this page. This information includes profile photo, Email and location. To make different changes on the profile directly, users have to click on top of the page clicking on their username. Pop-up list will be shown in which users choose "Settings" to make desired changes. On this settings user can choose their desired language to use the application. In order to change the language, users have to choose "Settings" and a core settings list will be shown in which "Language option" will be listed.

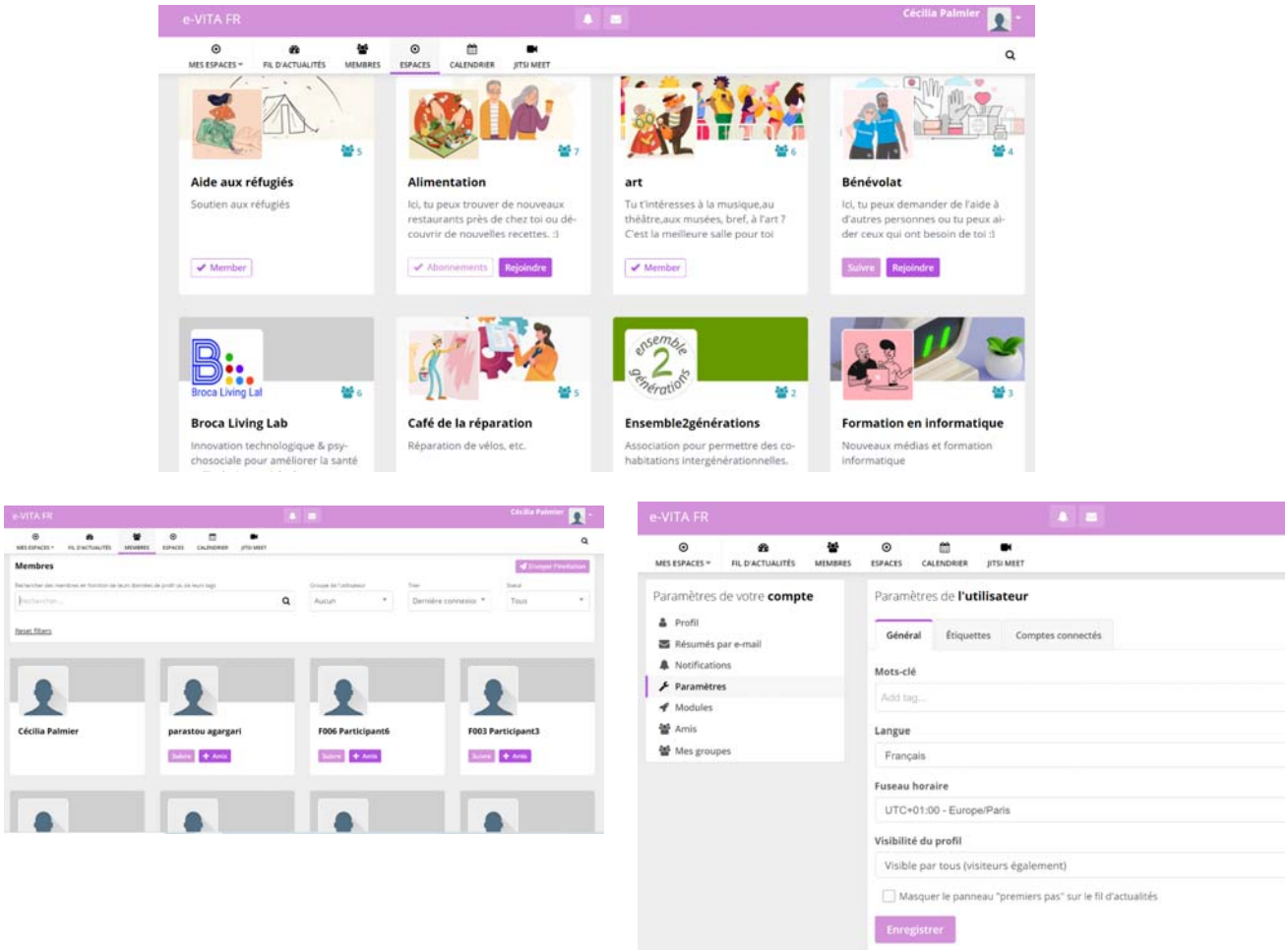


Figure 6. Screenshots of Social Platform

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

4.3.5 Emotion detection system module (EDS)

The e-VITA Emotion Detection System module (EDS) will serve as one of the basic foundations for an empathic coaching system. That is, by accurately detecting the end-users' emotional state, the EDS enables subsequent, higher-level components to flexibly adjust their functioning and end-user interaction, in order to achieve higher levels of acceptance, usability, and well-being. The EDS layer imports audio samples from the current speech of the user (pseudonymized) during the interaction with the coaching devices via speech. It then pre-processes these data and decomposes the audio signal into its statistical sub-components (anonymized, no reverse-engineering possible). Based on this, a classification layer detects the currently most prominent emotion from a fixed set of basic emotions. Another approach will be to add a sentiment-analysis to the EDS. This means, that in addition to the acoustic features of the audio data coming from the participant, information is extracted that is related to the participant's sentiment or opinion, based on Natural Language Processing (NLP). For this, the audio data will be transcribed to a text, which will be then analyzed based on keywords, that represent a basic emotion. This information will be then added to the results of the acoustic analysis, leading to a final model with labels of basic emotions such as anger, disgust, fear, joy, neutral, sadness. As a result, components directly modelling the interaction with the end-user, for instance dialogue management, can then be augmented to fit the user's emotional state.

4.3.6 Use Cases Configurator (UCC)

The use cases configurator (Figure 6) is a standalone software component of the e-VITA platform that translates user needs and requirements and environment configuration into technical specification of the sensing and coaching system. The configurator is focused on creating an adequate smart living environment considering minimization of costs and number of sensors without losing measurement accuracy and identifying the best device for the virtual coaching. It aims to provide the users with a service tailored to their needs and preferences.

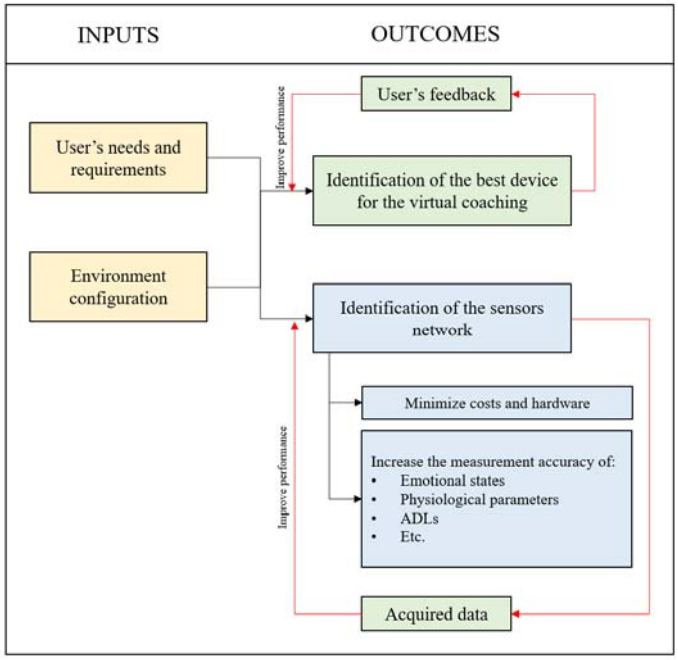


Figure 7 The use cases configurator

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

The UCC provides a graphical interface (Figure 7) to obtain information on which sensors and coaching devices will make up the e-VITA platform from the end-user's selected information, preferences, and goals (pls. see also D4.2).

The inputs for the configurator are needs and requirements of the older adults arising from information about the living environment (house architecture, rooms, etc.), living situation (single resident or multi resident), sensors acceptance (wearable or stationary sensors), privacy settings, and personal information (gender, age, cultural aspects, religion).

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

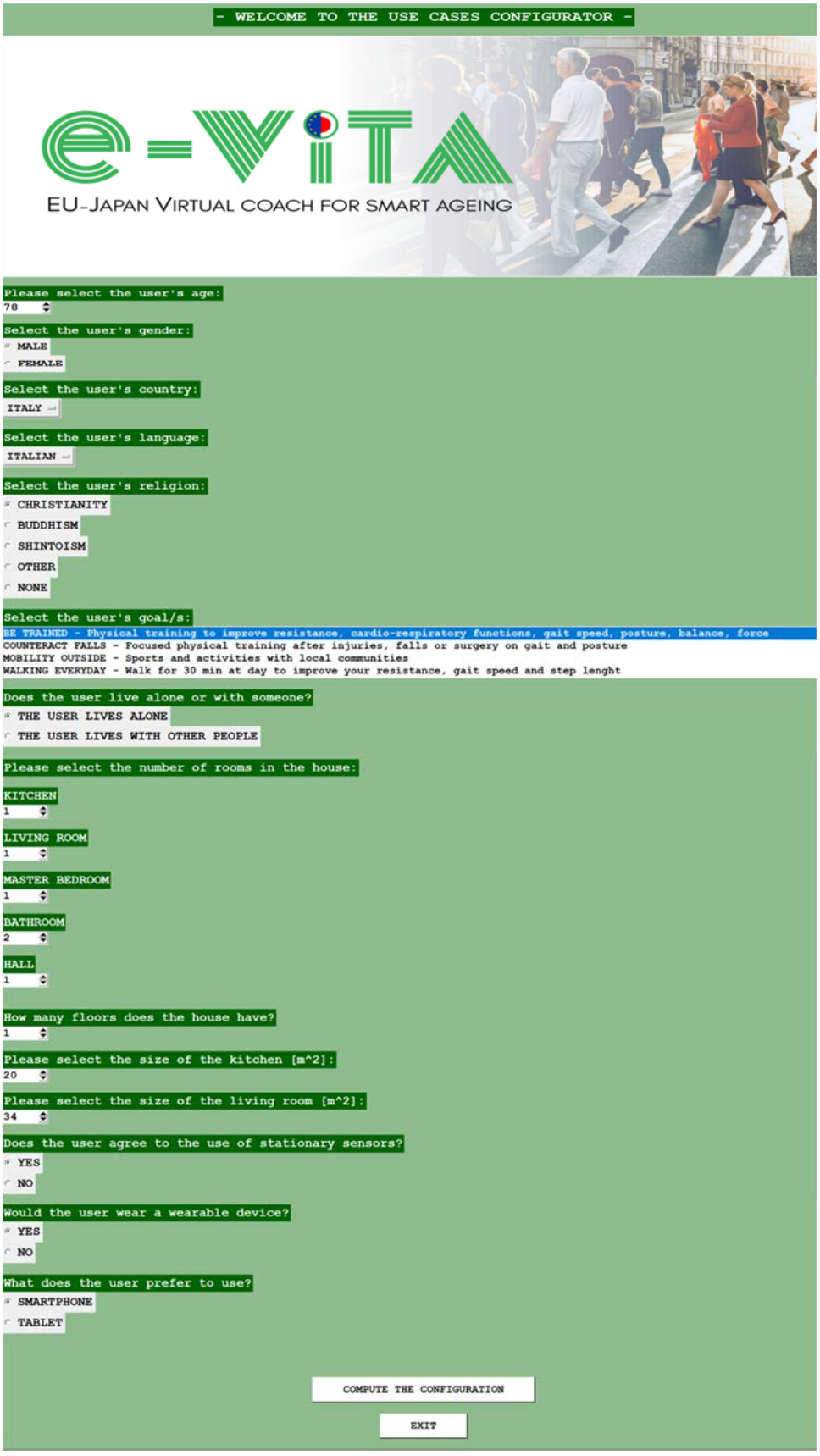


Figure 8 The use cases configurator initial screen

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

4.3.7 e-VITA platform operation

The following is a description of the different use cases envisaged within the project. To more information, please refer to deliverable D3.7.

✓ **Use cases:**

Through the platform, the virtual coaches provide different use case:

1. Everyday activities: when the user returns home, the virtual coach will welcome him/her. It will support the user in their daily life by interacting with them through dialogue, singing, situationally appropriate behaviours such as comforting or motivating words generated according to the factors such as sensor data, data from API, readiness level of behavior change and related determination factors proactively. The virtual coach will also be able to provide reminders about activities of daily living.
2. Health activities: The virtual coach can offer the user physical exercises and cognitive training through mini games, for example. It can also offer nutritional advice and support for physical therapy exercises. To this purpose, the following activities were derived from the analysis of literature and guidelines:
    - Activity 1: Multicomponent physical activity: to train balance, flexibility, aerobic training, functional training, and muscle-strengthening training
    - Activity 2: Aerobic activity: walking or hiking; some forms of yoga; some yard work, such as raking and pushing a lawnmower; bicycle riding (stationary or outdoors); water aerobics
    - Activity 3: Muscle-strengthening activities: lifting weights; working with resistance bands; doing exercises that use one's body weight for resistance (push-ups, sit-ups); Heavy gardening (digging, shovelling);
3. Social activities: The virtual coach will participate in the user's social life by offering information about social events.
4. The question-and-answer functionality: The user can ask questions to the coach who will search on the Wikipedia website for the answer. No sensors are needed for this feature.

Physical Exercise Coaching

Physical Exercise Coaching represent a subdomain of the *Health activities*, based on four goals:

1. Be trained: aimed at providing a complete multicomponent training for physical activities, covering different domains such as muscle strength, cardiovascular capability, posture, balance, relaxation.

2. Counteract falls: aimed at providing a focused rehabilitation set of exercises to recover after injuries, falls or surgery.

3. Mobility outside: aimed at combining social contacts with physical activity.

4. Walking everyday: for at least 30 minutes, following the international guidelines in the field.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

In order to reach a minimum core of common tasks, to be used for the assessment of the intervention, standardized exercises re-adapted from the My-AHA project (Summers et al, 2018; Rainero et al, 2021 will be provided to the end-users, in form of video. The exercises will be culturally adapted in the language of the pilot sites. In order to assure the comparison among the pilot sites, the following Module 1 and Module 4 constitute the basis of the minimum core of common exercises. Frequency of the activities for each objective are:

• Module 1: Be trained: 3 times per week

• Module 2: Counteract falls: 3 times per week, or 2 times + 1 time per week Module 1

• Module 3: Mobility outside: participation to activities, based on the users' preferences. In connection with social platform (see chapter 2.3).

• Module 4: Walking everyday: for at least 30 minutes, following the international guidelines in the field. To be alternated with the other modules.

Overall, there is an opportunity for older adults to self-document activities that the coach is not aware of (i.e., walk for 30 minutes, cycling or swimming). The virtual coach reminds the participants to the selected activities, and it is able to provide feedback on the basis of the data collected during the performance. The virtual coach stimulates and support the users' engagement in the different activities.

Table 3 Physical Exercise Coaching (Let's do Physical Activity)

Domain	Health Coaching
Subdomain	Physical Exercise Coaching
Use Case	Let's do Physical Activity
Scenario ID	PhysicalHealth1
Environmental Data	Doesn't need data
Interaction Modalities	Dialogue and instructional video
Physical activity of the user	Requires physical activity
Indoor/ outdoors	Indoor + Outdoor
Wearable device	Wearable device required (Smartwatch)
In front of the device	Only for indoor exercise

Cognitive Exercise Coaching

Cognitive Training is another subdomain of *Health activities*. It is known that cognitive function is influenced by multiple factors such as physical activity, nutrition, and social interaction. Cognitive stimulation activities are multiple, and those able to create a sense of accomplishment and satisfaction are particularly suitable. Also, there are differences across gender in terms of awareness of mental health, risk for cognitive impairment, and acceptance of support. Using technology to promote cognitive activities requires usable devices and software, but also user motivation. Furthermore, it is recommended to monitor these activities in order to see the evolution of cognitive performance.

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Cognitive Exercise Coaching is a use case belonging to the *Cognitive Health* subdomain. It is important to propose cognitive activities adapted to the needs and preferences of the older people that allow a wide range of cognitive functions to be exercised. To this end, the virtual coach will be able to inform users of the different ways of exercising their cognition and propose other scenarios such as going out with relatives, making a phone call or doing physical activity.

In addition, some games in paper/pencil format can be adapted to an electronic version, such as:

- Activity: True/False Goals: thinking, memory

The virtual coach could propose a cognitive game by giving a statement to the person, who has to say whether the statement is true or false. The virtual coach says whether the answer is true or false and gives an explanation to the person.

- Activity: Intrusive Goals: reflection, memory

The virtual coach gives a statement and then presents three other sentences. The user has to say which of these three sentences is not related to the statement at the beginning.

- Activity: Capital Goals: thinking, memory and language

The virtual coach says the name of a country and the user has to say the name of the capital.

- Activity Cognitive Application Goals: various cognitive functions

The virtual coach could propose to the person to perform cognitive activities proposed by an application. The application offers a wider range of activities that can be both verbal and visual, which stimulates a wider range of cognitive functions: spatio-temporal orientation, calculation, manipulation, orientation, language etc.

In order to ensure the comparison between the pilot sites, the virtual coach will have to propose modules 1 to 3 with the following frequency:

- Module 1: Memory: 3 times per week for 15 min.
- Module 2: Executive functions: 3 times per week for 15 min.
- Module 3: Attention and Orientation: 3 times per week for 15 min.
- Module 4: New skills achievement - eHealth and health literacy: participation to class lessons once a week for four weeks.

During each session, wearable sensors will be used to collect stress arousal. This can also be the case with the exBrain device from the NeU company that can also be used. The sensor placed on the forehead makes it possible to visualize brain activity, to see the evolution of performance and thus to adapt the proposed exercises. In addition, monthly assessments will be carried out to increase the level of difficulty of the cognitive training based on the improvements collected using standardized scales every week.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Table 4 Cognitive Training (Brain Coaching)

Domain	Health Coaching
Subdomain	Cognitive Training
Use Case	Brain Coaching
Scenario ID	CognitiveHealth1
Environmental Data	Doesn't need data
Interaction Modalities	Dialogue and visual interaction with coaching device
Physical activity of the user	Doesn't require physical activity
Indoor/ outdoors	Indoor
Wearable device	No device required
In front of the device	Requires to be in front of the device

Nutrition Coaching

The virtual coach should recommend an appropriate diet to prevent malnutrition. This subdomain relies on the chatbot mainly:

- While the chatbot runs independently, it is also connected to the e-VITA dashboard. This ensures that the user-data is already saved in the system and the users do not have to enter the same data all over again. The chatbot should interact with the coach and vice versa: the chatbot transmits some results to the coach so that the coach can include that in conversations on the topic. In addition, the coach should also motivate the use of the chatbot.
- The nutrition chatbot provides a better-suited solution for older adults because it feels more personal and operates within an already familiar messenger application.
- The chatbot provides a proactive, engaging way to encourage users to reflect on their eating habits. It sends the users general information about healthy nutrition, and animates them to try out new recipes, this way eventually reducing unhealthy habits through a long-term approach (as change will not happen overnight). Furthermore, it allows users to pose health-related questions to the chatbot.
- The chatbot pays attention to the great diversity in the older adults' eating habits. Over time, it learns about personal preferences and takes them into account when communicating with the users. This includes their nutrition knowledge, nutrition goals, and cooking ability.
- The chatbot also provides a tool for measuring 'success,' depending on its personal definition (e.g., loss of weight, reducing sugar, etc.)

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Table 5 Nutrition (Nutrition Coaching)

Domain	Health Coaching
Subdomain	Nutrition
Use Case	Nutrition Coaching
Scenario ID	NutritionHealth1
Environmental Data	Doesn't need data
Interaction Modalities	Dialogue and visual interaction with coaching device
Physical activity of the user	Doesn't require physical activity
Indoor/ outdoors	Indoor
Wearable device	No device required
In front of the device	Requires to be in front of the device

Social activities coaching

The virtual coach will participate in the user's social life by sending messages from family and/or friends, but also by responding to them with the user. In addition, the virtual coach will be able to link the user to social events.

Social Events Engagement:

This use case of Social activities domain works as follows:

• The envisioned social platform will receive a constant connection to the e-VITA middleware, the primary end-users in each community and to the secondary stakeholders from this community. The platform will become a new possibility for the secondary stakeholders to promote or offer their activities.

• Activities such as cognitive training, physical training, education on psychological or nutrition health as well as other events from the regional secondary stakeholders will be displayed within the platform. The secondary stakeholders will have the role to input these activities to the platform and to let end-users know about the platform and its offerings. For the secondary stakeholders this social platform will become a new tool to:

(1) Promote and share their activities.

(2) Get an overview of other activities and events in the region.

(3) Help older adults to know about other offers.

Further there will be trainers which will enable end-users to use the platform, these trainers could be older adults that just retired and who are looking for a new role. It is envisaged that they help other end-users which are not used to new technologies.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

The social platform will work on HumHub (www.humhub.com/), an open-source platform that give the freedom to create a platform without social tracking, with privacy of data and therefore be an attractive alternative to offerings from US companies. HumHub is a free and very flexible social networking software, it is easy to install, intuitive to use and yet very powerful. It gives the possibility to create your own social network and social intranet. Moreover, HumHub allows to combine many needs of the different stakeholder groups.

Table 6 Social Connectedness (Social Events Engagement)

Domain	Social Connectedness
Subdomain	Local Community
Use Case	Social Events Engagement
Scenario ID	Social3
Environmental Data	Doesn't need data
Interaction Modalities	Dialogue and visual interaction with coaching device
Physical activity of the user	Doesn't require physical activity
Indoor/ outdoors	Indoor
Wearable device	No device required
In front of the device	Requires to be in front of the device

Environmental monitoring

The virtual coach will be able to monitor the user's environment. Monitoring of safety and security often requires medical judgment. In the context of coaching for prevention of safety and security issues, sensor data from daily life is accumulated and analyzed to provide advice for prevention of decrease in health. For example, if the weight of the user is increasing slightly, the coach will advise to take a walk for longer distance and/or provide nutrition advice, according to the specific needs of the person.

In the e-VITA context, the use of other environmental sensors and their impact on the user's wellbeing is studied. For instance, it is possible to collect physiological data from the users, such as brain activity (e.g., NeU device), and also from a domestic sensor network of motion tracker, temperature, and light sensors (e.g., Gas metering, Water metering, Electric Consumption).

An important aspect is also related to building trustworthy AI. As discussed in Jokinen et al. (2021) many smart living functionalities require storage of data as well as the comparison and exchange of data with other systems, e.g. Electronic health records or Q/A services, or they may repurpose the stored cloud data to improve their intelligence. With new advances in trustworthy AI and federated data structures and edge computing (e.g., GAIA-X), the sharing of personal data between virtual coaching systems and components of smart environments has already begun and will become more common and pervasive. Also, long-term interaction between humans and robots requires data storage with a balancing act between privacy and security (Jokinen & Wilcock, 2021).

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Virtual coaches will increasingly interact with smart devices and become part of the pervasive information environment. Such decentralized and spatially distributed components present challenges regarding the use of information and in particular, data security. It is important to create mutual trust between all the actors. A prerequisite for developing trust in technological devices is that human operators can maintain "mental models" of their virtual machine, while the training system must communicate its internal state and explain its actions and decisions in ways that support the user's understanding of the virtual machine.

Table 7 Monitoring & Safety (Environmental Monitoring)

Domain	Monitoring
Subdomain	Safety
Use Case	Environmental Monitoring
Scenario ID	Safety2
Environmental Data	Needs environmental data
Interaction Modalities	-
Physical activity of the user	Doesn't require physical activity
Indoor/ outdoors	Indoor
Wearable device	No device required
In front of the device	Requires to be indoor

The question-and-answer functionality: The user can ask questions to the coach who will search on the Wikipedia website for the answer. No sensors are needed for this feature.

✓ Sensors

Virtual coaches also need the involvement of sensors to achieve this use case. Each use case requires the involvement of different sensors:

1. Everyday activities: For this use case, to monitor the user's daily activities the DELTA DORE DMB TYXAL+ and DO BL TYXAL+ (Europe) and ETC-PIR, ET9-OCS (Japan) sensors are required (see appendix 19.1 for the technical description).
2. Health activities: Health activities are shown using a smartphone. For this, wearable sensors are required for each use case
    - ✓ For cognitive activities, the NEU XB-01 brain activity measuring device and its application Active Brain Club will be used (see in the appendix 19.1 technical description). They will permit to show the brain activity and measure results of cognitive neurofeedback training.
    - ✓ For physical activities, the wearable device is required to evaluate the HR, HRV, SPO2, steps count, calories burned, activity

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

- ✓ For nutritional activities: For Nutritional activities, the wearable device is required for actimetry and pulse measurement: the calories burned, and the activity carried out during the day are useful for providing nutritional advice.
- ✓ For psychological activities: For Psychological activities, the wearable device is required for actimetry and pulse measurement: the absence of movement and poor vitality (except the stress measured by the emotion of speech) could certainly be a sign of depressive state.

3. Social activities: For social activities the smartphone is used to send and receive messages to friends/family and to update the user on social events to participate in according to their preferences users can also send out feed-back after participation.
4. Environment monitoring: For this use case, different sensors (see in appendix 19.1 for technical description) will be used like NETATMO Smart Indoor Air Quality Monitor to monitors the environment by measuring temperature, humidity, CO2 concentration and noise level; DELTA DORE DO BL TYXAL+, DMB TYXAL+ (Europe) and ETC-PIR, ET9-OCS (Japan), these sensors permit to monitor the presence of people in the room by detecting movement and the opening of doors on which the sensors are installed respectively;

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

5 Study endpoints

The main questions that e-VITA study want to answer are:

1) Is the e-VITA intervention effective to improve the quality of life of the older people?
2) Is the e-VITA intervention able to increase the compliance of the older people to the innovative lifestyle training, based on the Intrinsic Capacity framework to support AHA?
3) Is the technology proposed usable and acceptable by the older participants?
4) Is the e-VITA intervention effective in improving the eHealth literacy of the older participants?
5) Is the system able to counteract loneliness, by improving the social connectedness and the social participation of the older participants?
6) Which are the domains of Intrinsic Capacity that can be mostly favored by the e-VITA intervention?
7) Which is the role of dimensions like attitude, personality, motivation in supporting the intention to use the system?
8) Is the e-VITA effective in supporting the leisure activities of the older people?
9) Which are the factors that can mostly favored the adoption and purchase of the systems? Are there any positive benefits, in terms of cost, from the adoption of the e-VITA system/intervention?

5.1 Primary endpoint

The primary end-points of the study are constituted by the improvement of the adherence to the coaching intervention, through the frequency of use of technological devices collected through a semi-structured interviews and technical data. throughout the project. But also, by the improvement of the quality of life after the use of the e-VITA system, to be measured through the EQ-5D-5L, after 6 months of training.

5.2 Secondary endpoint

The secondary end-points are:

- Usability and the user experience of the overall system, to be evaluated through:
    - the System Usability Scale (SUS, Brooke, 1996) in the middle and at the end of the experiments.
    - the User Experience Questionnaire (UEQ, Laugwitz et al., 2008 and UEQ+, Klein et al., 2020) in the middle and at the end of the experiments.
- Improvement of:
    - eHealth literacy, to be addressed through the eHealth Literacy Scale (eHEALS, Norman et Skinner, 2006)
    - social connectedness through the UCLA Loneliness scale (UCLA, Russell, 1996)
    - nutritional state through the short version of FFQ to estimate the frequency of daily food intake over a period.

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

- cognitive status, through Montreal Cognitive Assessement (MOCA, Nasreddine et al., 2005)
- psychological mood through the Geriatric Depression Scale (GDS, Yesavage et al., 1982)
- functional status through Short Physical Performance Battery (SPPB, Guralnik et al., 2000)
- participation to leisure activities through an ad-hoc checklist
- Meets the participant's objectives through ADTPA-5 (scale B and E adapted)

A semi-structured interview will used to complement the information collected by questionnaires, focusing on: acceptability, attitude, usability and cost-benefits analysis (Appendix 19.4 and 19.5).

Others questionnaire will be used to better understand our participants:

- Socio-demographics questionnaire:
- Clinical Frailty Scale (CFS).
- Big Five Inventory – 10 (BFI-10, Rammstedt & John, 2007)
- Affinity for Technology Interaction (ATI).

5.3 Protocol

For this study, 240 older adults will be enrolled. The participants will be randomized into 2 groups. A summary of all data collected and when these are collected is provided in Table 8. In Annex 1, all the scales and tools used in the different assessment sessions are reported.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Table 8 Outcomes and clinical assessments

Dimension	Scale	R	T0	T1	T2
Clinical Frailty Scale	CFS	X			
Cognitive status	MOCA	X			X
Psychological status	GDS	X			X
Physical Capacity	SPPB	X			X
Overall health status	Clinical anamnesis	X			
General information	Socio-demographics questionnaire	X			
Quality of life	EQ-5D-5L		X		X
Goals and Expectation	ATDPA-5 (Scale B and E)		X		X (only Scale B)
eHealth literacy	eHEALS		X		X
Social connectedness	UCLA		X	X	X
Personality	10-item versions of the Big Five Inventory		X		
Nutrition	Short FFQ		X		X
Adherence	Collected through the system and by interview			X	X
Leisure activities	Physical and leisure activity checklist		X	X	X
Usability	SUS			X	X
User Experience	UEQ, UEQ+			X	X
Attitude, usability, acceptability and cost-benefit analysis	Semi-structured interview				X
Affinity for Technology Interaction	ATI		X		

Clinical Frailty Scale (CFS). This descriptive scale divides the older participants into 9 classes based on the information provided by them and their relatives: between 1 and 3 the patient is non-frail, pre-frail if 4, he is frail from 5 to 9.

Montreal Cognitive Assessment (MoCA). MoCA is a cognitive test validated as a highly sensitive tool for early detection of mild cognitive impairment (MCI). MoCA accurately and quickly assesses: short term memory, visuospatial abilities, executive functions, attention, concentration and working memory, language and orientation to time and place. The final version of the MoCA (available at

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

www.mocatest.org) is a one-page 30-point test administered in 10 minutes. Details on the specific MoCA items are as follows. The short-term memory recall task (5 points) involves two learning trials of five nouns and delayed recall after approximately 5 minutes. Visuospatial abilities are assessed using a clock-drawing task (3 points) and a three-dimensional cube copy (1 point). Multiple aspects of executive functions are assessed using an alternation task adapted from the Trail Making B task (1 point), a phonemic fluency task (1 point), and a two-item verbal abstraction task (2points). Attention, concentration, and working memory are evaluated using a sustained attention task (target detection using tapping; 1 point), a serial subtraction task (3 points), and digits forward and backward (1 point each). Language is assessed using a three-item confrontation naming task with low-familiarity animals (lion, camel, rhinoceros; 3points), repetition of two syntactically complex sentences (2points), and the aforementioned fluency task. Finally, orientation to time and place is evaluated (6 points).

Geriatric Depression scale 5-items version (GDS). This questionnaire assesses the current condition of the patient's mood. For the screening required by our study, only the first five items of the scale can be used. The answers highlighted indicate the statements expected by a non-depressed subject.

Short Physical Performance Battery (Guralnik et al., 2000). Assesses physical performance on the basis of three criteria by testing balance, walking speed and chair raising abilities. This scale is used for the inclusion of participants.

EQ-5D-5L: The scale consists of five dimensions: mobility, independence, usual activities, pain/discomfort and anxiety/depression. Each dimension has 5 levels: no problems, mild problems, moderate problems, severe problems and extreme problems. The participant is asked to indicate his/her health status by ticking the box corresponding to the most appropriate statement in each of the five dimensions. The numbers from the five dimensions can be combined into a 5-digit number that describes the health status of the participant.

Expectation of the virtual coaching system (ATDPA-5 – scales B and E adapted, Scherer & McKee, 1990): is a scale that assesses the person's need for technology. It has two parts. A part on the individual with 9 items assessing functional capacities and 11 items on well-being. These first 20 items are to be filled in on a Likert scale of 5, ranging from 1: poor/not satisfied to 5: excellent/very satisfied. Finally, this last part also assesses personal and psychosocial characteristics. There is no threshold value for these last items. The second part deals with technological tools with 12 items highlighting their expectations in terms of benefits towards three technological tools. There is no threshold for this scale, but the scores range from 0 to 60 (sum of the statements). The tool with the highest score is considered the most important. This scale is used at the beginning of the experiment. Only part B and E adapted will be used and adapted for the project.

Big Five Inventory – 10 (BFI-10, Rammstedt & John, 2007). The BFI-10 is a 10-item scale measuring the Big Five personality traits: Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness. The scale consists of 1à items that are rated from 1 (disagree strongly) to 5 (agree strongly).

Short FFQ Food frequency questionnaires (FFQ) are used to estimate the frequency of daily food intake over a period of time. The FFQ asks for the frequency of certain food intake (once daily, once or twice a week, once or twice a month), and the approximate serving size. The questionnaire asks for information on the habitual intake of the food and is not to quantify the actual amount of nutrients ingested. In Europe the partners will use the scale created by Robinson et al.2016.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

eHealth scale. The eHEALS is an 8-item measure of eHealth literacy developed to measure consumers' combined knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems.

Revised UCLA loneliness scale version 3. The revised UCLA scale version 3 is a consistent and reliable questionnaire-based measure for trait loneliness (Russell, 1996). The questionnaire consists of 20 items that are rated from 1 (never) to 4 (often) resulting in loneliness core ranging from 20 to 80. Higher score indicates higher trait loneliness.

System Usability Scale (SUS): The System Usability Scale is a reliable tool for measuring usability. It consists of a10 item questionnaire with five response options for respondents; from 'Strongly agree' to 'Strongly disagree'. It allows for evaluation of a wide variety of products and services, including hardware, software, mobile devices, websites and applications. It is easy to administer to participants and can be used on small sample sizes with reliable results and can effectively differentiate between usable and unusable systems.

User Experience Questionnaire (UEQ): The scales of the questionnaire cover a comprehensive impression of user experience. Both classical usability aspects (efficiency, perspicuity, dependability) and user experience aspects (originality, stimulation) are measured.

User Experience Questionnaire + (UEQ+, Klein et al., 2020): To measure the user experience of the voice interaction in particular, additional scales like response behavior or response quality from the UEQ+ can be added (Klein et al., 2020).

Affinity for Technology Interaction (ATI). The scale, developed 2019 from Franke et al., measures a person's interaction-related affinity with technology. It consists of a total of nine items and uses a six-point Likert scale from 1 = *completely disagree* to 6 = *completely agree*.

Physical and Leisure activity checklist. An ad-hoc checklist has been developed to collect information on engagement on leisure and physical activities of the participants during the e-VITA trial. It contains questions to be rated on a 6-points Likert scale about common physical and leisure activities, and a section to report the personal practices and frequency put in place by the participants.

Scales at T0 and T2 for control group: These two scales are necessary to better understand our participants. The scale at T0 focuses on the dimensions of daily life; social; prevention. The T2 scale focuses on the participants' feelings following the experiment, their experience with the information booklet and its usability, and their well-being.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

5.4 Procedure

5.4.1 Inclusion visit – recruitment (R):

After a reflection period of two weeks following reading the information letter and the consent form received by email, the participants having confirmed in writing or orally their wish to participate in the research, will be invited by the investigator to consult a doctor for 3 months preceding the start of the research. The doctor volunteering to carry out the inclusion visits will first give the participant the information letter and the two consent forms. After proofreading and signature of the consent forms by the participant and by the doctor, the doctor through an anamnesis CFS, MOCA, GDS, SPPB will attest the eligibility of the participant for research. This medical examination will take place before the start of the experiment. Participants who have signed the consent form but whose inclusion criteria are not confirmed by the doctor will not be included in the research.

5.4.2 Research follow-up visits – first evaluation (T0) and intermediate evaluation (T1)

Following the visit with the doctor, the investigator will contact (by email or telephone) the participant to define with him his availability with a view to setting up the research project at home. When recruitment is complete, the investigator will randomize the participants into two groups: control group and experimental group. The allocation is done in an alternating randomised manner (ABAB) according to the order of inclusion of the participants. Participants in the experimental group will receive either a Nao, Celeste (Europe)/Daruma (Japan), Gatebox or Google NEST (5 participants for each device). The first participants in each experimental group will receive the NEU XB-01 sensor. In addition, each participant will receive sensors, a smartphone and a booklet. The allocation of the technology is done in a randomised alternating manner (ABCDABCD) according to the order of inclusion of the participants. Participant in the control group will receive a booklet.

<u>For the experimental group:</u>

On the first day of the experiment, a researcher will go to the participants' homes to carry out the first evaluation (T0). The scales described below will be administered, then an interview will be conducted (appendix 19.5).

The participant will receive training sessions in the study centres with the other experimental participants.

Then the devices (virtual coach and sensors) will be installed at the participants' home.

During the six months of experimentation, the participant will be invited to use the technological devices in the way he/she wishes. The instruction which will be given to the user of the experimental group, will be to use them in the same way as he/she would do without the framework of the experiment. In any case, he will not be obliged to manipulate the technological devices.

In addition, during the experimentation phase of the experimental group, human coaches (alternatively, a student, a therapist, or a volunteer assigned by him/her) trained in the project and in supporting the older adults– will call participants once every two weeks (week 1 and 3 of each month) to inquire about the duration of the interaction, the type of interaction performed, their feelings about the activity and obtain some socio-economic information by following a guideline (Appendix n°19.7). The human coaches will also have the role of helping the user to take control of the technological devices and to help him/her in case of difficulties. They will ask about the user's satisfaction and

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

motivate him to use the device. They will also be able to complete the information given by the virtual coach to the user. Human coaches will also be available by telephone and, if necessary, at home.

Participants will also be offered the opportunity to meet with other research participants during videoconference sessions (1-2x per months: week 2 and 4 of each month), in order to exchange with them (these sessions are optional and depend on the availability of the participant). After three months (at +/-15-days intervals depending on the participants' availability), the Intermediate evaluation will be conducted (T1). The researcher will come to their home again. They will complete various questionnaires mentioned below.

For the control group:

On the first day of the experiment, a researcher will go to the participants' homes to carry out the first evaluation (T0). The scales described below will be administered.

They will receive a booklet containing information and activities on well-being. They will be invited to do whatever they wish with the information booklet and the proposed exercises, as they would do outside the framework of the experiment. In any case, they will not be required to read and do the proposed exercises.

In the month three of the experimentation (at +/- 15-days intervals depending on the participants' availability), a second evaluation will be offered to the participants after three months (T1). The researcher will come to their home again. They will complete various questionnaires mentioned below.

5.4.3 End of research visit – final evaluation (T2):

For the two experimental groups:

On the last day of the experiment, i.e. after six months of use of the devices (at +/- 15-days intervals depending on the participants' availability), a last evaluation (T2) will be offered to the participants (M6). The researcher will come to their home again. They will complete various questionnaires mentioned below. In addition, for the experimental group, a semi-structured interview will be conducted to collect the user's opinion (appendix 19. 5). Finally, the researcher will recover all the technological devices installed in the participant's home (only for the experimental group).

6 The human coach role

The role of the human coach is two-fold. One is to support users' use of devices, and the other is to assist in AHA wellness coaching together with devices. Human coach can also introduce available smartphone apps other than E-VITA app if requested by the users. During the experiment, the human coaches will be in proactive contact with users (bi-weekly) to provide user support. And the human coaches are always available when the user needs support. In addition, to support the social activities of seniors, the e-vita project will establish a "Human Coach Leader Network" of research staff and human coach leaders who will centrally receive inquiries about events from communities, companies, universities, etc., and promote the dissemination of information about events and gatherings through a social platform and human coaches. During the study, the University (test centers) will make an event

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

for the users gathering opportunity when the local users are invited to participate to meet each other if preferred. Human coaches encourage the user to provide the feedback about the events and gatherings that the users can leave their opinions on the social platform. Such feedback/opinion will be informed to the stakeholders such as community and the companies when appropriate by research associate and/or by human coach leaders (figure 9).

Human coaches will participate in a series of trainings by researchers and human coach leaders to learn not only the necessary skills but also how to teach the users. They will also receive education on communication skills, helping skills, ethical behavior, and ageism necessary for coaching, and receive coaching exercises that are close to practice. After starting their practice, coaches continue to hone their coaching skills through regular training and by participating in group sessions where they learn from other coaches.

The research associate or human coach leader will not only match users with coaches but will also follow up with them to confirm the relationship. If necessary, the coaches will be matched again.

The user can consult with the human coach about his/her needs and preferences and can change the frequency of contact with the human coach.

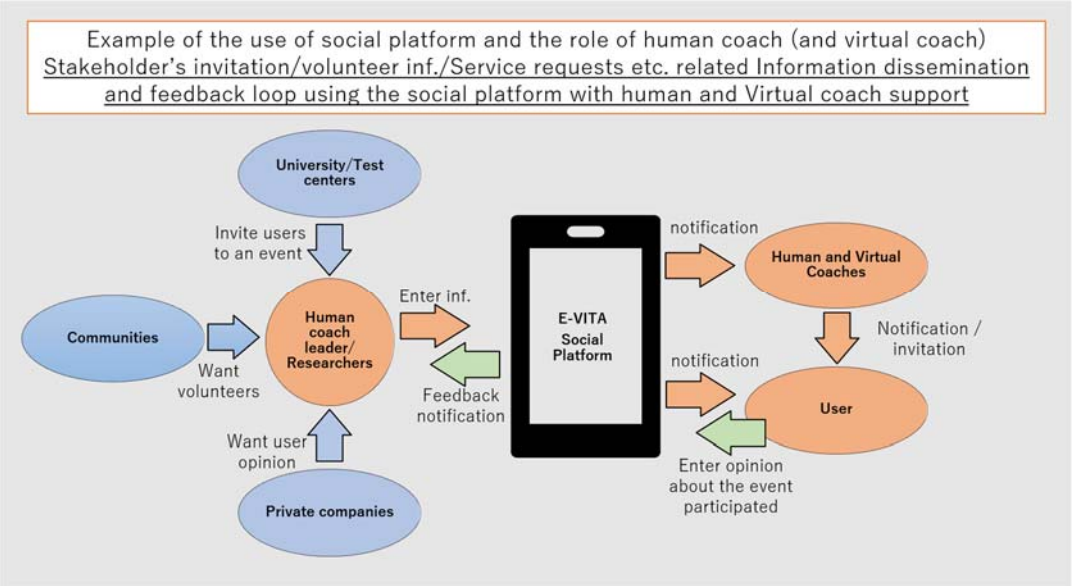


Figure 9. Relation between Human coach – e-VITA system and end user

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

7 Data analysis

A) Data collected by the researchers

The first step of the data analysis will deal with the description of the sample. Continuous variables will be reported as either mean and standard deviation or median and interquartile range on the basis of their distribution (assessed using Kolmogorov-Smirnov test). Categorical variables will be expressed as an absolute number and percentage. Mann-Whitney U tests (for non-normal distribution), or Chi-Square tests (normal or non-normal) will be used to compare the independent and dependent variables between the pre- and post- conditions, in addition to simple descriptive statistics (means, medians and SDs as appropriate). The analyses will be compared with the data from the other partner countries. Descriptive statistical analyses will be performed on the quantitative data with SPSS or Rstudio.

B) Data collected by the technological devices

One of the uses of the data collected from the sensors is to infer the activity of the user and to know his or her location so that the voice coach carries out personalized dialogues adapted to the contexts of the user. The environmental data will be used to identify dangerous situations and difficulties and to inform the user by giving him the right recommendation to remedy this situation. The aggregation of activity data from several testing centre will serve to motivate users and strengthen their adherence to the experiment. The analysis of user activity data and their interactions at well-defined milestones in the experiment will make it possible to detect system failures as early as possible, in order to prevent the user from dropping out.

8 Risk benefit analysis

This study poses little risk to participants however, there are some risks. There is a risk that the elderly person may wish to stop interacting with the technological devices (for example because they do not like the NAO robot). In this case the experiment will be immediately stopped and terminated.

The presence and use of technological devices (virtual coaches and sensors) in participants' homes can be a source of discomfort. Therefore, pre-studies with end-users (older people) and stakeholders (informal carers, health professionals, family, NGOs etc.) have been carried out in order to propose virtual coaches that meet the needs of elderly people. In addition, safety procedures were also designed to limit the risks as much as possible.

To protect the safety of participants:

- Participants will be informed about the appropriate use of the virtual coach or technological device (e.g., cannot lean on the technological device or make a movement that could destabilise it);
- The researcher will train the participant in the use of the sensors and be available in case of problems.
- The technological devices will be placed in the participant's home in a configuration that allows them to be used safely.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

In the case of adverse events occurring despite the precautions described above:

- Participants will be instructed to press the "off" button on the device or to disconnect it according to the instructions in the user manual.
- Participants will call the researcher, who will assist the participant in case of problems.

Participants will be able to call the researcher, who will come and ensure that no damage has been caused to the participants or to any other person.

To counteract the technological dependency to robotic system, especially if humanoid or theomorphic in shape, instruction and training will be given to the participants, for a proper and limited use of the virtual coaches. At this purpose, the researcher will be in contact with the participants. Even if this risk is present, however, technology has not yet achieved the level of sophistication required for natural human-robot interaction. Now, in fact, there is limited progress in the development of coaching devices capable of minimal and limited social interaction involving emotional, and psychological engagement with users under controlled conditions. Nevertheless, adjustments required to use safely coaching devices in emotional, social and psychological terms avoiding future addition towards them should be applied, as the provision of adequate training and daily support/monitoring of the researcher.

Finally, if after the experimentation, the participants would ask for a longer use of the system, they will be asked to be involved in similar studies to assure the continuity of use of the technology. Moreover, after the end of the study, the opportunity of receiving a personalized support on everyday technology will be offered to the participants, about eHealth literacy and similar solutions for health.

9 Data management

The project committed to the maintenance of participants' anonymity and confidentiality throughout all procedures, including screening, recruitment, testing, evaluation, and dissemination procedures. Data collection, usage and storage procedures complied with national laws and the EU's General Data Protection Regulation (GDPR) and APPI including the commitment of participants' the right to access, right to be informed, right to withdraw, and right to data erasure. Data collection will be compliant with the principle of data minimization i.e., the collection of personal information from study participants will be limited to what is directly relevant and necessary to accomplish the specific goals of the testing and evaluation work packages. Data entry will be carried out using specific software, providing blocks and data entry checks, to reduce the number of entry errors. All screening data will be discarded upon the project completion. During the testing procedures, all visual, auditory, and sensory data that the robot collects and processes in order to function as planned will be discarded after the procedures have been completed. The exception to this is the collection of the number of interactions that the robot logs with each participant. However, these interactions will be anonymous. All research data shall be made openly available for secondary analysis 3years after the project completion. All the information on Data Management is available in the D1.13 Intermediate Data Management Plan.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

10 Legal and technical aspects

The study will be conducted considering regulatory requirements and legal requirements, and the study will be initiated following receipt of an evaluation and approval of the study by an independent Ethics Committee and completion of the administrative requirements of the institution where the study is being conducted.

In addition:

- all potentially eligible participants will be required to receive complete information about the study and provide their consent to participate in the study.
- participating person must provide consent to the processing of personal data in anonymous and aggregate form, in accordance with EU Regulation 2016/679 (GDPR)/APPI on the protection of individuals with regard to the processing of personal data and Legislative Decree No. 101/2018 - Provisions for the adaptation of national legislation to the provisions of European Regulation 2016/679.
- the participant must be informed that his or her data may be examined by authorized personnel or by members of the competent ethics committee and officials of the competent regulatory authorities.
- the participant is also informed and asked to provide ad hoc informed consent to participate in the study, including data retention for up to 10 or 15 years (depending on the country's rules) after completion of the study.

Each signature must be personally dated by each signatory, and the informed consent and any additional patient information must be retained by the investigator. A signed copy of the informed consent and information sheet will be given to each patient.

Participant information and consent forms are included in the documentation attached to the request for approval by the local ethical committee.

[Optional] The Participant could indicate his or her agreement to the retention and use of his or her data long after the end of the project under the OPEN ACCESS TO SCIENTIFIC PUBLICATIONS AND OPEN RESEARCH DATA as requested by the European Commission.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

11 Conclusion

The document sets out the detailed activities and methods for conducting the latest round of evaluation. The protocol has been enriched with information learned from the first wave of evaluation. Within the protocol, the dimensions of adherence, acceptance and usability of the platform are assessed in order to highlight variables that may influence the use of virtual coaches.

In addition, the dimensions of well-being and quality of life are also analysed to see a potential positive impact of the coaching system on these aspects.

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

References

Andrieu, S. (2012). Évaluer les programmes de prévention de la dépendance des personnes âgées: Approche méthodologique. Gérontologie et société, vol. 35 / hs 1(5), 75- 80. https://doi.org/10.3917/gs.hs01.0075

Boh, B., Lemmens, L. H. J. M., Jansen, A., Nederkoorn, C., Kerkhofs, V., Spanakis, G., Weiss, G. et Roefs,A. (2016). An Ecological Momentary Intervention for weight loss and healthy eating via smartphone and Internet: Study protocol for a randomised controlled trial. Trials, 17(1), 1–12. https://doi.org/10.1186/s13063-016-1280-x Breiding, 2014

Brooke, J. (1996). SUS-A quick and dirty usability scale. Usability evaluation in industry, 189(194), 4-7.

Cameireo, M.S., Smailagic, A., Miao, G., Siewiorek, D.P., 2016. Coaching or gaming? Implications of strategy choice for homebased stroke rehabilitation. J. NeuroEngineering Rehabil. 13. doi:10.1186/s12984-016-0127-8

Chatterjee, A., Gerdes, M. et Martinez, S. (2019). EHealth Initiatives for the Promotion of Healthy Lifestyle and Allied Implementation Difficulties. International Conference on Wireless and Mobile Computing, Networking and Communications, 2019-Octob(March 2021), 7–14. https://doi.org/10.1109/WiMOB.2019.8923324

Cooper, S., Di Fava, A., Vivas, C., Marchionni, L. et Ferro, F. (2020). ARI: The Social Assistive Robot and Companion. 29th IEEE International Conference on Robot and Human Interactive Communication, RO-MAN 2020, August, 745–751. https://doi.org/10.1109/RO-MAN47096.2020.9223470

de Vries, P. W., Oinas-Kukkonen, H., Siemons, L., Beerlage-de Jong, N. et Van Gemert-Pijnen, L. (2017). Preface. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial

Intelligence and Lecture Notes in Bioinformatics), 10171 LNCS(November), V–VI. https://doi.org/10.1007/978-3-319-55134-0

Diener, E., & Ryan, K. (2008). Subjective well-being : a general overview. 39(4), 391–406.

Fasola, J. et Mataric, M. (2013). A Socially Assistive Robot Exercise Coach for the Elderly. Journal of Human-Robot Interaction, 2(2), 3–32. https://doi.org/10.5898/jhri.2.2.fasola

Fettig, A., Barton, E. E., Carter, A., & Eisenhower, A. (2016). Using e-coaching to support an early intervention provider's implementation of a functional assessment-based intervention. Infants and young children, 29(2), 130.

Forette, F. (2012). Les enjeux de la prévention. Gérontologie et société, vol. 35 / hs 1(5), 27- 40. https://doi.org/10.3917/gs.hs01.0027

Franke, T., Attig, C., & Wessel, D. (2019). A Personal Resource for Technology Interaction: Development and Validation of the Affinity for Technology Interaction (ATI) Scale. *International Journal of Human–Computer Interaction, 35*(6), 456-467, DOI: 10.1080/10447318.2018.1456150

Görer, B., Salah, A. A. et Akin, H. L. (2013). A robotic fitness coach for the elderly. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 8309 LNCS(January), 124–139. https://doi.org/10.1007/978-3-319-03647-2_9

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Guralnik JM, Ferrucci L, Pieper CF, Leveille SG, Markides KS, Ostir GV, et al. « Lower extremity function and subsequent disability: consistency across studies, predictive models, and value of gait speed alone compared with the short physical performance battery » J. Gerontol. A Biol. Sci. Med. Sci. 2000 avr;55(4):M221-231.

Hassenzahl, M., Diefenbach, S., & Göritz, A. (2010). Needs, affect, and interactive products – Facets of user experience. Interacting with Computers, 22(5), 353–362. https://doi.org/https://doi.org/10.1016/j.intcom.2010.04.002

Institut national d'études démographiques. (s.d) Espérance de vie. https://www.ined.fr/fr/tout-savoir-population/chiffres/europe-pays-developpes/esperance-vie/

Institut national de la statistique et des études économiques. (2020). Espérance de vie et indicateurs de mortalité dans le monde: Données annuelles 2020-2025. https://www.insee.fr/fr/statistiques/2383448

Kamphorst, B. A. (2017). E-coaching systems: What they are, and what they aren't. Personal and Ubiquitous Computing, 21(4), 625–632. https://doi.org/10.1007/s00779-017-1020-6

Kari, T. et Rinne, P. (2018). Influence of digital coaching on physical activity: Motivation and behavior of physically inactive individuals. 31st Bled EConference: Digital Transformation: Meeting the Challenges, BLED 2018, 127–146. https://doi.org/10.18690/978-961-286-170-4.8

Kiresuk TJ, Sherman RE. Goal attainment scaling: a general method for evaluating comprehensive community mental health programs. Community Ment Health J 1968;4(6):443–53.

Klein, A., Hinderks, A., Schrepp, M., Thomaschewski, J. (2020). Construction of UEQ+ Scales for Voice Quality: Measuring User Experience Quality of Voice Interaction. In Proceedings of MuC'20, September 6–9, 2020, Magdeburg, Germany. https://doi.org/10.1145/3404983.3410003

Kulyk, O., Op den Akkery, R., Klaasseny, R. et van Gemert-Pijnen, L. (2014). Personalized virtual coaching for lifestyle support: Principles for design and evaluation. International Journal on Advances in Life Sciences, 6(3–4), 300–309

Kyriazakos, S., Schlieter, H., Gand, K., Caprino, M., Corbo, M., Tropea, P., Judica, E., Sterpi, I., Busnatu, S., Philipp, P., Rovira, J., Martínez, A., Lange, M., Gabilondo, I., Del Pino, R., Carlos Gomez-Esteban, J., Pannese, L., Bøttcher, M. et Lynggaard, V. (2020). A Novel Virtual Coaching System Based on Personalized Clinical Pathways for Rehabilitation of Older Adults—Requirements and Implementation Plan of the vCare Project. Frontiers in Digital Health, 2(October), 1–16. https://doi.org/10.3389/fdgth.2020.546562

Lallemand, C., Gronier, G., & Koenig, V. (2013). L'expérience utilisateur: un concept sans consensus? Enquête sur le point de vue des professionnels. Activités humaines, Technologies et Bien-être.

Laugwitz, B., Schrepp, M. & Held, T. (2008). Construction and evaluation of a user experience questionnaire. In: Holzinger, A. (Ed.): USAB 2008, LNCS 5298, pp. 63-76.

Lubben, J., Blozik, E., Gillmann, G., Iliffe, S., von Renteln Kruse, W., Beck, J. C., & Stuck, A. E. (2006). Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. The Gerontologist, 46(4), 503-513.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Mostajeran, F., Katzakis, N., Ariza, O., Freiwald, J. P. et Steinicke, F. (2019). Welcoming a holographic virtual coach for balance training at home: Two focus groups with older adults. 26th IEEE Conference on Virtual Reality and 3D User Interfaces, VR 2019 - Proceedings, 1465–1470. https://doi.org/10.1109/VR.2019.8797813

Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., …et Chertkow, H. (2005). The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society, 53(4), 695-699.

Nguyen, M., Pachana, N.A., Beattie, E., Fielding, E., Ramis, M.-A., 2015. Effectiveness of interventions to improve family-staff relationships in the care of people with dementia in residential aged care: a systematic review protocol: JBI Database Syst. Rev. Implement. Rep. 13, 52–63. doi:10.11124/jbisrir-2015-2415.

Norman, C. D., & Skinner, H. A. (2006). eHEALS: the eHealth literacy scale. Journal of medical Internet research, 8(4), e27.

Obdržálek, Š., Kurillo, G., Seto, E. et Bajcsy, R. (2013). Architecture of an automated coaching system for elderly population. Studies in Health Technology and Informatics, 184, 309–311. https://doi.org/10.3233/978-1-61499-209-7-309

Op Den Akker, H., Klaassen, R., Op Den Akker, R., Jones, V. M.et Hermens, H. J. (2013). Opportunities for smart & tailored activity coaching. Proceedings - IEEE Symposium on Computer-Based Medical Systems, 546–547.

Organisation mondiale de la Santé. (2016). Rapport mondial sur le vieillissement et la santé. 9789240694842_fre.pdf (who.int)

Organisation Mondiale de la Santé. (s.d) . Décennie pour le vieillissement en bonne santé : 2020-2030. https://www.who.int/fr/initiatives/ageing/decade-of-healthy-ageing)

Rae, M.J. (2010). The demographic and bio-medical case for late-life interventions in aging. Science translational Medicine, 2 (40): 1-6.

Rainero, I., et al. "The My Active and Healthy Aging ICT platform prevents quality of life decline in older adults: A randomised controlled study." Age and Ageing 50.4 (2021): 1261-1267.

Rammstedt, B. & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. Journal of Research in Personality, 41, 203-212.

Robinson, S. M., Jameson, K. A., Bloom, I., Ntani, G., Crozier, S. R., Syddall, H., ... & Sayer, A. A. (2017). Development of a short questionnaire to assess diet quality among older community-dwelling adults. The journal of nutrition, health & aging, 21(3), 247-253.

Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of personality assessment, 66*(1), 20-40.

Scherer, M. J., & McKee, B. G. (1990). Assistive technology device predisposition assessment. Scherer Associates.

Siewiorek, D. P., Smailagic, A. et Dey, A. (2012). Architecture and applications of virtual coaches. Quality of Life Technology Handbook, 100(8), 197–226. https://doi.org/10.1201/b12940

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Summers, M. J., et al. "The My Active and Healthy Aging (My-AHA) ICT platform to detect and prevent frailty in older adults: Randomized control trial design and protocol." Alzheimer's & Dementia: Translational Research & Clinical Interventions 4.1 (2018): 252-262.

Venning, A., Herd, M. C., Oswald, T. K., Razmi, S., Glover, F., Hawke, T., Quartermain, V. et Redpath, P. (2021). Exploring the acceptability of a digital mental health platform incorporating a virtual coach: The good, the bad, and the opportunities. Health Informatics Journal, 27(1).

https://doi.org/10.1177/1460458221994873

Vie publique.(2019). Espérance de vie en bonne santé : 64,5 ans pour les femmes, 63,4 pour les hommes.https://www.vie-publique.fr/en-bref/20016-esperance-de-vie-en-bonne-sante-pour-les-femmes-et-les hommes#:~:text=Au%20sein%20de%20l'Union,5%20ans%20pour%20les%20hommes

Wrobel, J., Pino, M., Wargnier, P., & Rigaud, A. S. (2014). Robots et agents virtuels au service des personnes âgées: une revue de l'actualité en gérontechnologie. NPG Neurologie-Psychiatrie-Gériatrie, 14(82), 184-193.

Yousuf, H., Reintjens, R., Slipszenko, E., Blok, S., Somsen, G. A., Tulevski, I. I. et Hofstra, L. (2019). Effectiveness of web-based personalised e-Coaching lifestyle interventions. Netherlands Heart Journal, 27(1), 24–29. https://doi.org/10.1007/s12471-018-1200-7

Yesavage, J. A., Brink, T. L., Rose, T. L., Lum, O., Huang, V., Adey, M., & Leirer, V. O. (1982). Development and validation of a geriatric depression screening scale: a preliminary report. Journal of psychiatric research, 17(1), 37-49.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

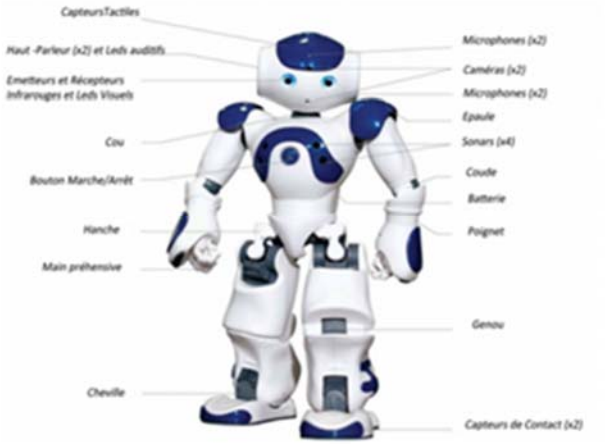
Annexes

Annex 1 Protocols of questionnaire

19.1. Booklet of technical description of technological devices

A. Technical description of virtual coaches

Robot Nao (Located at URL: http://blewando.fr/elv/Promo2018/th4/pag1.html)



CARACTERISTIQUES PHYSIQUES
58 cm de haut
4,8 kg
INTERFACE
Yeux lumineux
Bouton de marche/arrêt
AUTONOMIE
90 minutes
CONNECTIVITE
Ethernet et WIFI
VISION
2 caméras
AUDIO
4 microphones

NAO is a small humanoid robot developed by Aldebaran Robotics (part of the Softbank group). It is a common platform for human-robot interaction studies worldwide due to its ease of use, software customization capabilities, and pleasing appearance. NAO is 58 centimetres tall and has up to 25 degrees of freedom. It is the only device, among those we are considering, that has autonomous mobility capability. The face and voice interaction engines on the robot makes it to have better interaction with its audience. Some tactiles and buttons have been located on its body that can be program for different perposes.

Gatebox (Located at URL https://www.gatebox.ai/)

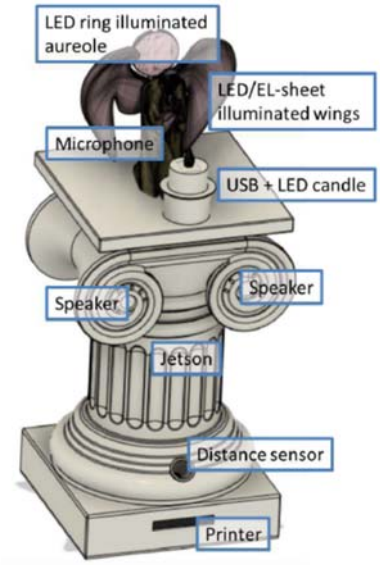
Gatebox®

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

It allows to visualize a virtual coach using a 3D effect. When people approach the holographic structure, the virtual coach appears. The framework not only displays the virtual coach but also provides sensors for data collection or voice interaction with the virtual coach. The screen resolution is 720p, which is enough to show the coach in 3D, and requires less power consumption and cost. The structure has its processor inside and works autonomously or connects to servers for better use. The image of the virtual trainer looks flat but the technical structure allows the whole body to be seen. The device incorporates a digital video player and content. The device has an audio output for the voice of the virtual coach, an audio input to collect the voice of the user and a camera input to see the user's face, movements, etc.

Celeste



Celeste is a robot with 2 degrees of freedom representing a small interactive statue of a Christian Catholic saint. Celeste can be a prayer companion, specially designed for Christian Catholic seniors, and contains a large amount of teachings, including the entire Bible. Celeste incorporates into its appearance elements of sacred art, notably gold, in order to give the impression of a sacred object, associating form with functionality. Communication is by voice, vision, touch and lights, implement multi-modal interaction in turn. No buttons, screens or keyboards are used, which makes it possible to achieve an interface suitable for the elderly.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Google Nest Hub (2e generation)

https://store.google.com/fr/product/nest_hub_2nd_gen?hl=fr)

The Google Nest hub is a voice assistant device included 7-inch tablet for more interaction with users. The voice interaction is activated by using the phrase of “Hello Google”. It does not have a camera; however, the sound and motion detection sensors enable the device to track the quality of sleeping if it close to the bed. The quality of sleep as well as recommendation for better quality of sleeping can be shown on the screen. For the user safety, a button has been located in the back of the device that can swich of the microphone when it needed.

DarumaTO

DarumaTO-2 (Daruma Theomorphic1 Operator v2) is a social robot with 2 degrees of freedom that resembles a traditional Buddhist and Shinto doll called Daruma (部).
With its familiar appearance to older generations in Japan, it can serve as a social robot that keeps company and monitors the health of the elderly. It can communicate through visual tracking, voice, and facial expressions. DarumaTO has been introduced in homes for the elderly in Japan and has been well received. The current hardware can be extended in the current project by integrating sensors and a complex dialogue system.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

B. Technical description of sensors

Sensors from DELTA DORE (French company) for Europe

- DO BL TYXAL+

(Link : https://www.deltadore.fr/domotique/alerte/detecteur/detecteur-ouverture-bl-tyxal-plus-ref-6412288)
This is a wireless magnetic contact door/window sensor which consists of two parts: one is installed on the window or door jamb, the other is installed on the window or door itself. - same. It is an X3D protocol sensor. It transmits information when the door/window opens or closes. It can be used to detect the habits or movements of users, or the opening of certain parts of the house (for example the front door or the refrigerator).

- BMD TYXAL+

(Link: https://www.deltadore.fr/domotique/alerte/detecteur/detecteur-mouvement-tyxal-plus-ref-6412286)
It is a wireless motion detector based on PIR technology that can be installed in any room of the house to transmit a detection message when movement is detected. By collecting the start of motion detection and its end, it could be used to monitor users' habits or movements, detecting whether users occupy a room, whether they move in it.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

- TYDOM HOME

(Link:https://www.deltadore.fr/domotique/pilotage-maison-connectee/passerelles-domotiques/tydom-home-ref-6700116)
It is a gateway that allows you to view real-time data from connected equipment (DO BL TYXAL + and DMB TYXAL +).

NETATMO Smart Indoor Air Quality Monitor (French company)
The Netatmo Smart Indoor Air Quality Monitor is a device that monitors humidity, air quality, temperature and sound level in the house. All values are displayed in the app on the smartphone (iOS and Android). The app indicates whether the values pose a health hazard to the user and gives advice on how to solve the problem.

Link: https://www.netatmo.com/en-eu/aircare/homecoach

Netatmo is an air quality monitor device which measure the quality of the air as well as ,room tempretature, humadity and noise monitoring. This device can connects to the internet with first time setup via Bloutooth on a smartphone. With Netatmo Connect APIs, it is possible to retrieve users' home data as well as device-specific data, such as Wi-Fi status.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Sensors for Japan ETC-PIR, ET9-OCS, ET9-RHT (ITEC Corporation)

1.Human sensor ETC-PIR/IRMIN, (ITEC Co., Ltd.)
2.ET9-OCS/IRMIN928, open/close sensor
3.ET9-RHT/Armin 928, temperature/humidity sensor
By adopting the specified low-power radio standard (920MHz band), it can cover an area of 150m or more under the outdoor outlook environment.

C. WEARABLE DEVICES

NeU XB-01 (Japanese company)

(Link : http://neu-brains.site/en/abc/#abc3)
It is an ultra-compact sensor-type embedded device that weighs only 30 grams (battery included) and measures 80 x 40 x 13 mm. Its "butterfly" type design bends down the middle, allowing the XB-01 to easily conform to anyone's forehead. Brain activity is measured using NIRS technology and the rate of change in brain blood flow is measured using weak near-infrared light. Data is transferred via Bluetooth 4.1 Real-time to any smartphone or tablet, allowing brain activity to be measured. It can be used for various scenarios such as cognitive function training, movement training, cognitive function and stress management.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Huawei Band 7

Huawei Band 7 is a connected watch that measures the quality of sleep as well as other vital signs. The watch tracks respiratory rate, heart rate, blood oxygen level, temperature and movement (steps and sport activities). The measurements are carried out using high precision sensors and heart rate and also an accelerometer.

(https://consumer.huawei.com/en/wearables/band7/)

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

19.2. Technological description of data processing and application

USI chatbots: Both the exercise and nutrition chatbots from University of Siegen (USI) use the Telegram API at their front-end. For users to access both these chatbots, they need to make an account on the Telegram application. This requires them to provide their first and last names, a valid phone number and their country of residence. The exercise chatbot requires relevant user data for personalisation. It needs users to provide their name, sports that they participate(d) in, the level of sport they are involved in (beginner, intermediate etc.) and the goal they wish to achieve with this chatbot. All of this is required by the exercise chatbot to primarily determine a training program for its user, in the form of video-lists. The chatbot further asks its users about their average time spent sitting. This information serves to reflect on one's sitting and movement behaviour. These collected data is stored in database. The chatbot uses Mongo DB as a database service.

The nutrition chatbot asks for user's likes and dislikes, their intolerances (e.g., lactose or gluten intolerance) towards food. If the user is comfortable with sharing personal data with it, the chatbot asks them for their age, gender and weight. This helps the chatbot in calculating nutritional information for the users. Furthermore, the chatbot uses telegram chatID as an identifier instead of the username. Users do not need to create usernames in order to utilise the full capabilities of the chatbot. chatIDs are anonymous as they are uniquely and randomly assigned by Telegram. Similar to the exercise chatbot, the nutrition chatbot also stores the user data, including their age, gender, likes/dislikes etc., in MongoDB. The chatbot's database is in-turn connected to USI's server. Unlike the exercise chatbot which uses Google's Dialogflow API for Natural Language Processing (NLP), the nutrition chatbot uses node-nlp. Node-nlp is a library designed specifically for Node.JS to help developers build bots. It is used in sentiment analysis and entity-extraction. Furthermore, it does not collect user-data like Google's Dialogflow. Node-nlp directly stores and trains the model on the server that the chatbot is uploaded on and hence, the user-data is not sent elsewhere. The exercise and nutrition chatbots along with their databases (MongoDB) are deployed on the university's server.

Dialogue system: The dialogue system is one of the core functionalities of the e-VITA coach. The user should be able to interact with the coach concerning the selected use cases that deal with the user's daily living topics and the user profiling, as well as more open-domain conversations. It is also expected that the user can control the Nao robot to guide the user through physical exercises, and the Daruma robot to guide the user through spiritual conversations. For a good user experience, the system will have question-answering capabilities over three sources. The first source is the Knowledge Graph, constructed on the basis of user data to give personalised services. The second source is textual Knowledge acquired within the e-VITA project from text-based resources that support active health ageing. On the third front, the system will retrieve information from Wikipedia for having general knowledge question answering capabilities."

Knowledge Graph: The Knowledge Graph (KG) will be based on RDF data format, following well established semantic web principle.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

The Knowledge about the selected use cases like food or temperature-related recommendations will be stored in knowledge graphs which form a neo4j graph database and follow the principles of property graphs.
The KG data will be stored within the EU, further limited to the project partners. The KG data can only be queried within the e-VITA framework, and no external access would be granted as a security measure.
The textual knowledge acquired within the project covering topics like fall prevention will be stored in a textual database such as MongoDB. The Wikipedia datasets are available for public downloads, and we will have our private instance of Wikipedia indexed for performing question answering. Again, all this data will be only be accessed by project partners and stored within the EU. All the data exchange will be done through RESTful APIs and JSON files."

We will use the RASA framework for the Dialogue system functionality, as RASA is an open-source machine learning framework to automate text-and voice-based conversation. No user data from the project is shared with Rasa Technologies, Inc. as it offers standalone solutions. Further, the question-answering capabilities mentioned above will be integrated with the Dialogue System based on the RASA framework.

Social Platform data (Humhub): The server HumHub is operating in DEBUG mode. The server has following security measurements which are:

- Limiting user access: user registration can be disabled, or the new user approval system can be enabled.
- Password strength configuration: HumHub provides an option to add additional validation rules for the user's password during registration using regular expressions.
- Web Security Configuration: HumHub 1.4 comes with a built-in web security configuration used to define security headers and Content-Security-Policy (csp) rules.

But also, restricted user access; automatic IP address blocking; network separation.

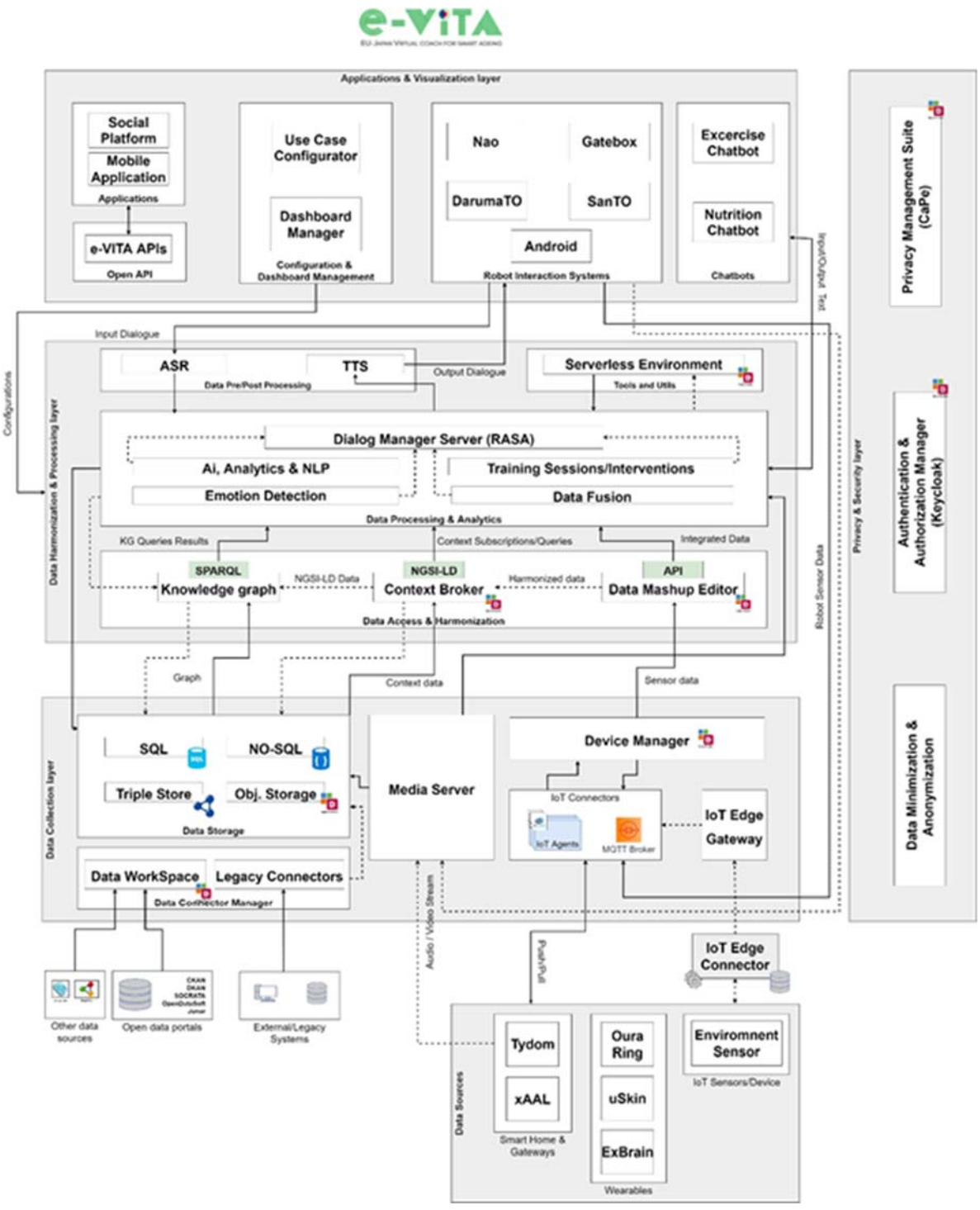
Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

19.3 Technological description of e-VITA platform

1.1 e-VITA System Architecture

The e-VITA logical architecture is shown in the Figure.



This architecture combines the Digital Enabler (DE) modules with the different components that are provided within the e-VITA project.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Coaching devices are shown top-right. The user's speech, collected by the coaching device microphone, goes through ”ASR” to “Dialog Manager”.
“Data Harmonization & Processing Layer”, centered on “Dialog Manager”, decides what action to take based on the user's speech, and the response from the system is communicated to the user via “TTS”, together with/or coaching contents.
In “Data Collection Layer”, data is collected and processed to enrich the coaching content.
The data is anonymized and processed as big data, or it is linked to a person's ID to create personalized content.
Sensors are shown bottom-right. Data acquired from sensors is also input to “Data collection Layer” and processed as input data as well as user speech.
Privacy and data security are two of the key issues in the e-VITA project, and they concern all layers, which are shown in the rightmost block in this diagram.
Detailed descriptions of each layer are provided in the following section.

1.2 Layers Descriptions

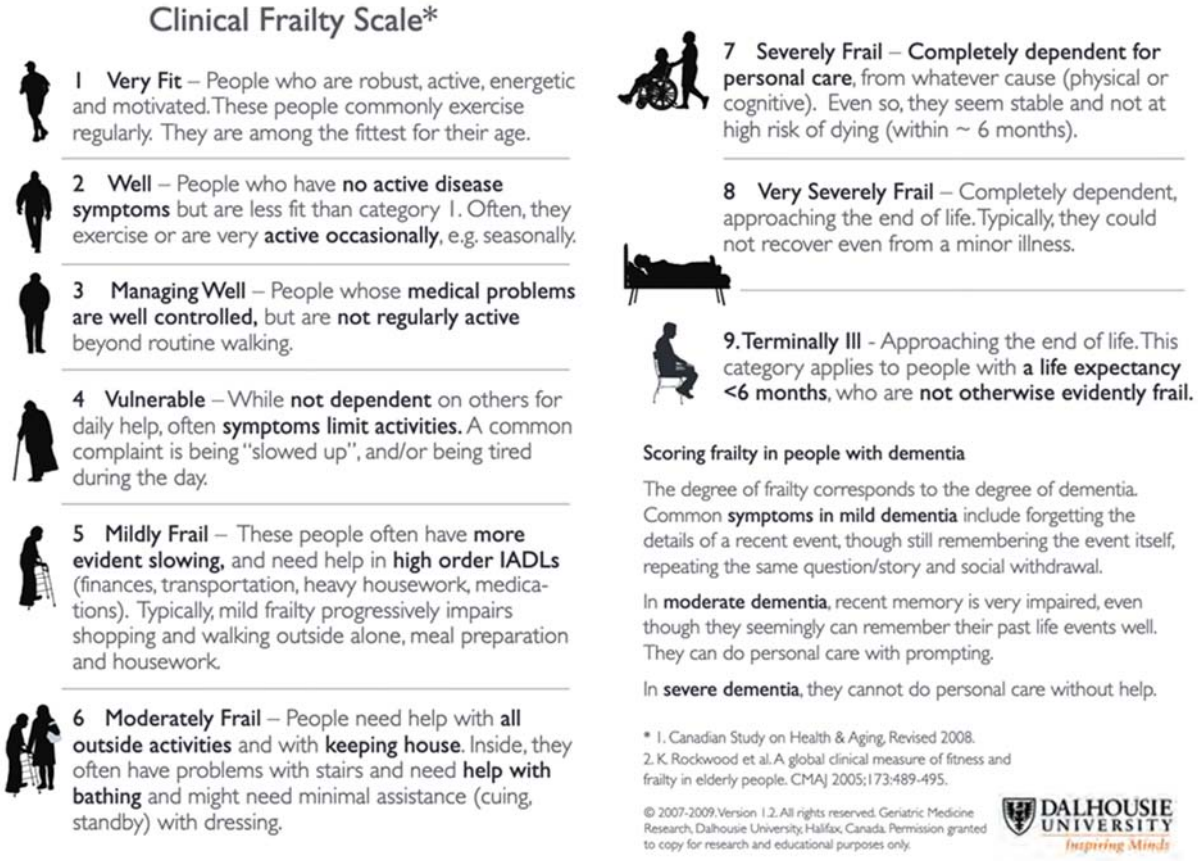
In Figure 2, five blocks (layers) are shown. In this section, we will describe their outline and the relationship between them.
At the top is the Application & Visualization Layer. This layer consists mainly of components that interface directly with the user, such as coaching devices and the UI for setting up the e-VITA system. The input data obtained here is sent to two data processing layers. In addition, since e-VITA aims to be an open platform, APIs used by third parties are also included in this layer.
Data Harmonization & Processing Layer processes user input at a relatively high speed and returns a quick response or passes it on to a later layer when deeper data handling is required. It contains many blocks, such as natural language processing, emotion detection, and Knowledge Graphs to determine coaching contents.
Some loops are completed in this layer and returned to the user as content, and some are passed to the Data Collection Layer for further analysis and use. Data Collection Layer is a set of data collection mechanisms already implemented in Digital Enabler, organized for e-VITA. Unlike Data Harmonization & Processing Layer, Data Collection Layer is mainly for big data processing, or data processing that does not require real-time processing, and can be used to generate coaching content that is unique to e-VITA, such as long-term learning and cultural sensitivity.
Privacy & Security Layer is the long one on the right of the figure. Needless to say, this layer contains the functional blocks that deal with privacy and security required by e-VITA, such as data authentication, personal information protection, and anonymization.
Finally, Data Sources is not a functionally independent layer, but rather a way to connect a group of sensors to the Data Collection Layer. Logically, this block can be listed in the same column as Robot Interaction Systems, which contains the Coaching Device.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

19.4 Questionnaires and scales

Clinical Frailty Scale



Clinical Frailty Scale*

1 **Very Fit** – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 **Well** – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 **Managing Well** – People whose **medical problems are well controlled,** but are **not regularly active** beyond routine walking.

4 **Vulnerable** – While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up", and/or being tired during the day.

5 **Mildly Frail** – These people often have **more evident slowing,** and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 **Moderately Frail** – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 **Severely Frail** – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 **Very Severely Frail** – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. **Terminally Ill** - Approaching the end of life. This category applies to people with **a life expectancy <6 months**, who are **not otherwise evidently frail.**

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

DALHOUSIE UNIVERSITY *Inspiring Minds*

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

GDS

Geriatric Depression Scale (short form)

Instructions: Circle the answer that best describes how you felt over the past week.

1.	Are you basically satisfied with your life?	yes	no
2.	Have you dropped many of your activities and interests?	yes	no
3.	Do you feel that your life is empty?	yes	no
4.	Do you often get bored?	yes	no
5.	Are you in good spirits most of the time?	yes	no
6.	Are you afraid that something bad is going to happen to you?	yes	no
7.	Do you feel happy most of the time?	yes	no
8.	Do you often feel helpless?	yes	no
9.	Do you prefer to stay at home, rather than going out and doing things?	yes	no
10.	Do you feel that you have more problems with memory than most?	yes	no
11.	Do you think it is wonderful to be alive now?	yes	no
12.	Do you feel worthless the way you are now?	yes	no
13.	Do you feel full of energy?	yes	no
14.	Do you feel that your situation is hopeless?	yes	no
15.	Do you think that most people are better off than you are?	yes	no

Total Score _____

Ministry of Internal Affairs and Communications, JAPAN

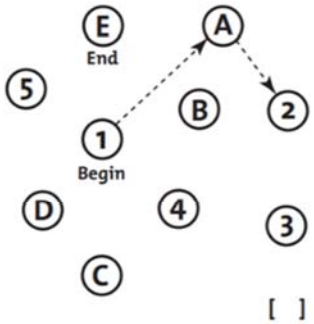
The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

MoCA

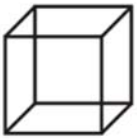
MONTREAL COGNITIVE ASSESSMENT (MOCA)

NAME :
Education : Date of birth :
Sex : DATE :

VISUOSPATIAL / EXECUTIVE — POINTS



Copy cube



[ ] [ ]

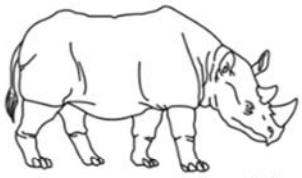
Draw CLOCK (Ten past eleven) (3 points)

[ ] Contour [ ] Numbers [ ] Hands

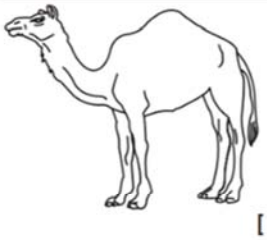
__/5

NAMING

[ ]



[ ]



[ ]

__/3

MEMORY — Read list of words, subject must repeat them. Do 2 trials. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION — Read list of digits (1 digit/ sec.).

Subject has to repeat them in the forward order [ ] 2 1 8 5 4

Subject has to repeat them in the backward order [ ] 7 4 2

__/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B

__/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**

__/3

LANGUAGE — Repeat : I only know that John is the one to help today. [ ]

The cat always hid under the couch when dogs were in the room. [ ]

__/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] ____ (N ≥ 11 words)

__/1

ABSTRACTION — Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler

__/2

DELAYED RECALL

	Has to recall words WITH NO CUE	FACE	VELVET	CHURCH	DAISY	RED	Points for UNCUED recall only
		[ ]	[ ]	[ ]	[ ]	[ ]	
Optional	Category cue						
	Multiple choice cue						

__/5

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City

__/6

© Z.Nasreddine MD Version November 7, 2004

www.mocatest.org

Normal ≥ 26 / 30

TOTAL __/30

Add 1 point if ≤ 12 yr edu

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

SPBB

SPPB (SHORT PHYSICAL PERFORMANCE BATTERY)

1. Repeated Chair Stands

Instructions: Do you think it is safe for you to try and stand up from a chair five times without using your arms? Please stand up straight as quickly as you can five times, without stopping in between. After standing up each time, sit down and then stand up again. Keep your arms folded across your chest. Please watch while I demonstrate. I'll be timing you with a stopwatch. Are you ready?

Begin Grading: Begin stop watch when subject begins to stand up. Count aloud each time subject arises. Stop the stopwatch when subject has straightened up completely for the fifth time. Also stop if the subject uses arms, or after 1 minute, if subject has not completed rises, and if concerned about the subject's safety. Record the number of seconds and the presence of imbalance.

Then complete ordinal scoring. Time: _____sec (if five stands are completed)

Number of Stands Completed: 1 2 3 4 5

Chair Stand Ordinal Score: _____ 0 = unable 1 = > 16.7 sec 2 = 16.6-13.7 sec 3 = 13.6-11.2 sec 4 = < 11.1 sec

2. Balance Testing

Begin with a semitandem stand (heel of one foot placed by the big toe of the other foot). Individuals unable to hold this position should try the side-by-side position. Those able to stand in the semitandem position should be tested in the full tandem position. Once you have completed time measures, complete ordinal scoring.

a. Semitandem Stand

Instructions: Now I want you to try to stand with the side of the heel of one foot touching the big toe of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you. Please watch while I demonstrate. Grading: Stand next to the participant to help him or her into semitandem position. Allow participant to hold onto your arms to get balance. Begin timing when participant has the feet in position and let's go.

Circle one number 2. Held for 10 sec 1.

Held for less than 10 sec; number of seconds held _____ 0.

Not attempted

b. Side-by-Side stand

Instructions: I want you to try to stand with your feet together, side by side, for about 10 sec. Please watch while I demonstrate. You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop. Grading: Stand next to the participant to help him or her into the side-by-side position. Allow participant to hold onto your arms to get balance. Begin timing when participant has feet together and let's go. Grading 2. Held of 10 sec 1. Held for less than 10 sec; number of seconds held_____ 0. Not attempted

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

c. Tandem Stand
Instructions: Now I want you to try to stand with the heel of one foot in front of and touching the toes of the other foot for 10 sec. You may put either foot in front, whichever is more comfortable for you. Please watch while I demonstrate.
Grading: Stand next to the participant to help him or her into the side-by-side position. Allow participant to hold onto your arms to get balance. Begin timing when participant has feet together and lets go. Grading 2. Held of 10 sec 1. Held for less than 10 sec; number of seconds held_____ 0. Not attempted
Balance Ordinal Score: _____ 0 = side by side 0-9 sec or unable 1 = side by side 10, <10 sec semitandem 2 = semitandem 10 sec, tandem 0-2 sec 3 = semitandem 10 sec, tandem 3-9 sec 4 = tandem 10 sec

3. 8' Walk (2.44 meters)
Instructions: This is our walking course. If you use a cane or other walking aid when walking outside your home, please use it for this test. I want you to walk at your usual pace to the other end of this course (a distance of 8'). Walk all the way past the other end of the tape before you stop. I will walk with you. Are you ready? Grading: Press the start button to start the stopwatch as the participant begins walking. Measure the time take to walk 8'. Then complete ordinal scoring.
Time: _____ sec
Gait Ordinal Score: _____ 0 = could not do 1 = >5.7 sec (<0.43 m/sec) 2 = 4.1-6.5 sec (0.44-0.60 m/sec) 3 = 3.2-4.0 (0.61-0.77 m/sec) 4 = <3.1 sec (>0.78 m/sec)

Summary Ordinal Score: _____

Range: 0 (worst performance) to 12 (best performance). Shown to have predictive validity showing a gradient of risk for mortality, nursing home admission, and disability.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Socio-Demographics

Date of birth: _____
Gender: □ male □ female □ diverse

1. Residence:
□ City □ Suburban □ Rural community

2. Housing situation:
□ Alone □ Shared apartment
□ With (marriage) partner □ Family □ Other: _____

3. Marital status
□ single □ widowed
□ married / registered civil partnership □ divorced
□ solid partnership

4. Do you have children?
□ no □ yes → *if yes, how much:* _____

5. Do you have grandchildren?
□ no □ yes → *if yes, how much:* _____

5. Highest level of education:
□ No school degree □ High school □ Other: _____
□ Secondary school □ Specialized baccalaureate
□ Junior high school □ University degree

6. Are you currently employed?
□ no
□ yes → *if yes, please mark where applicable:* □ Full-Time □ Part-Time □ Minijob

7. Are you currently retired?
□ no □ yes → *if yes, since when:* _____ (Year)

8. Do you currently hold a volunteer position?
□ no □ yes

9. Able to stand and walk unaided?
□ no □ yes

10. No acute or untreated medical problems such as history of syncopal episodes, epilepsy and vertigo not controlled pharmacologically; serious dysfunction of the autonomic system; severe

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

behavioral syndromes not compensated by drugs; concurrent neurological diseases; severe systemic diseases with life expectancy < 1 year;

□ no □ yes

11. Use of active implant or not-implant medical devices

□ no □ yes

12. Allergy to nichel

□ no □ yes

12. Clinical Frailty Scale score: ___ (for inclusion in the PoC: 2-4)

13. MOCA score: ___

14. GDS score: ___

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Scale at T0 for control group: Fill in the questions below and explain your thoughts.

Person Information:	Can you briefly introduce yourself, in 2 or 3 sentences?
	Can you describe a typical day (what do you do in the morning, afternoon, evening)?
Social dimension	Do you volunteer? If Yes: What structure? What are your missions? How many per week? Since when?
	Are you a member of a club/association (e.g., sports, reading, drawing, etc.)?
	Do you regularly visit family members or friends? If yes: How often? For how long?
Prevention aspect	How do you think you can live a healthy life and age well?
	How can you get recommendations for aging well?
	What do you think about prevention for aging well?
	Do you follow recommendations for aging well? If yes, Why do you follow? Which ones

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

e-Heals

I would like to ask for your opinion and experience of using the internet for health information. For each statement, tell me which answer best reflects your opinion and current experience.

1. How useful do you think the Internet is in helping you make decisions about your health?

☐Not at all useful
☐Not useful
☐Uncertain
☐Useful
☐Very useful

2. How important is it to you to be able to access health resources on the Internet?

☐Not important at all
☐Not important
☐Uncertain
☐Important
☐Very important

*

3. I know what health resources are available on the Internet

☐totally disagree
☐Disagree
☐Undecided
☐Ok
☐Totally agree

4. I know where to find useful health resources on the Internet .

☐totally disagree
☐Disagree
☐Undecided
☐Ok
☐Totally agree

5. I know how to find useful health resources on the Internet.

☐totally disagree
☐Disagree
☐Undecided

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

☐Ok
☐Totally agree

6. I know how to use the Internet to answer my health questions.

☐totally disagree
☐Disagree
☐Undecided
☐Ok
☐Totally agree

7. I know how to use the health information I find on the Internet to help me.

☐totally disagree
☐Disagree
☐Undecided
☐Ok
☐Totally agree

8. I have the skills to evaluate the health resources I find on the Internet.

☐totally disagree
☐Disagree
☐Undecided
☐Ok
☐Totally agree

9. I can tell high-quality health resources from low-quality health resources. quality on the Internet .

☐totally disagree
☐Disagree
☐Undecided
☐Ok
☐Totally agree

10. I feel comfortable using information from the Internet to make health decisions.

☐totally disagree
☐Disagree
☐Undecided
☐Ok
☐Totally agree

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Thanks !

*Note: Questions 1 and 2 are recommended as additional items for use with the eHEALS scale to understand consumer interest in eHealth usage in general. These questions are not an integral part of the eHealth Competency Scale, which includes questions 3 through 10.

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

ATDPA-5

Assistive Technology Device Predisposition Assessment

B. How satisfied are you currently in the following areas?

- For item 10 - 21, mark the best response (1 for *Not satisfied* through 5 for *Very Satisfied*)
- Which 3 items are most important to you? Under 3 Most Important, write #1, #2 or #3 for the three areas that concers you most (#1 = most important). Leave the other lines blank.

	Not Satisfied		Satisfied		Very Satisfied
10.Personal care and household activities	☐1	☐2	☐3	☐4	☐5
11.Physical comfort & well-being	☐1	☐2	☐3	☐4	☐5
12.Overall health	☐1	☐2	☐3	☐4	☐5
13.Freedom to go wherever desired	☐1	☐2	☐3	☐4	☐5
14.Participation in desired activities	☐1	☐2	☐3	☐4	☐5
15.Educational attainment	☐1	☐2	☐3	☐4	☐5
16.Employment status/potential	☐1	☐2	☐3	☐4	☐5
17.Family relationships	☐1	☐2	☐3	☐4	☐5
18.Close, intimate relationships	☐1	☐2	☐3	☐4	☐5
19.Autonomy and self-determination (choosing)	☐1	☐2	☐3	☐4	☐5
20.Fitting in, belonging, feeling connected	☐1	☐2	☐3	☐4	☐5
21. Emotional well-being	☐1	☐2	☐3	☐4	☐5

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Scale E

Goals

Please rate the virtual coach1 in terms of **your expectations** for the 12 points (A-L) according to the following scale and enter your rating in the corresponding field:

5 = All the time (100 % of the time) 2 = Sometimes (around 25 % of the time)

4 = Often (around 75 % of the time) 1 = Not at all (0 % of the time)

3 = Half the time, neutral (about 50 % of the time) 0 = Not applicable

	Question	Rating
A	The virtual coach will help me to achieve my goals (including the primary goals written above)	
B	The virtual coach will benefit me and improve my quality of life	
C	I am confident I know how to use the virtual coach and ist various features	
D	I will feel more secure (safe, sure of myself) when using the virtual coach	
E	The virtual coach will fit will with my accustomed routine	
F	I have the capabilities and stamina to use the virtual coach without discomfort, stress and fatigue	
G	The supports, assistance and accommodations exist for successful use of the virtual coach	
H	The virutal coach will physically fit in all desired environments (car, living room, etc)	
I	I will feel comfortable (and not self-conscious) using the virtual coach around friends	
J	I will feel comfortable (and not self-conscious) using the virtual coach at school or work	
K	I will feel comfortable (and not self-conscious) using the virtual coach around the community	

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

	Total (add A-L)	

Big Five Inventory-10

Appendix A. Big Five Inventory-10 (BFI-10)

English version.
Instruction: How well do the following statements describe your personality?

I see myself as someone who …	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
… is reserved	(1)	(2)	(3)	(4)	(5)
… is generally trusting	(1)	(2)	(3)	(4)	(5)
… tends to be lazy	(1)	(2)	(3)	(4)	(5)
… is relaxed, handles stress well	(1)	(2)	(3)	(4)	(5)
… has few artistic interests	(1)	(2)	(3)	(4)	(5)
… is outgoing, sociable	(1)	(2)	(3)	(4)	(5)
… tends to find fault with others	(1)	(2)	(3)	(4)	(5)
… does a thorough job	(1)	(2)	(3)	(4)	(5)
… gets nervous easily	(1)	(2)	(3)	(4)	(5)
… has an active imagination	(1)	(2)	(3)	(4)	(5)

Scoring the BFI-10 scales:
Extraversion: 1R, 6; Agreeableness: 2, 7R; Conscientiousness: 3R, 8; Neuroticism: 4R, 9; Openness: 5R; 10 (R = item is reversed-scored).

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Revised UCLA Loneliness score version 3 English version

Instruction: Indicate how often each of the statements below is descriptive of you.

Statement	Never	Rarely	Sometimes	Often
1. How often do you feel that you are "in tune" with the people around you?	1	2	3	4
2. How often do you feel that you lack companionship?	1	2	3	4
3. How often do you feel that there is no one you can turn to?	1	2	3	4
4. How often do you feel alone?	1	2	3	4
5. How often do you feel part of a group of friends?	1	2	3	4
6. How often do you feel that you have a lot in common with the people around you?	1	2	3	4
7. How often do you feel that you are no longer close to anyone?	1	2	3	4
8. How often do you feel that your interests and ideas are not shared by those around you?	1	2	3	4
9. How often do you feel outgoing and friendly?	1	2	3	4
10. How often do you feel close to people?	1	2	3	4
11. How often do you feel left out?	1	2	3	4
12. How often do you feel that your relationships with others are not meaningful?	1	2	3	4
13. How often do you feel that no one really knows you well?	1	2	3	4
14. How often do you feel isolated from others?	1	2	3	4
15. How often do you feel you can find companionship when you want it?	1	2	3	4
16. How often do you feel that there are people who really understand you?	1	2	3	4
17. How often do you feel shy?	1	2	3	4
18. How often do you feel that people are around you but not with you?	1	2	3	4
19. How often do you feel that there are people you can talk to?	1	2	3	4
20. How often do you feel that there are people you can turn to?	1	2	3	4

Items 1, 5, 6, 9, 10, 15, 16, 19, 20 are reverse scored.

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

EQ-ED-5L

Health Questionnaire (EQ-5D-5L)

Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

- ☐ 1 I have no problems in walking about
- ☐ 2 I have slight problems in walking about
- ☐ 3 I have moderate problems in walking about
- ☐ 4 I have severe problems in walking about
- ☐ 5 I am unable to walk about

SELF-CARE

- ☐ 1 I have no problems washing or dressing myself
- ☐ 2 I have slight problems washing or dressing myself
- ☐ 3 I have moderate problems washing or dressing myself
- ☐ 4 I have severe problems washing or dressing myself
- ☐ 5 I am unable to wash or dress myself

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

- ☐ 1 I have no problems doing my usual activities
- ☐ 2 I have slight problems doing my usual activities
- ☐ 3 I have moderate problems doing my usual activities
- ☐ 4 I have severe problems doing my usual activities
- ☐ 5 I am unable to do my usual activities

PAIN / DISCOMFORT

- ☐ 1 I have no pain or discomfort
- ☐ 2 I have slight pain or discomfort
- ☐ 3 I have moderate pain or discomfort
- ☐ 4 I have severe pain or discomfort
- ☐ 5 I have extreme pain or discomfort

ANXIETY / DEPRESSION

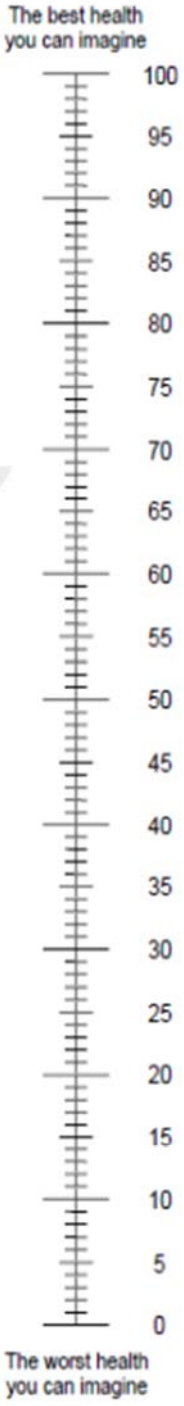
- ☐ 1 I am not anxious or depressed
- ☐ 2 I am slightly anxious or depressed
- ☐ 3 I am moderately anxious or depressed
- ☐ 4 I am severely anxious or depressed
- ☐ 5 I am extremely anxious or depressed

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Health Questionnaire (EQ-5D-5L)

- We would like to know how good or bad your health is **TODAY**.
- This scale is numbered from 0 to 100.
- 100 means the best health you can imagine.
  0 means the worst health you can imagine.
- Mark an X on the scale to indicate how your health is **TODAY**
- Now, please write the number you marked on the scale in the below.

YOUR HEALTH TODAY = ☐



Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

PHYSICAL AND LEISURE ACTIVITIES CHECKLIST

PHYSICAL ACTIVITY

11. Give an approximate idea of the number of hours each week you have undertaken the following activities, during the last year.

0 = none;1 = less than 1 hour for week; 2 = 1-3 hours for week; 3 = 3-6 hours for week; 4 = 6-10 hours for week; 5 = 10-15 for week; 6 = more than 15 hours.

	1	2	3	4	5	6
Preparing food, cooking and washing up	☐	☐	☐	☐	☐	☐
Shopping for food and groceries	☐	☐	☐	☐	☐	☐
Shopping and browsing in shop for other items (e.g.clothes	☐	☐	☐	☐	☐	☐
Walking	☐	☐	☐	☐	☐	☐
Cleaning the house	☐	☐	☐	☐	☐	☐
Doing the laundry and ironing	☐	☐	☐	☐	☐	☐
Watching TV	☐	☐	☐	☐	☐	☐

12. Are you regularly engaged in any leisure activity? Yes ☐ No ☐

13. If yes, can you list these activities and the frequency:

Activity	Frequency

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Affinity for technology interaction

Affinity for Technology Interaction (ATI) Scale

Franke, Attig, & Wessel (2019)

In the following questionnaire, we will ask you about your interaction with technical systems. The term "technical systems" refers to apps and other software applications, as well as entire digital devices (e.g., mobile phone, computer, TV, car navigation).

Please indicate the degree to which you agree/disagree with the following statements.		completely disagree	largely disagree	slightly disagree	slightly agree	largely agree	completely agree
01	I like to occupy myself in greater detail with technical systems.	☐	☐	☐	☐	☐	☐
02	I like testing the functions of new technical systems.	☐	☐	☐	☐	☐	☐
03	I predominantly deal with technical systems because I have to.	☐	☐	☐	☐	☐	☐
04	When I have a new technical system in front of me, I try it out intensively.	☐	☐	☐	☐	☐	☐
05	I enjoy spending time becoming acquainted with a new technical system.	☐	☐	☐	☐	☐	☐
06	It is enough for me that a technical system works; I don't care how or why.	☐	☐	☐	☐	☐	☐
07	I try to understand how a technical system exactly works.	☐	☐	☐	☐	☐	☐
08	It is enough for me to know the basic functions of a technical system.	☐	☐	☐	☐	☐	☐
09	I try to make full use of the capabilities of a technical system.	☐	☐	☐	☐	☐	☐

Analysis

1. When entering the participants' responses into a data file for the analysis, the responses should be coded as follows: completely disagree = 1, largely disagree = 2, slightly disagree = 3, slightly agree = 4, largely agree = 5, completely agree = 6.
2. Responses to the **three negatively worded items** (items 3, 6, 8) **need to be reversed** (6=1, 5=2, 4=3, 3=4, 2=5, 1=6).
3. Finally, a mean score should be computed over all 9 items.
4. Report mean (*M*), standard deviation (*SD*) and Cronbach's alpha, usually with two decimal places, e.g., $M = 3.61$, $SD = 1.08$, $\alpha = .87$.

Source: Franke, T., Attig, C., & Wessel, D. (2019). A Personal Resource for Technology Interaction: Development and Validation of the Affinity for Technology Interaction (ATI) Scale. *International Journal of Human–Computer Interaction, 35*(6), 456-467, DOI: 10.1080/10447318.2018.1456150

More Information: www.ati-scale.org 25.02.2022

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

SUS: System Usability Scale

SUS: System Usability Scale

	Not at all Okay				Completely agree
1. I think I will use this program frequently	1	2	3	4	5
2. I find this program unnecessarily complex	1	2	3	4	5
3. I think this program is easy to use	1	2	3	4	5
4. I think I will need the help of a technician to be able to use this program	1	2	3	4	5
5. I found that the various functions of this program were well integrated	1	2	3	4	5
6. I think there is too much inconsistency in this service	1	2	3	4	5
7. I imagine most people would be able to learn how to use this service very quickly	1	2	3	4	5
8 I found this service very cumbersome to use.	1	2	3	4	5
9. I felt very confident using this service.	1	2	3	4	5
10. I need to learn a lot before I can use this service.	1	2	3	4	5

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

User Experience Questionnaire

UEQ Questionnaire

For the assessment of the systems and applications, please fill out the following questionnaire. The questionnaire consists of pairs of contrasting attributes that may apply to the used systems and applications. The circles between the attributes represent gradations between the opposites. You can express your agreement with the attributes by ticking the circle that most closely reflects your impression. Example:

attractive	○	⊗	○	○	○	○	○	unattractive

Please decide spontaneously. Don't think too long about your decision to make sure that you convey your original impression. Please remember: there is no wrong or right answer! Please assess the **Device/App** now by ticking one circle per line.

	1	2	3	4	5	6	7		
annoying	○	○	○	○	○	○	○	enjoyable	1
not understandable	○	○	○	○	○	○	○	understandable	2
creative	○	○	○	○	○	○	○	dull	3
easy to learn	○	○	○	○	○	○	○	difficult to learn	4
valuable	○	○	○	○	○	○	○	inferior	5
boring	○	○	○	○	○	○	○	exciting	6
not interesting	○	○	○	○	○	○	○	interesting	7
unpredictable	○	○	○	○	○	○	○	predictable	8
fast	○	○	○	○	○	○	○	slow	9
inventive	○	○	○	○	○	○	○	conventional	10
obstructive	○	○	○	○	○	○	○	supportive	11
good	○	○	○	○	○	○	○	bad	12
complicated	○	○	○	○	○	○	○	easy	13
unlikable	○	○	○	○	○	○	○	pleasing	14
usual	○	○	○	○	○	○	○	leading edge	15
unpleasant	○	○	○	○	○	○	○	pleasant	16
secure	○	○	○	○	○	○	○	not secure	17
motivating	○	○	○	○	○	○	○	demotivating	18
meets expectations	○	○	○	○	○	○	○	does not meet expectations	19
inefficient	○	○	○	○	○	○	○	efficient	20
clear	○	○	○	○	○	○	○	confusing	21
impractical	○	○	○	○	○	○	○	practical	22
organized	○	○	○	○	○	○	○	cluttered	23
attractive	○	○	○	○	○	○	○	unattractive	24
friendly	○	○	○	○	○	○	○	unfriendly	25
conservative	○	○	○	○	○	○	○	innovative	26

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

UEQ +

Template for preparation of an English version of the UEQ+ questionnaire

The UEQ+ follows a modular approach. The UEQ+ is not intended for direct use. Instead, the user has the possibility to prepare a custom questionnaire and to select the scales most suitable for the project from a catalogue of scales. For details on the approach, refer to the UEQ+ manual.

Page 2 of this template provides pre-formulated instructions for the participants in the survey. Of course, specific instructions can also be added.

On the following pages all available scales for the UEQ+ are listed with their items. Simply delete the scales that are not required for your survey. The red scale names serve for orientation and support preparation of the questionnaire. Please delete them in the final version for the participants.

Please do not delete or change any individual items within the scales!

For general information concerning the application of the UEQ+, please refer to the UEQ+ manual.

Please let us have your assessment.

Please complete the following questionnaire to assess the product. The questionnaire contains opposing pairs of product properties. The grades between the opposites are indicated by circles. Check one of the circles to indicate your level of agreement with the individual terms.

Example:

unattractive	■ ⊗ ■ ■ ■ ■ ■	attractive

With this assessment, you state that you consider the product rather unattractive than attractive.

Try to make a spontaneous decision! It is important not to think too long about the terms to reach a direct assessment. Please always check one answer, even if you are insecure about your assessment of one pair of terms or if you think that it does not fit the product.

The opposing pairs are indicated in groups relating to one similar aspect. Under each group, you have the possibility to state the importance of the respective aspect for your overall impression of the product.

There are no "right" or "wrong" answers. Your personal opinion is all that counts!

Please only check one circle in each line.

1 2 3 4 5 6 7

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Attractiveness

In my opinion, the product is generally

annoying	■ ■ ■ ■ ■ ■ ■	enjoyable
bad	■ ■ ■ ■ ■ ■ ■	good
unpleasant	■ ■ ■ ■ ■ ■ ■	pleasant
unfriendly	■ ■ ■ ■ ■ ■ ■	friendly

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Efficiency

To achieve my goals, I consider the product as

slow	■ ■ ■ ■ ■ ■ ■	fast
inefficient	■ ■ ■ ■ ■ ■ ■	efficient
impractical	■ ■ ■ ■ ■ ■ ■	practical
cluttered	■ ■ ■ ■ ■ ■ ■	organized

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Perspicuity

In my opinion, handling and using the product are

not understandable	■ ■ ■ ■ ■ ■ ■	understandable
difficult to learn	■ ■ ■ ■ ■ ■ ■	easy to learn
complicated	■ ■ ■ ■ ■ ■ ■	easy
confusing	■ ■ ■ ■ ■ ■ ■	clear

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Dependability

In my opinion, the reactions of the product to my input and command are

unpredictable	■ ■ ■ ■ ■ ■ ■	predictable
obstructive	■ ■ ■ ■ ■ ■ ■	supportive
not secure	■ ■ ■ ■ ■ ■ ■	secure
does not meet expectations	■ ■ ■ ■ ■ ■ ■	meets expectations

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Stimulation

In my opinion, handling and working with the product are

not interesting	■ ■ ■ ■ ■ ■ ■	interesting
boring	■ ■ ■ ■ ■ ■ ■	exiting
inferior	■ ■ ■ ■ ■ ■ ■	valuable
demotivating	■ ■ ■ ■ ■ ■ ■	motivating

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Novelty

In my opinion, the idea behind the product and its design are

dull	■ ■ ■ ■ ■ ■ ■	creative
conventional	■ ■ ■ ■ ■ ■ ■	inventive
usual	■ ■ ■ ■ ■ ■ ■	leading edge
conservative	■ ■ ■ ■ ■ ■ ■	innovative

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Trust

Regarding the use of my personal information and data, the product is

insecure	■ ■ ■ ■ ■ ■ ■	secure
untrustworthy	■ ■ ■ ■ ■ ■ ■	trustworthy
unreliable	■ ■ ■ ■ ■ ■ ■	reliable
non-transparent	■ ■ ■ ■ ■ ■ ■	transparent

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Haptics

In my opinion, the surface of the product is

unstable	■ ■ ■ ■ ■ ■ ■	stable
unpleasant to the touch	■ ■ ■ ■ ■ ■ ■	pleasant to the touch
rough	■ ■ ■ ■ ■ ■ ■	smooth
slippery	■ ■ ■ ■ ■ ■ ■	slip-resistant

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Acoustics

The noise during use of the product is

loud	■ ■ ■ ■ ■ ■ ■	quiet
dissonant	■ ■ ■ ■ ■ ■ ■	melodic
booming	■ ■ ■ ■ ■ ■ ■	dampened
piercing	■ ■ ■ ■ ■ ■ ■	soft

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Personalization

Regarding my personal requirements and preferences, the product is

not adjustable	■ ■ ■ ■ ■ ■ ■	adjustable
not changeable	■ ■ ■ ■ ■ ■ ■	changeable
inflexible	■ ■ ■ ■ ■ ■ ■	flexible
not extendable	■ ■ ■ ■ ■ ■ ■	extendable

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Usefulness

I consider the possibility of using the product as

useless	■ ■ ■ ■ ■ ■ ■	useful
not helpful	■ ■ ■ ■ ■ ■ ■	helpful
not beneficial	■ ■ ■ ■ ■ ■ ■	beneficial
not rewarding	■ ■ ■ ■ ■ ■ ■	rewarding

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Value

I generally consider the design of the product as

inferior	■ ■ ■ ■ ■ ■ ■	valuable
not presentable	■ ■ ■ ■ ■ ■ ■	presentable
tasteless	■ ■ ■ ■ ■ ■ ■	tasteful
not elegant	■ ■ ■ ■ ■ ■ ■	elegant

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Visual Aesthetics

In my opinion, the visual design of the product is

ugly	■ ■ ■ ■ ■ ■ ■	beautiful
lacking style	■ ■ ■ ■ ■ ■ ■	stylish
unappealing	■ ■ ■ ■ ■ ■ ■	appealing
unpleasant	■ ■ ■ ■ ■ ■ ■	pleasant

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Intuitive Use

In my opinion, using the product is

difficult	■ ■ ■ ■ ■ ■ ■	easy
illogical	■ ■ ■ ■ ■ ■ ■	logical
not plausible	■ ■ ■ ■ ■ ■ ■	plausible
inconclusive	■ ■ ■ ■ ■ ■ ■	conclusive

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Trustworthiness of Content

In my opinion, the information and data provided by the product are

useless	■ ■ ■ ■ ■ ■ ■	useful
implausible	■ ■ ■ ■ ■ ■ ■	plausible
untrustworthy	■ ■ ■ ■ ■ ■ ■	trustworthy
inaccurate	■ ■ ■ ■ ■ ■ ■	accurate

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Quality of Content

In my opinion, the information and data provided by the product are

obsolete	■ ■ ■ ■ ■ ■ ■	up-to-date
not interesting	■ ■ ■ ■ ■ ■ ■	interesting
poorly prepared	■ ■ ■ ■ ■ ■ ■	well prepared
incomprehensible	■ ■ ■ ■ ■ ■ ■	comprehensible

I consider the product property described by these terms as

Completely irrelevant	■ ■ ■ ■ ■ ■ ■	Very important

Clarity

In my opinion the user interface of the product looks

• poorly grouped	□ □ □ □ □ □ □	well grouped
unstructured	□ □ □ □ □ □ □	structured
disordered	□ □ □ □ □ □ □	ordered
disorganized	□ □ □ □ □ □ □	organized

I consider the product property described by these terms as

Completely irrelevant	□ □ □ □ □ □ □	Very important

Response behavior

In my opinion the response behaviour of the voice assistant is

artificial	□ □ □ □ □ □ □	natural
unpleasant	□ □ □ □ □ □ □	pleasant
unlikeable	□ □ □ □ □ □ □	likeable
boring	□ □ □ □ □ □ □	entertaining

I consider the product property described by these terms as

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Completely irrelevant	□	□	□	□	□	□	□	Very important

Response quality

The answers and questions asked by the voice assistant are

inappropriate	□	□	□	□	□	□	□	suitable
useless	□	□	□	□	□	□	□	useful
not helpful	□	□	□	□	□	□	□	helpful
unintelligent	□	□	□	□	□	□	□	intelligent

I consider the product property described by these terms as

Completely irrelevant	□	□	□	□	□	□	□	Very important

Comprehensibility

In my opinion the voice assistant has understood my voice commands

complicated	□	□	□	□	□	□	□	simple
ambiguous	□	□	□	□	□	□	□	unambiguous
inaccurate	□	□	□	□	□	□	□	accurate
enigmatic	□	□	□	□	□	□	□	explainable

I consider the product property described by these terms as

Completely irrelevant	□	□	□	□	□	□	□	Very important

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Scale at T2 : Fill in the questions below and explain your thoughts

Experience with the booklet	What are your feelings about these six months of experimentation?
	What did you think of the information and activity booklet? Positive points : Negative points :
	What benefit has the booklet brought to your daily life?
	What improvements can be made?
	Would you recommend this booklet to your family and friends? Why *(not)*?
Quality of life	Do you think this booklet has improved your well-being? Why *(not)*?
Usability	Was the booklet easy to use?
	How often did you use it (about how many times a week?)
	Do you think technology is better suited to provide information and activities on aging well? : Why *(not)* : Which technology (or analog alternative):
Others	Do you have any comments for us?

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

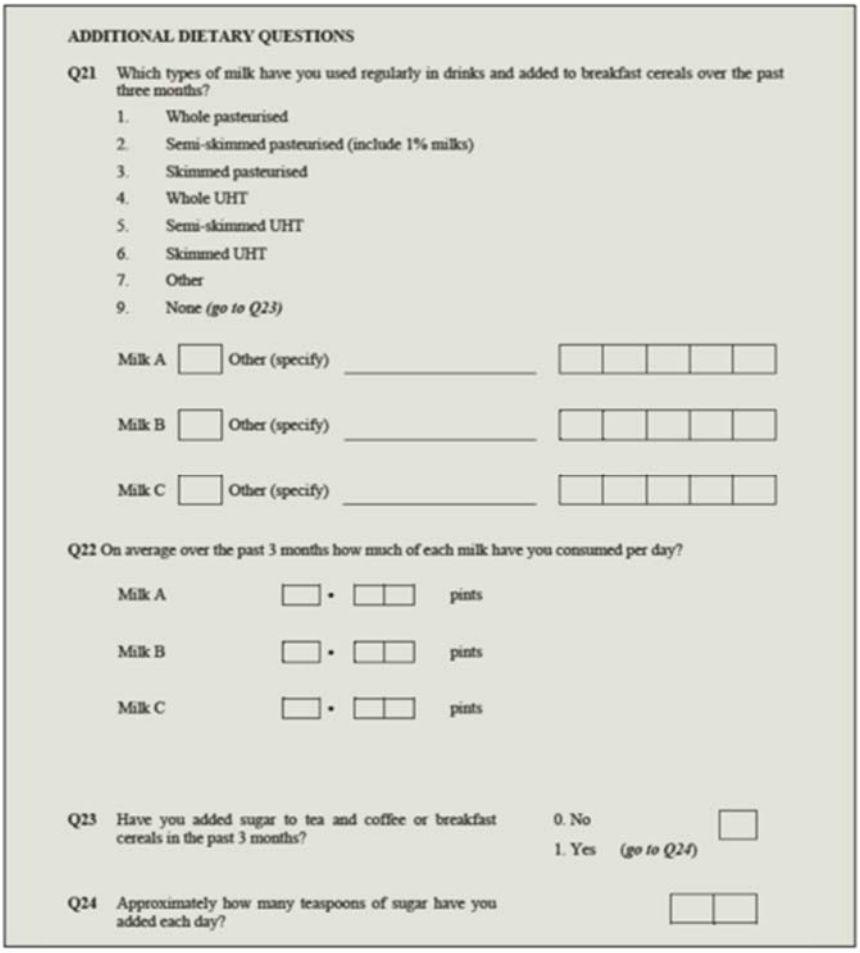
Short FFQ _Europe

Now I am going to ask you how often over the past 3 months you have eaten particular foods.

	FOOD AND AMOUNTS	AVERAGE USE IN PAST 3 MONTHS									
		Never	less than once/ month	1-3 per month	Once a week	2-4 per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
1.	White bread (one slice)										
2.	Brown and wholemeal bread (one slice)										
3.	Biscuits eg digestive (one)										
4.	Apples (one fruit)										
5.	Bananas (one fruit)										
6.	Melon, pineapple, kiwi and other tropical fruits (medium serving)										
7.	Green salad eg lettuce, cucumber, celery										
8.	Garlic – raw and cooked dishes										
9.	Marrow and courgettes										
10.	Peppers – cooked & fresh										
11.	Yogurt (125g pot)										
12.	Eggs as boiled, fried, scrambled etc. (one egg)										
13.	White fish eg cod, haddock, plaice, sole (not in batter/crumbs)										
14.	Oily fish, eg. mackerel, tuna, salmon										
15.	Bacon and Gammon										
16.	Meat pies, eg. pork pie, pasties, steak & kidney, sausage rolls										
17.	Boiled, mashed and jacket potatoes (one egg size potato)										
18.	Chips										
19.	Pasta eg spaghetti, macaroni										
Which is the main spreading fat you have used for example on bread or vegetables?											
20.	Spreading fat (teaspoon) _____ ☐☐☐☐☐										

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).



ADDITIONAL DIETARY QUESTIONS

Q21 Which types of milk have you used regularly in drinks and added to breakfast cereals over the past three months?

1. Whole pasteurised
2. Semi-skimmed pasteurised (include 1% milks)
3. Skimmed pasteurised
4. Whole UHT
5. Semi-skimmed UHT
6. Skimmed UHT
7. Other
9. None *(go to Q23)*

Milk A ☐ Other (specify) _____ ☐☐☐☐☐

Milk B ☐ Other (specify) _____ ☐☐☐☐☐

Milk C ☐ Other (specify) _____ ☐☐☐☐☐

Q22 On average over the past 3 months how much of each milk have you consumed per day?

Milk A ☐ • ☐☐ pints

Milk B ☐ • ☐☐ pints

Milk C ☐ • ☐☐ pints

Q23 Have you added sugar to tea and coffee or breakfast cereals in the past 3 months?

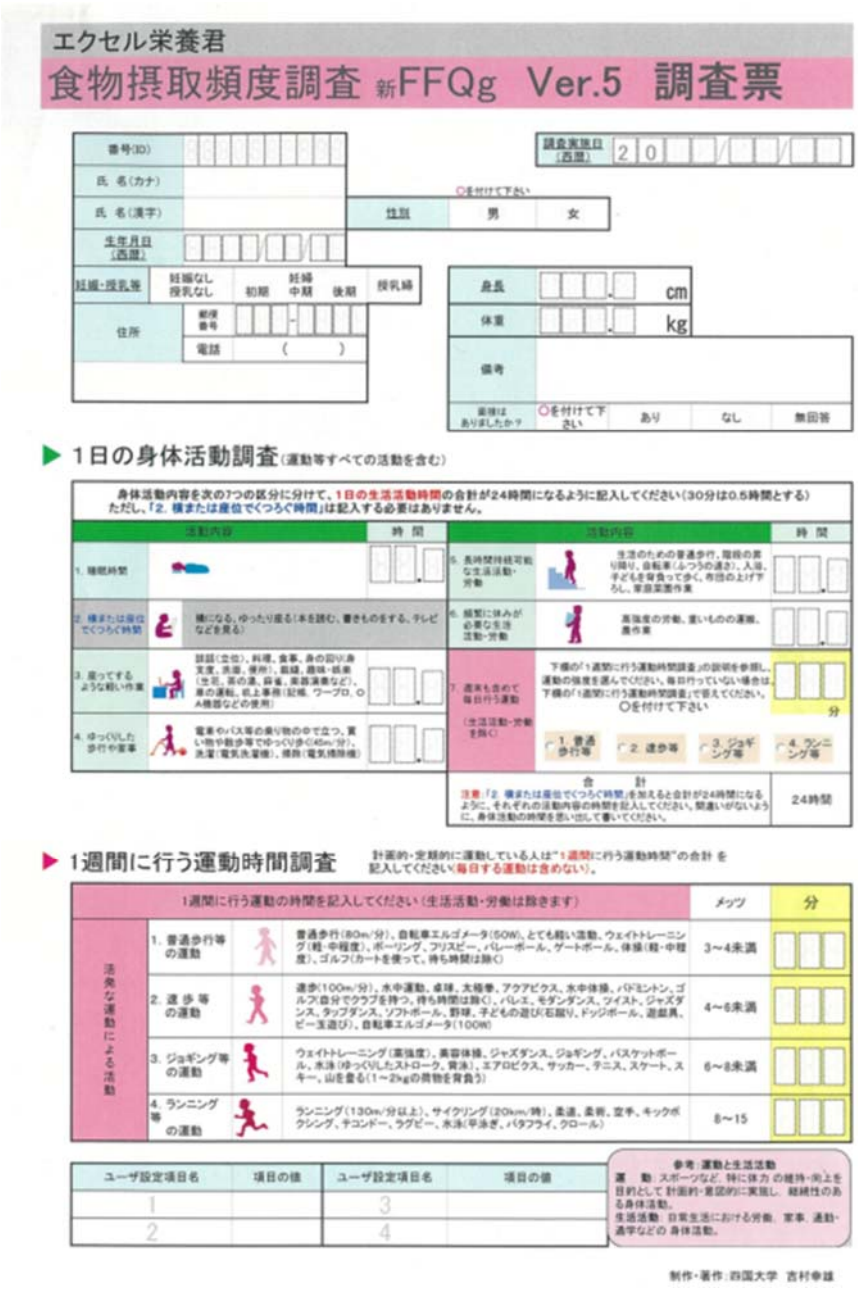
0. No
1. Yes *(go to Q24)* ☐

Q24 Approximately how many teaspoons of sugar have you added each day? ☐☐

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

FFQ_ Japan



エクセル栄養君

食物摂取頻度調査 新FFQg Ver.5 調査票

番号(ID)

調査実施日（西暦） 2 0

氏 名（カナ）

氏 名（漢字）

○を付けて下さい

性別 男 女

生年月日（西暦）

妊娠・授乳等 妊娠なし 授乳なし / 妊婦 初期 中期 後期 / 授乳婦

住所 郵便番号 電話 ( )

身長 cm

体重 kg

備考

薬剤はありましたか？ ○を付けて下さい あり なし 無回答

▶ 1日の身体活動調査（運動等すべての活動を含む）

身体活動内容を次の7つの区分に分けて、1日の生活活動時間の合計が24時間になるように記入してください（30分は0.5時間とする）
ただし、「2. 横または座位でくつろぐ時間」は記入する必要はありません。

活動内容	時間	活動内容	時間
1. 睡眠時間		5. 長時間持続可能な生活活動・労働	
2. 横または座位でくつろぐ時間	横になる、ゆったり座る（本を読む、書きものをする、テレビなどを見る）	6. 頻繁に休みが必要な生活活動・労働	
3. 座ってするような軽い作業	談話（立位）、料理、食事、身の回り（身支度、洗面、便所）、裁縫、趣味・娯楽（生花、茶の湯、麻雀、楽器演奏など）、車の運転、机上事務（記帳、ワープロ、OA機器などの使用）	7. 週末も含めて毎日行う運動（生活活動・労働を除く）	下欄の「1週間に行う運動時間調査」の説明を参照し、運動の強度を選んでください。毎日行っていない場合は、下欄の「1週間に行う運動時間調査」で答えてください。 ○を付けて下さい 1. 普通歩行等 2. 速歩等 3. ジョギング等 4. ランニング等 分
4. ゆっくりした歩行や家事	電車やバス等の乗り物の中で立つ、買い物や散歩等でゆっくり歩く(4km/分)、洗濯（電気洗濯機）、掃除（電気掃除機）		
		合 計	24時間

注意：「2. 横または座位でくつろぐ時間」を加えると合計が24時間になるように、それぞれの活動内容の時間を記入してください。間違いがないように、身体活動の時間を思い出して書いてください。

▶ 1週間に行う運動時間調査 計画的・定期的に運動している人は"1週間に行う運動時間"の合計 を記入してください（毎日する運動は含めない）。

1週間に行う運動の時間を記入してください（生活活動・労働は除きます）			メッツ	分
活発な運動による活動	1. 普通歩行等の運動	普通歩行（80m/分）、自転車エルゴメータ（50W）、とても軽い活動、ウェイトトレーニング（軽・中程度）、ボーリング、フリスビー、バレーボール、ゲートボール、体操（軽・中程度）、ゴルフ（カートを使って、待ち時間は除く）	3～4未満	
	2. 速歩等の運動	速歩（100m/分）、水中運動、卓球、太極拳、アクアビクス、水中体操、バドミントン、ゴルフ（自分でクラブを持つ、待ち時間は除く）、バレエ、モダンダンス、ツイスト、ジャズダンス、タップダンス、ソフトボール、野球、子どもの遊び（石蹴り、ドッジボール、遊具具、ビー玉遊び）、自転車エルゴメータ（100W）	4～6未満	
	3. ジョギング等の運動	ウェイトトレーニング（高強度）、美容体操、ジャズダンス、ジョギング、バスケットボール、水泳（ゆっくりしたストローク、背泳）、エアロビクス、サッカー、テニス、スケート、スキー、山を登る（1～2kgの荷物を背負う）	6～8未満	
	4. ランニング等の運動	ランニング（130m/分以上）、サイクリング（20km/時）、柔道、柔術、空手、キックボクシング、テコンドー、ラグビー、水泳（平泳ぎ、バタフライ、クロール）	8～15	

ユーザ設定項目名	項目の値	ユーザ設定項目名	項目の値
1		3	
2		4	

参考：運動と生活活動
運　動：スポーツなど、特に体力の維持・向上を目的として計画的・意図的に実施し、継続性のある身体活動。
生活活動：日常生活における労働、家事、通勤・通学などの身体活動。

制作・著作：四国大学　吉村幸雄

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

食品ごとに示した図は「2. 普通」量の目安です。この量を参考にして，1回（または1食）に食べる量と1週間に食べる回数を答えてください。
「1. 少し」は普通量の1/2，「3. たっぷり」は普通量の1.5倍が目安です。

1-a 穀類 主食は，朝・昼・夕に，何を，どれくらいの量，1週間に何回食べますか？
間食や夜食については，一番近い食事の中に含めてください。

回 答 欄

穀類
①，②，③について1週間に食べる回数
① 杯 ② 枚 ③ 杯
1週間に 朝
1週間に 昼
1週間に 夕

ご飯もの
カレーやハヤシライス
1週間に 回

1-b ①，②のうち，寿司や炊き込みご飯，どんぶりものやお好み焼きなどは，1週間に何回食べますか？＊【1-a】と重複しますが，再度回答してください。

1-c ①，②，③のうち，カレーライス・ハヤシライス・グラタンなど，ルーを使った料理や，パスタは1週間に何回食べますか？
＊【1-a】と重複しますが，再度回答してください。

2 肉・肉加工品類 朝・昼・夕に，肉・肉の加工品は，何を，どれくらいの量，1週間に何回食べますか？
普通量は80gです。80gとは…
ロース肉 1枚
薄切り肉 2～3枚
ウィンナー 4本
ハム 4枚
鶏から揚げ 4～5個

肉・肉加工品類
1回に食べる量を 0，1，2，3 のいずれかに○をつける
朝 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回
昼 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回
夕 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回

3 魚介類 朝・昼・夕に，魚介類・その加工品は，何を，どれくらいの量，1週間に何回食べますか？小魚は，【8. 小魚】で回答してください。
普通量は80gです。80gとは…
切り身1切れ 魚（中）なら1尾
干物1枚
竹輪やかまぼこ 中1本
さしみ5切れ
あさり殻付 15個
エビ 中3～4尾
いか 1/2杯

魚介類
朝 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回
昼 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回
夕 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回

4 卵 卵は1週間に何個食べますか？
1個は鶏卵1個

卵
1週間に 個

5 大豆・大豆製品
朝・昼・夕に，大豆・大豆製品は，どれくらいの量，1週間に何回食べますか？
（みそは除きます。）枝豆は【10.緑色野菜】で回答してください。
＊味噌汁の豆腐なら「1. 少し」を選んでください。
豆腐1丁（300g）の1/4
納豆 小1パック（30g）
がんもどき 1個（100g）の1/2個
油揚げ 2枚（20g）
豆乳 200mL

大豆・大豆製品
朝 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回
昼 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回
夕 0 食べない 1 少し 2 普通 3 たっぷり 1週間に 回

1-a 牛乳・乳製品
牛乳は，1週間に何杯飲みますか？コップ1杯（170mL）を1杯の目安とします。
フォローアップミルクは牛乳と同様に考えてください。

牛乳
1週間に 杯

1-b 乳製品は1週間に何回食べますか？
牛乳1杯（170mL）
ヨーグルト 1個（100g）
チーズ 1切れ（20g）

乳製品
1週間に 回

－ 1 －

制作・著作：四国大学 吉村幸雄

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

7 海藻 ワカメ・ひじきなどの海藻類を，1回にどのくらいの量，1週間に何回食べますか？

1.少しの量の目安 → わかめ水戻し 5g / わかめの汁物 1杯分 / 焼付け海苔 1袋（5枚）

2.普通量の目安 → 昆布 5～6cmくらい / ひじき煮物小鉢1杯

8 小魚 小魚を，1回にどれくらいの量，1週間に何回食べますか？

＊小魚とは骨ごと食べる体長10cm位までのものです。骨を残す場合は，【8. 魚介類】で答えてください。

普通量は20gです。20gとは…

しらす干し 大さじ山盛り2杯 / うるめいわし 2尾

9 緑黄色野菜 朝・昼・夕に，緑黄色野菜を，どれくらいの量，1週間に何回食べますか？

普通量は50gです。50gとは…

人参 1/3本 / ほうれん草1/4束（お浸し小鉢1杯） / トマト 中1/3個 / いろいろな緑黄色野菜を合わせて片手1杯 / ブロッコリー 5房 / ピーマン 中2個 / かぼちゃ 2cm角5個

10 淡色野菜・きのこ類 朝・昼・夕に，淡色野菜・きのこ類を，どれくらいの量，1週間に何回食べますか？

野菜ジュースは，1パック（200mL）を普通量とします。

普通量は80gです。80gとは

きゅうり 1本 / 大根 3～4cm / お浸し小鉢2鉢または煮物小鉢2杯 / キャベツ大葉1枚 / えだまめ1/2袋 / 野菜サラダ サラダ鉢1杯 / 野菜炒め 1/2皿 / 野菜100%ジュース（200mL）

11 果物 果物は，1回にどれくらいの量，1週間に何回食べますか？

果汁100%ジュースは，コップ1.5杯（300mL）を普通量とします。

普通量は150gです。150gとは…

みかん 2個 / りんご 1/2個 / バナナ 1.5本 / スイカ 1/8個 / メロン 1/6個 / 柿 1/2個

＊普通量の重量は正味の重量です。

巨峰 1/2房 / いちご 1/2パック / 果汁100%ジュース 1.5杯（300mL）

12 いも いも類を，1回にどれくらいの量，1週間に何回食べますか？

普通量は100gです。100gとは…

じゃがいも 中1個 / さつまいも 中1/2個 / 里いも 中3個

海藻

1回	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回

小魚

1回	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回

緑黄色野菜

朝	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回
昼	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回
夕	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回

淡色野菜・きのこ類

朝	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回
昼	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回
夕	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回

果物

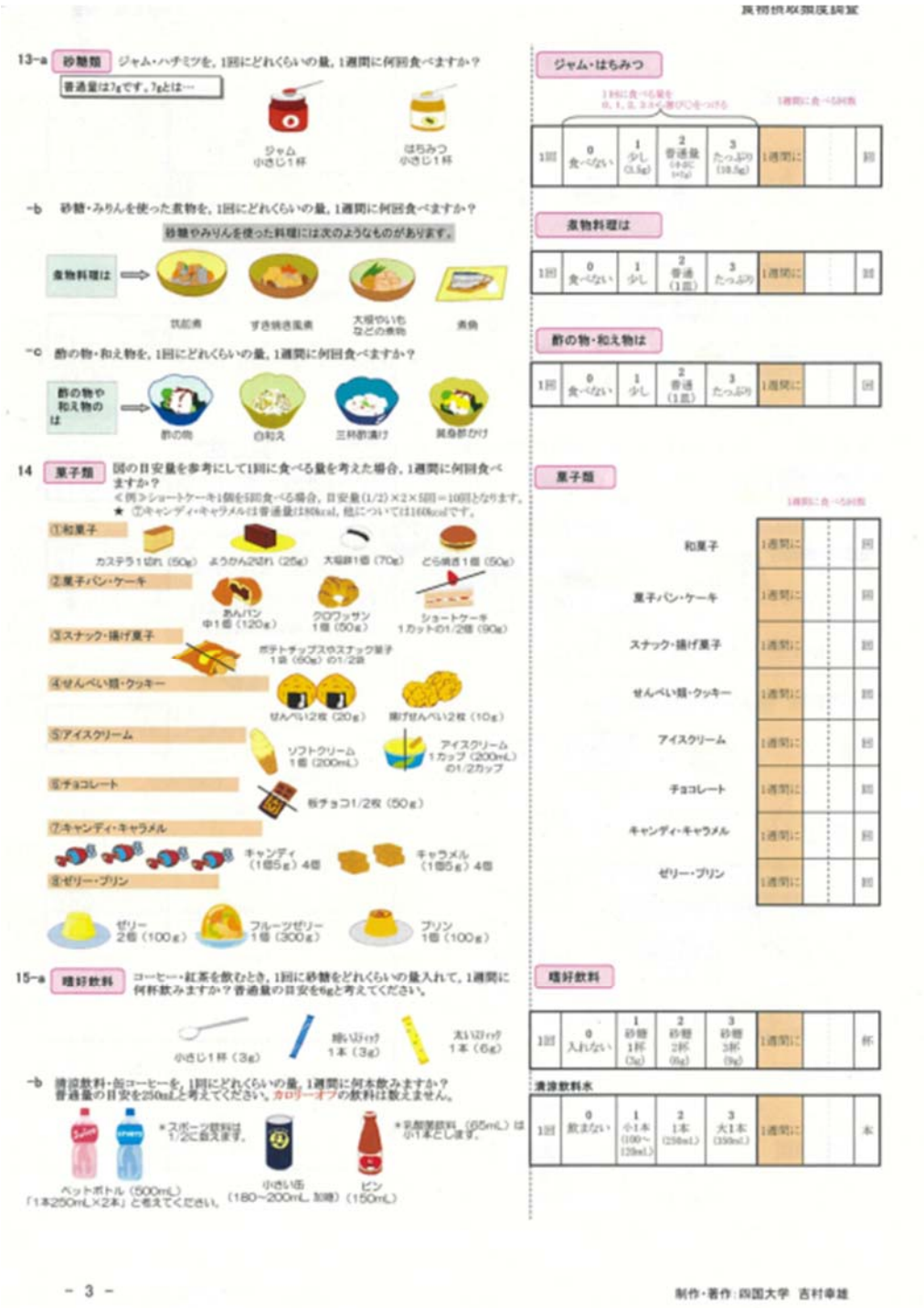
1回	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回

いも

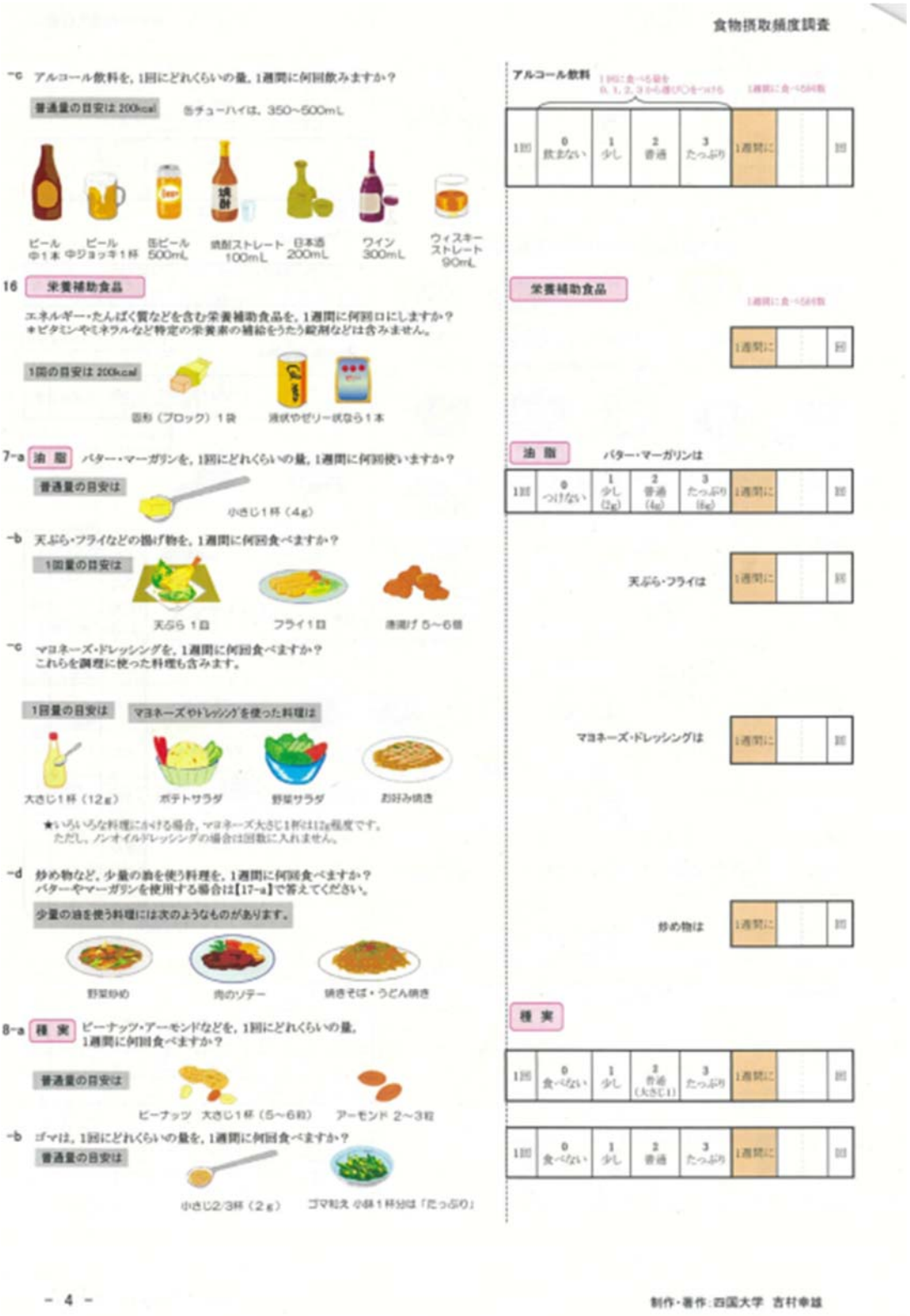
1回	0 食べない	1 少し	2 普通	3 たっぷり	1週間に		回

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).



The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).



食物摂取頻度調査

-c アルコール飲料を，1回にどれくらいの量，1週間に何回飲みますか？

普通量の目安は 200kcal　※チューハイは，350～500mL

ビール 中1本　ビール ※ジョッキ1杯　※ビール 500mL　焼酎ストレート 100mL　日本酒 200mL　ワイン 300mL　ウィスキーストレート 90mL

16 栄養補助食品

エネルギー・たんぱく質などを含む栄養補助食品を，1週間に何回ロにしますか？
＊ビタミンやミネラルなど特定の栄養素の補給をうたう錠剤などは含みません。

1回の目安は 200kcal

固形（ブロック）1袋　液状やゼリー状なら1本

7-a 油脂 バター・マーガリンを，1回にどれくらいの量，1週間に何回使いますか？

普通量の目安は

小さじ1杯（4g）

-b 天ぷら・フライなどの揚げ物を，1週間に何回食べますか？

1回量の目安は

天ぷら 1目　フライ1目　唐揚げ 5～6個

-c マヨネーズ・ドレッシングを，1週間に何回食べますか？
これらを調理に使った料理も含みます。

1回量の目安は　マヨネーズやドレッシングを使った料理は

大さじ1杯（12g）　ポテトサラダ　野菜サラダ　お好み焼き

★いろいろな料理にかける場合，マヨネーズ大さじ1杯は12g程度です。
ただし，ノンオイルドレッシングの場合は回数に入れません。

-d 炒め物など，少量の油を使う料理を，1週間に何回食べますか？
バターやマーガリンを使用する場合は【17-a】で答えてください。

少量の油を使う料理には次のようなものがあります。

野菜炒め　肉のソテー　焼きそば・うどん焼き

8-a 種実 ピーナッツ・アーモンドなどを，1回にどれくらいの量，
1週間に何回食べますか？

普通量の目安は

ピーナッツ 大さじ1杯（5～6粒）　アーモンド 2～3粒

-b ゴマは，1回にどれくらいの量を，1週間に何回食べますか？

普通量の目安は

小さじ2/3杯（2g）　ゴマ和え 小鉢1杯分は「たっぷり」

アルコール飲料

1回 | 0 飲まない | 1 少し | 2 普通 | 3 たっぷり | 1週間に | 回

栄養補助食品

1週間に | 回

油脂　バター・マーガリンは

1回 | 0 つけない | 1 少し（2g） | 2 普通（4g） | 3 たっぷり（6g） | 1週間に | 回

天ぷら・フライは　1週間に | 回

マヨネーズ・ドレッシングは　1週間に | 回

炒め物は　1週間に | 回

種実

1回 | 0 食べない | 1 少し | 2 普通（大さじ1） | 3 たっぷり | 1週間に | 回

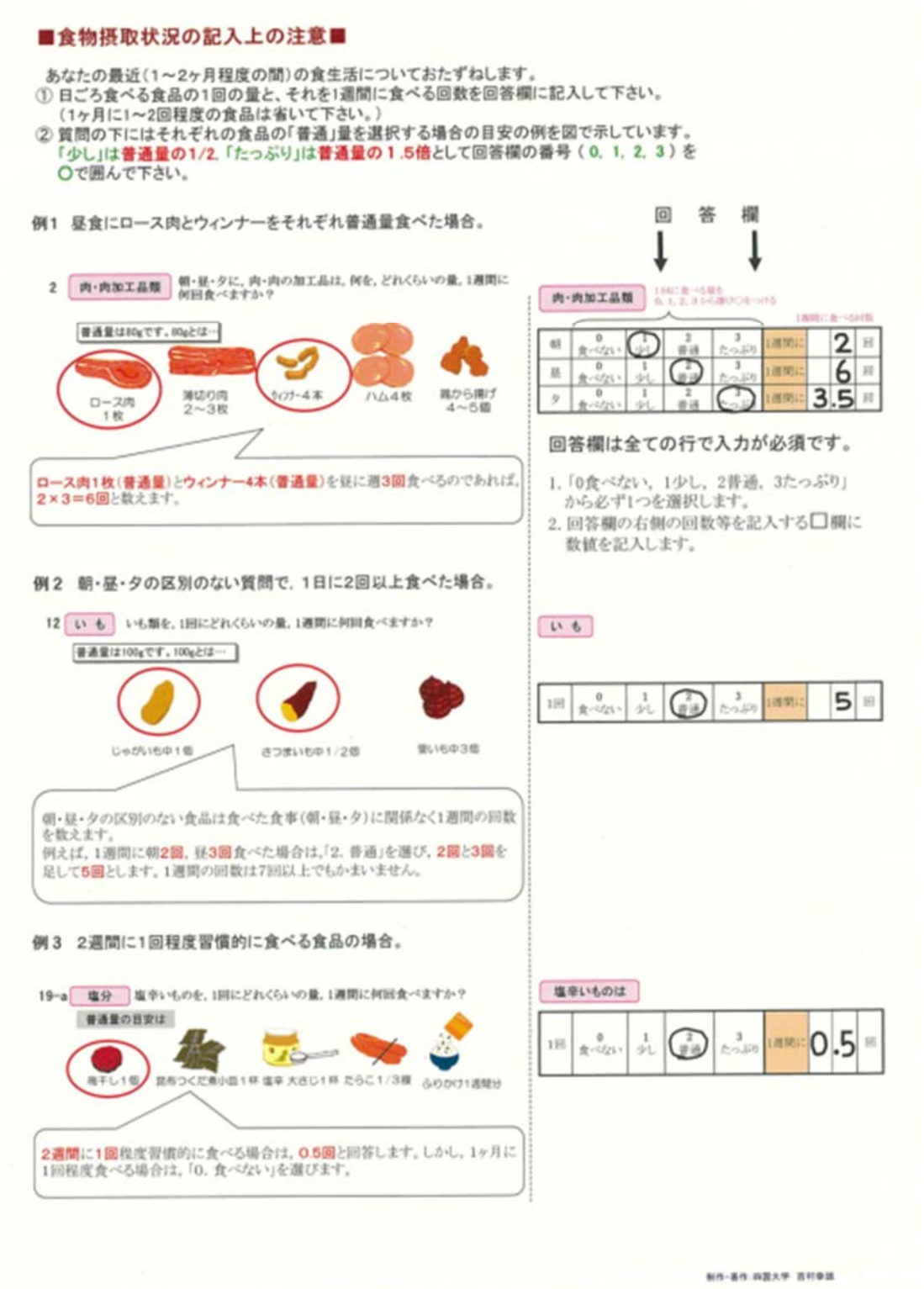
1回 | 0 食べない | 1 少し | 2 普通 | 3 たっぷり | 1週間に | 回

－ 4 －

制作・著作：四国大学　吉村幸雄

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).



■食物摂取状況の記入上の注意■

あなたの最近(1～2ヶ月程度の間)の食生活についておたずねします。
① 日ごろ食べる食品の1回の量と、それを1週間に食べる回数を回答欄に記入して下さい。
(1ヶ月に1～2回程度の食品は省いて下さい。)
② 質問の下にはそれぞれの食品の「普通」量を選択する場合の目安の例を図で示しています。
「少し」は普通量の1/2、「たっぷり」は普通量の1.5倍として回答欄の番号(0, 1, 2, 3)を
○で囲んで下さい。

例1 昼食にロース肉とウィンナーをそれぞれ普通量食べた場合。

2 肉・肉加工品類 朝・昼・夕に、肉・肉の加工品は、何を、どれくらいの量、1週間に何回食べますか?

普通量は80gです。80gとは…

ロース肉1枚 / 薄切り肉2～3枚 / ウィンナー4本 / ハム4枚 / 鶏から揚げ4～5個

ロース肉1枚(普通量)とウィンナー4本(普通量)を昼に週3回食べるのであれば、2×3=6回と数えます。

例2 朝・昼・夕の区別のない質問で、1日に2回以上食べた場合。

12 いも いも類を、1回にどれくらいの量、1週間に何回食べますか?

普通量は100gです。100gとは…

じゃがいも中1個 / さつまいも中1/2個 / 里いも中3個

朝・昼・夕の区別のない食品は食べた食事(朝・昼・夕)に関係なく1週間の回数を数えます。
例えば、1週間に朝2回、昼3回食べた場合は、「2. 普通」を選び、2回と3回を足して5回とします。1週間の回数は7回以上でもかまいません。

例3 2週間に1回程度習慣的に食べる食品の場合。

19-a 塩分 塩辛いものを、1回にどれくらいの量、1週間に何回食べますか?

普通量の目安は

梅干し1個 / 昆布つくだ煮小皿1杯 塩辛 大さじ1杯 / たらこ1/3腹 / ふりかけ1週間分

2週間に1回程度習慣的に食べる場合は、0.5回と回答します。しかし、1ヶ月に1回程度食べる場合は、「0. 食べない」を選びます。

回 答 欄

肉・肉加工品類

朝	0 食べない	1 少し	2 普通	3 たっぷり	1週間に	2	回
昼	0 食べない	1 少し	2 普通	3 たっぷり	1週間に	6	回
夕	0 食べない	1 少し	2 普通	3 たっぷり	1週間に	3.5	回

回答欄は全ての行で入力が必須です。

1.「0食べない、1少し、2普通、3たっぷり」から必ず1つを選択します。
2. 回答欄の右側の回数等を記入する□欄に数値を記入します。

いも

1回	0 食べない	1 少し	2 普通	3 たっぷり	1週間に	5	回

塩辛いものは

1回	0 食べない	1 少し	2 普通	3 たっぷり	1週間に	0.5	回

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

食物摂取頻度調査 FFQg

		主食の種類		ご飯(茶碗で○杯)	パン・シリアル○枚	麺類○杯
1－a	穀類	1週間に	朝			
		1週間に	昼			
		1週間に	夕			
b	ご飯もの	1週間に			回	
c	カレーやハヤシライス	1週間に			回	

1週間の回数は小数点以下を記入してもよい。
例:
ご飯…… 4．5杯
肉 …… 6．5回

1回に食べる量を 0．1．2．3 から選び、○をつけてください

2	肉・肉加工品類	朝	0.食べない	1．少し	2.普通	3．たっぷり	1週間に		回
		昼	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		夕	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
3	魚介類	朝	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		昼	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		夕	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
4	卵						1週間に		個
5	大豆・大豆製品	朝	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		昼	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		夕	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
6－a	牛乳	1杯 170mL					1週間に		杯
b	乳製品						1週間に		回
7	海藻	1回	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
8	小魚	1回	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回

1回に食べる量を 0．1．2．3 から選び、○をつけてください　　1週間に食べる回数

9	緑黄色野菜	朝	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		昼	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		夕	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
10	淡色野菜・きのこ類	朝	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		昼	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
		夕	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回
11	果物	1回	0.食べない	1.少し	2.普通	3.たっぷり	1週間に		回

制作・著作：四国大学　吉村幸雄

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

食物摂取頻度調査 FFQg

12	いも	1回	0.食べない	1.少し	2.普通	3.たっぷり	1週間に			回
13－a	ジャム・はちみつ	1回	0.食べない	1.少し (3.5g)	2.普通量 (小さじ1＝7g)	3.たっぷり (10.5g)	1週間に			回
b	煮物料理	1回	0.食べない	1.少し	2.普通 (1皿)	3.たっぷり	1週間に			回
c	酢の物 和え物	1回	0.食べない	1.少し	2.普通 (1皿)	3.たっぷり	1週間に			回
14	菓子類	①和菓子					1週間に			回
		②菓子パン・ケーキ					1週間に			回
		③スナック菓子・揚げ菓子(1/2袋 60g)					1週間に			回
		④せんべい類・クッキー(1枚5～10g×2枚)					1週間に			回
		⑤アイスクリーム(1/2カップ 200mL)					1週間に			回
		⑥チョコレート(1/2枚 50g)					1週間に			回
		⑦キャンディ・キャラメル(1個5g×4個)					1週間に			回
		⑧ゼリー・プリン(1個100g)					1週間に			回
15－a	コーヒー・紅茶に入れる砂糖	1回	0.入れない	1.砂糖1杯 (3g)	2.砂糖2杯 (6g)	3.砂糖3杯 (9g)	1週間に			杯
b	清涼飲料水	1回	0.飲まない	1.小1本 (100～120mL)	2. 1本 (250mL)	3.大1本 (350mL)	1週間に			本
c	アルコール飲料	1回	0.飲まない	1.少し	2.普通 (200kcal)	3.たっぷり	1週間に			回
16	栄養補助食品	1回の目安は200kcal					1週間に			回
17－a	バター マーガリン	1回	0.つけない	1.少し (2g)	2.普通 (4g)	3.たっぷり (6g)	1週間に			回
b	天ぷらやフライの揚げ物料理						1週間に			回
c	マヨネーズやドレッシング						1週間に			回
d	炒め物						1週間に			回
18－a	種実類(ピーナッツやアーモンド)	1回	0.食べない	1.少し	2.普通 (大さじ1)	3.たっぷり	1週間に			回
b	種実類(ごま)	1回	0.食べない	1.少し	2.普通	3.たっぷり	1週間に			回
19－a	梅干し・佃煮類	1回	0.食べない	1.少し	2.普通	3.たっぷり	1週間に			回
b	漬け物	1回	0.食べない	1.少し	2.普通	3.たっぷり	1週間に			回
c	食卓しょうゆ・ソース	1回	0.使わない	1.少し	2.普通	3.たっぷり	1週間に			回
d	味噌汁						1週間に			杯
e	すまし汁やスープ						1週間に			杯
20－a	麺類の汁は	0.ほとんど残す		1.半分残す	2.ほとんど飲む		1週間に			回
b	外食の味の感じ方	1.外食の味を薄く感じる		2.ほとんど同じ	3.外食の味を濃く感じる					

＊【1～4粒類】と重複しますが、再度答えてください。

制作・著作：四国大学　吉村幸雄

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

19.5 Interviews

Semi-structured Interview T0 for experimental group

	Guiding Questions	Further questions	Sustaining questions	Goal
Expectations	First of all, thank you for participating in the e-VITA project. Why did you decide to participate in the project?	• What do you expect from the next 6 months? • What do you expect from the e-VITA system and the virtual coach? • What do you expect from the e-VITA system and the Human coach? •	Can you explain this in more detail? What do you mean by that exactly? Do you have any other ideas about this?	Einstieg ins Interview Ermitteln von Erwartungen an die Studie und den virtuellen Coach
Current use of technology	Which technical devices are you currently already using?	• What experiences have you had with voice assistants so far? • Why do you use certain devices and others not? • For what do you use your technical devices?	What was it like for you as ....? - ...	Ermitteln der bisherigen Techniknutzung und -akzeptanz
Quality of Life	What does quality of life mean to you?	• To what extent do you pay attention to your health in everyday life? • How would you describe your current health? Which aspects are particularly important to you in terms of health/quality of life?		Own ideas of quality of life Dealing with health and relevance in everyday life
Closing		**Is there anything else you think we should address or anything that is particularly important to you?**		

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Semi-structured Interview Guide T2

	Guiding questions	Follow-up questions	Sustaining questions	Goal
Project procedure	Thank you for participating in the e VITA project. How did you experience the past 6 months of the study?	In terms of the overall project process, what did you think was good, what could have been better? What did you miss in the study/what would you have liked?	Can you explain this in more detail? What do you mean by that exactly? Do you have any other ideas about this? What was it like for you as .... ?	*Getting started with the interview* *Evaluation of the project process*
Use of the e-VITA system[1]	When you think about the last 6 Month, what was your use of the e-VITA system like?	For what did you use the e-VITA system the most? How did the e-VITA system help you achieve your goals How did the frequency of use change over the time?		*Usage behaviour*
Satisfaction with e-VITA system[1]	How satisfied are you with the e-VITA system after the past 6 months?	Why are you satisfied/dissatisfied with it? Which aspects of the system do you rate positively/negatively? What would you personally change about the system? What can be retained? Who would be the ideal target group for you?		*Satisfaction with the system* *Suggestions for improvement Already good aspects*
Human Coach	The project and the use of the system was accompanied by a human coach. How did you feel about the cooperation with the human coach?	What did you particularly like/dislike about the cooperation? What should be improved/considered in the future?		*Cooperation with the Human Coach* *Needs for improvement Good aspects*
Implementation	If you imagine the e-VITA system is on the market, what would help	With whom would you consult beforehand?		*Future use*

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

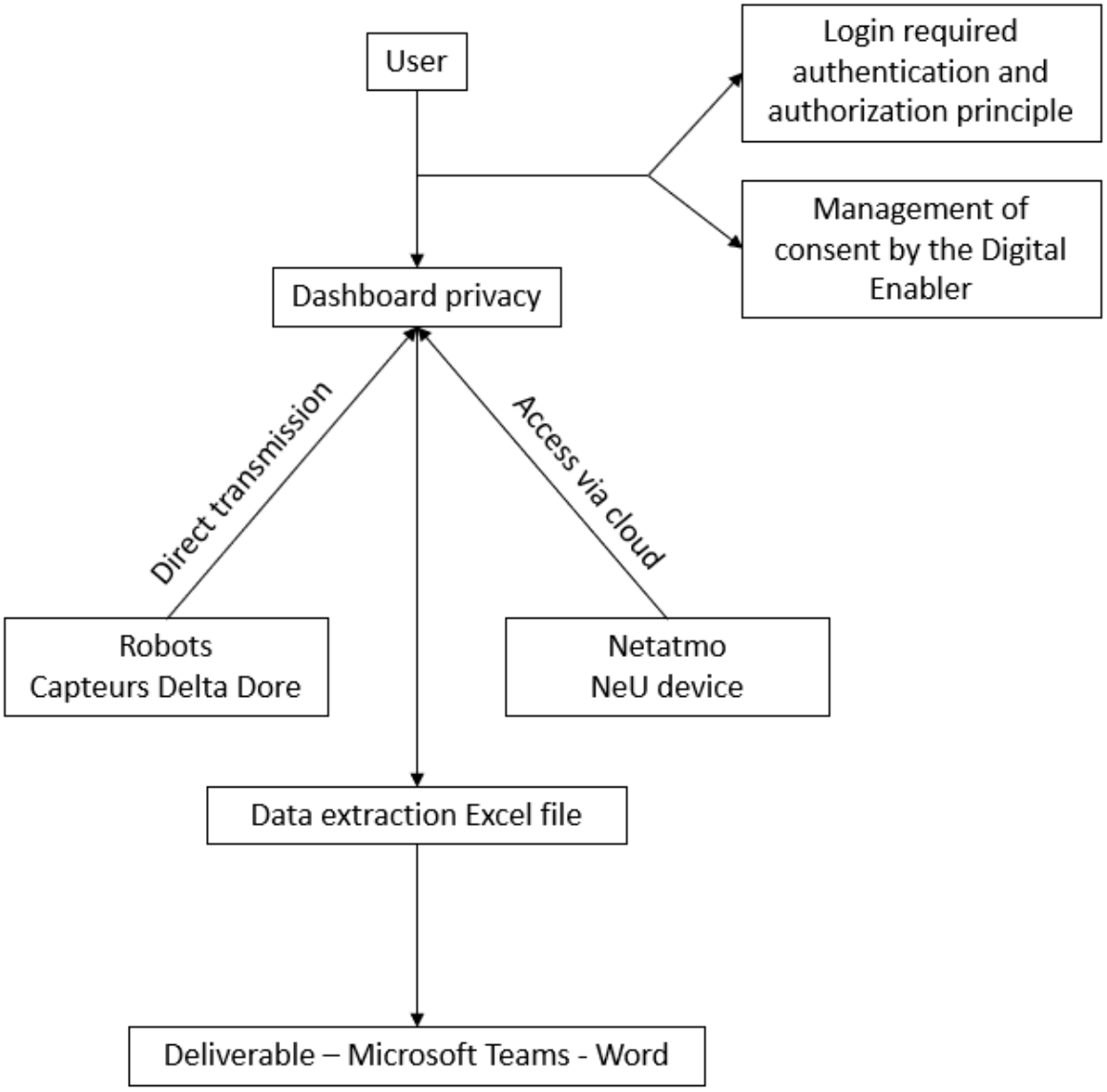
	you decide whether or not to purchase the e-VITA system?	Which aspects would be particularly important to you in the purchase?		
Financing	When the system is launched, how should it be financed?	What would be good value for money for the system? If you could live at home alone for longer, what amount (on top of what you already pay) would you be willing to pay for aids (wait for answer and then show list)		*Desired financing strategies* *Value of the system*
Closing		**Is there anything else you think we should address or anything that is particularly important to you?**		

List for amount that would be invested in digital tools (€):

1-100	c 1
101-250	c 2
251-499	c 3
500-999	c 4
1000-2999	c 5
3000 or more	c 6
I would not be willing to pay additional amounts for such devices	c 7
Don't know	**c98**
Refused	**c99**

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

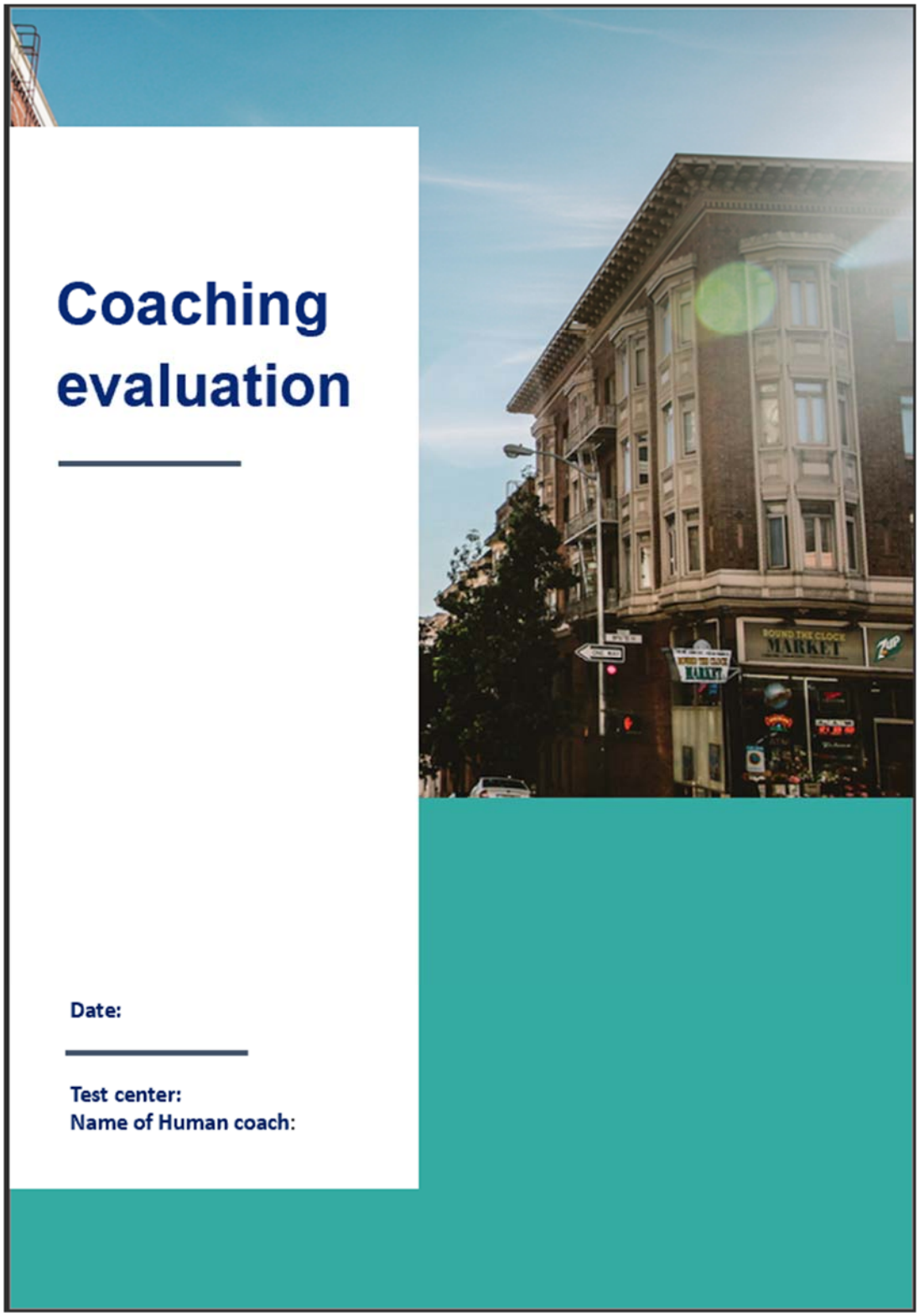
19.6 Schematic representation of the management of data collected by technological devices.



19.7 Guidelines for Human Coach

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).



The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Coaching offered by E-VITA

Tim Galway (2000) defines coaching as "the art of creating an environment that facilitates the process of moving a person toward desired goals in a context E-VITA brings together virtual and human coaches to help users maintain and improve their healthy lives. While virtual coaches are available 24/7 and provide accurate and reliable answers to everything, human coaches are not. While virtual coaches are available 24/7 and provide accurate and reliable answers to everything, human coaches have the advantage of being able to scratch an itch and commiserate with the user on a variety of feelings. feelings.

Human coaches work on the user's mind by introducing the "coaching concept" so that the user can proactively engage in a healthy lifestyle. You are someone who is on equal footing with the user, always maintaining an attitude of trying to understand the user. You are someone who is on equal footing with the user, who always tries to understand their feelings and is willing to work with them if they have problems. Through coaching, the user becomes aware of what they want to do for themselves.

Please accompany the user to the end so that they can enjoy and practice positive health activities and enrich their lives by using the strengths of each as a virtual coach and human coach.

The answer is somewhere.

(Thomas Leonard (2002), one of the founders of modern life coaching)

Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Coaching memo-1

Date :
ID :

Name	Gender : Men/Women	Date of Birth: Birthplace:	Adress:
Academic background	☐Middle School ☐Junior College	☐High school ☐University	☐ Vocational school
Personnality			
Household classification	☐One-person households	☐Elderly households	☐ Other :
Family structure			
Hobbies/Habits	☐ TV (fréquence) ☐sSport ☐ Gourmet ☐ Cigarettes ☐ Handicraft	☐ Music ☐ Movement ☐ Animals ☐ Reading	☐ Travel ☐ Plants/garden ☐ Alcohol ☐ Others

Page 1/2

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Coaching memo-1

Physical state	☐ Good ☐ Issue
Details.	
Mind state	☐ Good ☐ Issue
Details.	
GDS	T0: T2:
Health state	

Page 2/2

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Coaching memo-n°

Eating habits

Number of meals	3 times/day		2 times/day
Details			
Cooking for oneself	☐Yes	☐No	Details
Eating pleasure	☐Yes	☐No	Details
Interest in diet modification	☐Yes	☐No	Details
What to look out for in the diet			
FFQ	T0: T2:		

Exercise habits

Exercise habitually	☐Yes	☐No	Details
Motivation for exercise	☐Yes	☐No	Details
SPBB	T0: T2:		

Sleep

Sleeping conditions	☐ Good sleep	☐ to improve	Details

Page 1/4

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Coaching memo- n°

Social relationship

Participation in social activities	☐Yes	☐No	☐Experienced in the past		Details
Willingness to participate in social activities	☐Yes	☐No	☐Participants	☐Host	Details
Relation to others	☐Yes	☐No	☐Active	☐Passive	Details
Frequency of output					
Places you go often (other than shopping)					
Sens of loss	☐Yes		☐No		Details
Feelings of loneliness	☐Yes		☐No		Details
How to maintain social relationships	☐TV ☐Internet		☐Newspaper/magazine/book ☐Family/friends		☐Others (...)

Cognitive function

Feel forgetfulness	☐Yes	☐No	MoCA:
Desir to prevent	☐Yes	☐No	☐Already implemented
Details			

Page 2/4

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Coaching memo- n°

Use of the technology

Device used	☐Smartphone ☐PC ☐Tablette ☐Other (…)		
Device used	Name	Activity : ☐Phone ☐Email ☐Internet ☐Other (…)	
Device used	Name	Activity : ☐Phone ☐Email ☐Internet ☐Other (…)	
Frequency of use	☐Always ☐ Occasionally ☐When I have things to do (…)		
Use of applications	☐No ☐Yes (…)		
What to do in case of problems	☐Search ☐Ask a family member or friend ☐Make an inquiry ☐Other (…)		
Preferred support	☐Human coach	☐Mechanic	Details
Image for robots	☐Good	☐Bad	Details

Comments

Page 3/4

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Mémo-coaching n°

Interaction with the devices

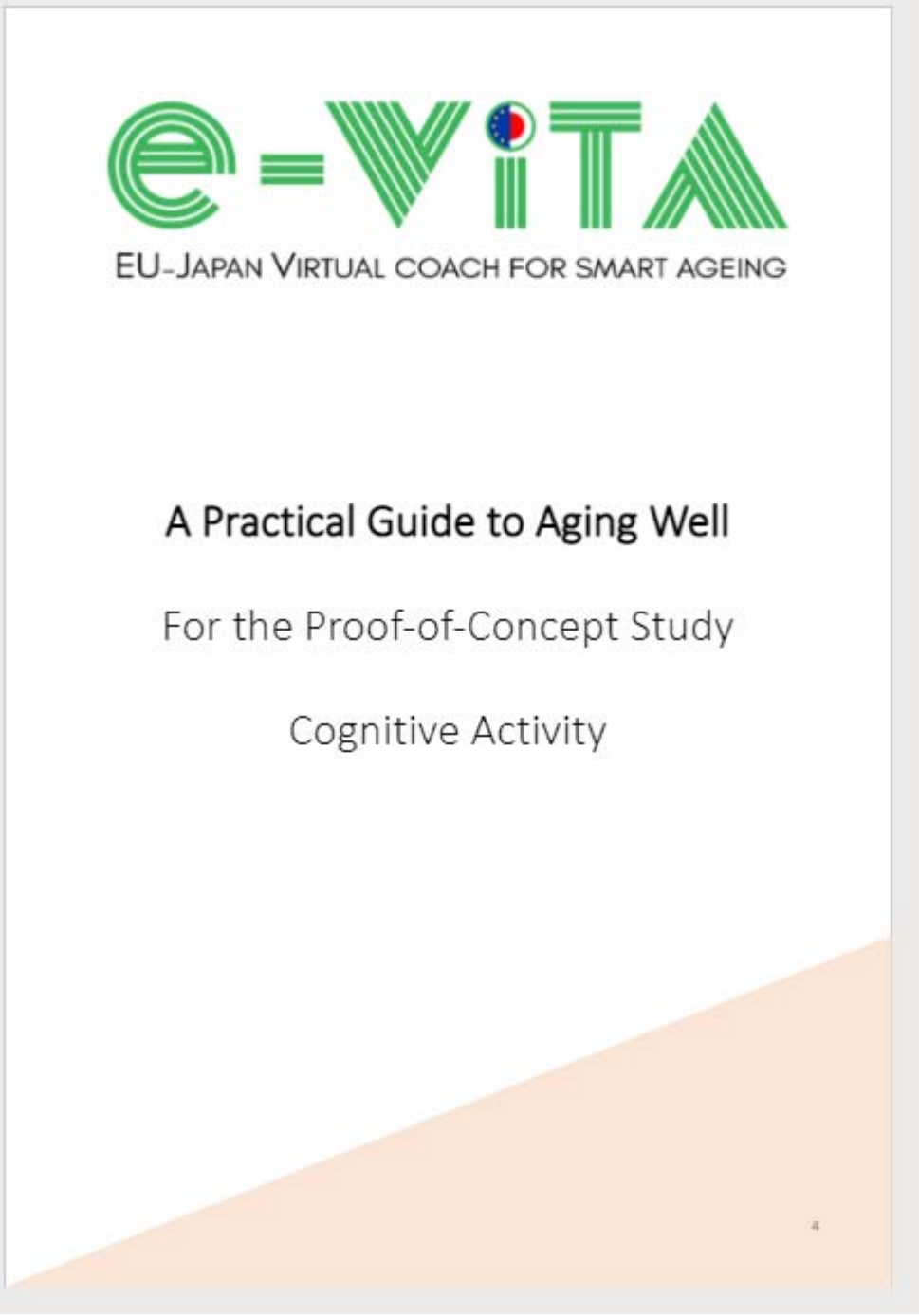
Number of interaction last 2 weeks			Duration of interaction (mean time)		
Frequency of interaction		/day		/week	
What was the situation in use ?					
How did you experience the use?					
What did you find good?					
Did you encounter any problems?					
What could be improved?					
Did the coach suggest a particular activity : Yes/No ? If yes, which one ?					
Did you do this activity : Yes/No ? If no, why not?					

Comments

Page 4/4

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

19.8 Extract from the booklet



Ministry of Internal Affairs and Communications, JAPAN

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Cognitive activity

Introduction

Cognitive skills include many abilities such as:

- Remembering a date, an event, a person etc.
- Focusing on a movie, a task, etc.
- Paying attention
- Reasoning

These abilities are essential for carrying out everyday activities such as communicating and learning.

But as we age, some abilities decline, such as remembering recent information and concentrating.

Although these problems can be minor and due to many factors (stress, fatigue, depression, medication etc.). In some people, these problems can be more significant and impact the quality of life such as in Alzheimer's disease.

However, a good quality of life such as a healthy diet, physical activity, socializing and regular vision and hearing checks can positively influence cognitive abilities.

In this guide, you will find examples of activities to maintain memory as well as practical exercises. You can also refer to the sites mentioned to find other sources of information and exercises. The answers to the activities can be found at the end of the booklet.

5

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

Cognitive activity

Examples of activities

Maintain social relationships: Sharing social moments, outings with friends and family, phone calls, cultural activities, etc. stimulate the brain because they require various cognitive abilities such as attention or planning.

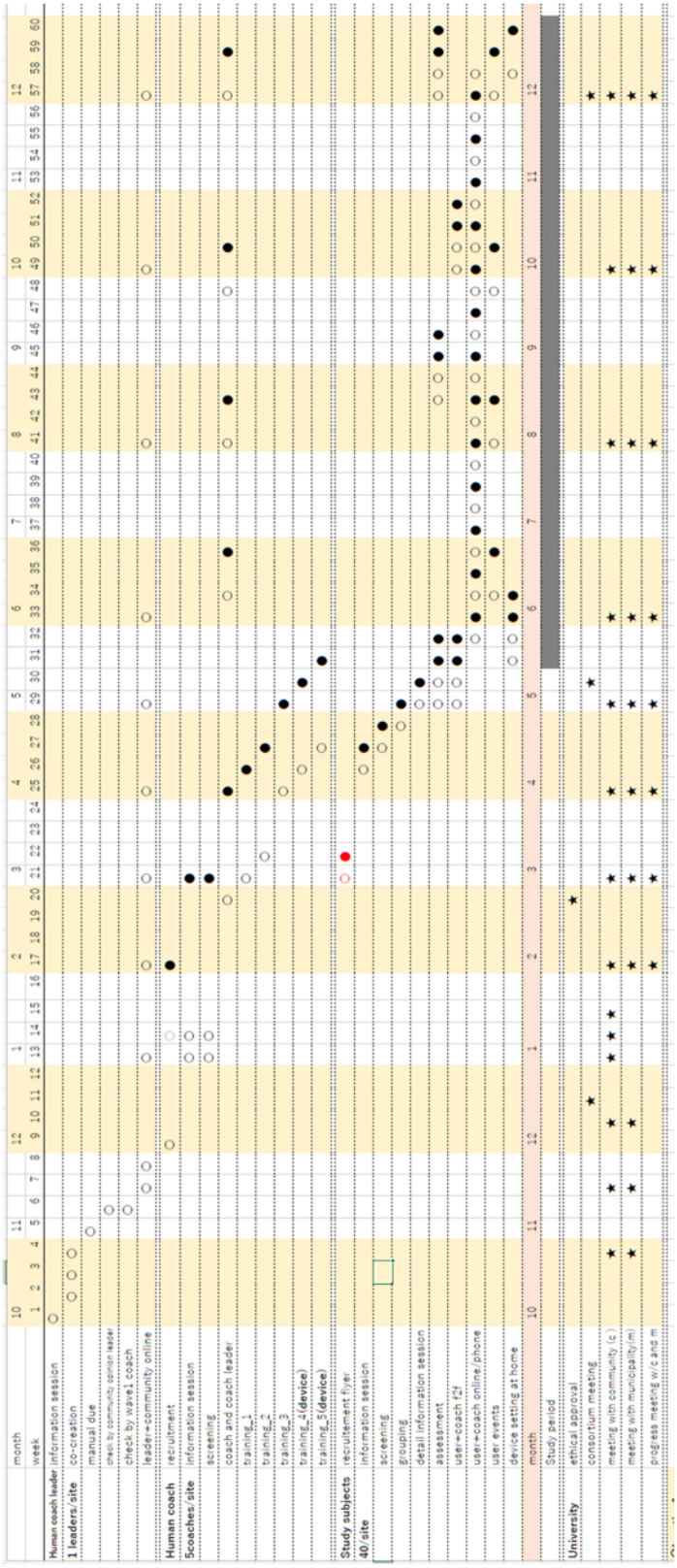
It is essential to diversify pleasures and meaningful activities. It is easier to retain the information provided by a pleasant and interesting activity than the opposite. In addition, it will be easier to
It is also easier to repeat these activities and thus to stimulate cognitive abilities more regularly. It is also important to think of varying the pleasures by practicing different activities in order to stimulate a wider brain network.

The implementation of strategies can be useful to stimulate cognitive abilities.
One strategy is to pay attention
One strategy is to pay attention to what you are doing and try to memorize information, for example, summarize the chapter you read and the next day remember what you learned. summarize the chapter you read and the next day remember it, or orally recount what you did to better remember it. Another strategy is to be organized and regular in your activities, such as taking your medication at a set time, putting the pill box in a place where you are not likely to forget, such as on the table. Memory strategies such as mental imagery can be useful for remembering the name of someone you have name of a person you met.

6

The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).

19.9 Study Planning



The project has received funding from the European Union H2020 Programme under grant agreement n° 101016453. The Japanese consortium received funding by the Japanese Ministry of Internal Affairs and Communication (MIC).