Smart Health Use Cases

Joint Action Outcomes

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1. Introduction

This short document is a summary and analysis of the information gathered in the context of one the LIV_IN Virtual Community Joint Actions[1]. The objective of the „Smart Health Cases and Champions Joint Action" is to promote Responsible Innovation (RI) methods and practices to support the design and creation of smart eHealth solutions. We were interested in identifying and collecting good practice applying RI methodologies for the creation of smart eHealth and healthy living/ wellbeing products and service.

Therefore, we invited specific projects and initiatives in the domain to share use cases and successful examples of smart technologies used to support eHealth, healthy living and preventive health in particular. We asked companies or organizations that had designed or delivered smart eHealth and healthy living product or services welcoming any evidence of the effect of RI methodologies in anticipating future challenges of smart eHealth products adoption and acceptance.

The methodology used to gather the information was to build a common template, convert it into a form that can be filled online (see Annex), test it and provide a link to potential use cases via the Smart Health cases and champions Joint Action Space (see Figure 1) - which needs participants to be registered in the virtual community platform - or direcly by email.

The invitation to complete the form was promoted within the consortium, but most of respondants were contacted by "la Caixa" Foundation, through its network of projects.[2] (We contacted with around 30 projects and received 16 answers). Most participants filled the form directly online, while some preferred to be interviewed. The interview output was then transferred to the form by the interviewer. The whole process took place between mid October and late December 2020.
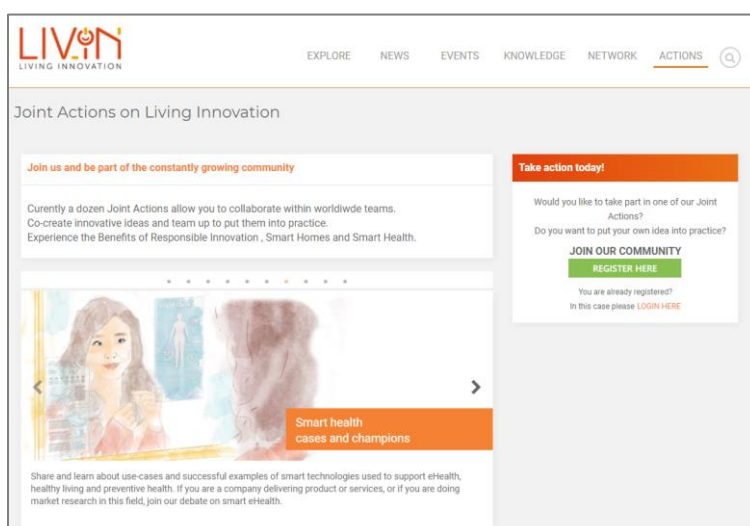
Figure 1: Screenshot of the Joint Action Banner

The following chapters provide a summary of all cases, an analysis of the information and considerations for future steps.

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[1] https://www.living-innovation.net/joint-actions/overview

[2] "la Caixa" Foundation (LCF) is a private foundation that works in the areas of social welfare projects, education, science, research, and the dissemination of culture. LCF funds scientific research mainly in Biomedicine and Health through open calls, by collaborating with universities and research institutes and hospitals, and through specific training mentoring and acceleration programs for health researchers, innovators, and entrepreneurs.

2. Use Cases (answers to form)

Category eHealth, including remote monitoring and smart health

2.1   Care Respite

Organization	Care Respite
Idea	CEO push
Description	Intelligent compact device based on computer vision to monitor risk behaviours and send remote alarms to the mobile phone of the caregiver/professional/family.
Methods	Co-creation; Design Thinking; Citizen Consultation;
RRI considered	Yes
How	From a grant/courses received from Compass H2020 project[3]
Adopted	Yes
Successful	Still in the process of introducing it to the market;
Role of RRI	Still too soon to say, but looks it helped.
Website	http://www.care-respite.com

2.2   Virtual Clinic for Mental Health

Organization	Aimentia
Idea	CEO push
Description	Mental Health is an invisible pandemic that is often ignored, and with COVID-19 it just got worse. Most of the people suffering from a mental health illness receive no treatment. Half of the ones who do, receive a wrong diagnosis. This leads to a lot of patient abandonment. Data-driven solutions for mental health professionals and their patients offer a **virtual clinic that empowers professionals through smart and AI-based tools**. These tools help to reduce the loss of information between sessions, provide diagnostic suggestions and improve decision making capability of the professionals. Traditional tools have been digitized and improved by integrating AI. Treatment is individualized and personalized considering the aggregation of anonymous data to increase its therapeutic efficacy. It reduces the time necessary for diagnoses, it can obtain the same results as the standards with half the necessary inputs. All customizable to adapt it to the comfort of the patient and professional. In order to evolve the standard, we have changed the paradigm. Aimentia works based on the clustering of symptoms or data, not on disorder labels. This is how the pioneering transdiagnostic model is defined. Aimentia is **in contact with various players of different ecosystems to ensure that our product is useful for**: Companies that require EAPs, Pharmas (giving support of clinical trials,) Investigation groups, the Academic sector (to train future professionals). And when the needs are very specific, they offer tailor-made solutions for hospitals and large clinics, always re-using their AI core.
Methods	Co-creation; Citizen Consultation; Design Thinking;

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[3] https://innovation-compass.eu/

RRI considered	Yes
How	Aimentia is born from patients and professionals. They have created a social awareness committee led by directors of associations external to Aimentia. Thus, they can objectively evaluate and advise in all the company's decision-making to always maintain the social impact as the core of development. As well as being able to measure and enhance it. With the ultimate goal of democratizing mental health and improving it.
Adopted	Yes
Successful	Yes, in terms of number of users / critical mass
Role of RRI	Yes, it has helped us to be able to differentiate aimentia from other companies with objectives very different from ours. **We must build trust with our health professionals and without transparency or social / ethical responsibility it is very difficult**. Also, with the help of the associations we work with pro-activism in mental health in order to defend the rights of patients and professionals. To denounce the practices that precarize the health sector.
Comment	We are facing a huge invisible pandemic and we need collaboration with institutions that share the same vision and values as aimentia. We all have mental health we need to take care of.
Website	https://www.aimentia.com/

2.3   eVALAPPS

Organization	Universitat Oberta de Catalunya
Idea	Employee initiative
Description	We have developed an app (EVALAPPS app) as an outcome of a research project. The research project aimed to define how can we evaluate safety and effectiveness of health apps whose main aim is to **manage overweight or obesity**. To do it we conducted a systematic review to know what has been published (what is being evaluated and how). Secondly, we did a Delphi study to reach a consensus in order to define a common set of domains and items to be assessed. Thirdly we **co-create the eVALAPPS app**. We did a pilot test with 30 patients and finally we have conducted a final test with a sample size of **260 participants**. We have evaluated 3 different apps (MyFitness Pal, Yazio and Lifesum). The objective was not to assess these apps but to **test usability, acceptability, adherence and user experience** of the EVALAPPS tool
Methods	Co-creation;
RRI considered	Yes
How	Although it was not explicitly mentioned or discussed, RRI was always present. We have tried to respect ethical limitations and to adapt the final project to the potential final users.
Adopted	Yes
Successful	Yes, in terms of number of users / critical mass;
Role of RRI	yes, everything must be considered in advance, if possible.
Website	https://www.uoc.edu/portal/en/news/actualitat/2020/240-clinica-validity-weight-control-apps.html

2.4 Inrobics

Organization	Inrobics
Idea	University research project, spin-off
Description	Inrobics[4] proposes a disruptive rehab solution through a digital health AI platform embodied in **social robots to improve the quality of life of people with functional or neurological diversity**. It is a medical device designed by health professionals within the paediatric and geriatric context, and that can be used in the clinical and home setting. In the first case, to enrich long-term therapeutic interventions that frequently suffer from lack of motivation and adherence on the part of the patient. In the second case, provide an accessible resource to families with which to increase the possibilities of providing remote rehabilitation support from home, thus enabling a better reconciliation of family life and enjoying a better quality of life.
Methods	Co-creation;
RRI considered	Yes
How	Throughout the development of the technology, we have followed a user-centred methodology accompanied by clinical centres and rehabilitation units. The patient has participated throughout this design, development, and evaluation process, where each output has brought new needs and improvements to the project.
Adopted	Yes
Successful	Yes, in terms of number of users / critical mass;
Role of RRI	Focusing development on the patient has made it possible to maximize the positive impact on daily life and that of those close to them.
Comment	We appreciate these initiatives in which the use of responsible methodologies is valued.
Website	https://inrobics.com/es/

2.5 V-REAL Virtual Neurological Telerehabilitation

Organization	Eyegress S.L.
Idea	Employee initiative
Description	VReal is an affordable telerehabilitation platform that helps patients with neurological deficits, such as those caused by a stroke, to regain their independence. Using the patient's smartphone, the platform provides evidence-based, cost-effective neurological telerehabilitation through a range of 360-degree virtual reality (VR) videos. VReal combines three different treatments: Mirror Therapy, Action Observation, and Motor Imagery, which were traditionally used separately. VReal patients will also benefit from the synergistic effect of this approach.
Methods	Design Thinking;
RRI considered	Yes
How	The system's affordability was a key objective during development because we aim to make it available in Low income countries, and therapies were designed in direct collaboration with our patients.

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[4] www.inrobics.com

Adopted	Yes
Successful	Early results are promising, we are working on mass implementation;
Role of RRI	Yes, the entry cost barrier would have been gigantic if we hadn't prioritized our patient's needs.
Website	https://impulse.caixaresearch.org/en-US/web/guest/projects/-/caixaimpulse/project/VREAL

2.6   Carealia – Intelligent Sense Care

Organization	Carealia
Idea	Research Project
Description	Carealia develops assisted living and eHealth solutions, by **enhancing IoT products with smart analysis** to support the increasing ageing population. As a spin-off of a research institute in Greece, its results and ongoing pilots clinically validate its effectiveness for active and healthy ageing as well as the prognosis and care of chronic and neurodegenerative disease common in old age, such as **dementia and Parkinson's**. Carealia's solutions work in two levels: first we **integrate several off-the-shelf devices** (smart home, lifestyle, fitness and health monitoring) and represent their measurements in a cross-device, cross-platform and cross-manufacturer interoperable way, creating a future proof and customisable solution for every individual or site. Secondly, this universally represented raw information is further processed to create tangible and more meaningful clinical, social, physical and medical information for end-users themselves, relatives and carers. For instance, fitness wearables together with home monitoring **can be used to deduce** walking outside home events, sleep problems, latency during home chores, stress and other behaviours and symptoms related to diseases. **We ran a subscription model** for our main cloud service, namely data retrieval, intelligent processing, and use of tablet/smartphone/web applications for end-users, relatives and carers. Pharmaceutical companies and nursing homes can get consultation, white-label products and special bundles for large deployments. Hardware is purchased once and can be used for a lifetime, even outside our service. Carealia is a spin-off of CERTH-ITI, we consider ourselves a "responsible" company, with a direct impact on the wellness, mental and cognitive well-being of human users, especially vulnerable groups such as elders, with affordable and accessible solutions (no "premiums", no "shared economy/resources") and an aim to increase efficiency (i.e. less use of resources). We respect ethical limitations and our studies and use are always approved by Bioethics Committees, Scientific Advisory Boards and follow protocol including informed consent.
Methods	Citizen Consultation; Design Thinking; Co-creation;
RRI considered	Yes
How	We respect ethical limitations and our studies and use are **always approved by Bioethics Committees**, Scientific Advisory Boards and follow protocol including informed consent.

Adopted	I don't know
Successful	No, there were important drawbacks;
Role of RRI	No. The users do not consider ethics in innovation. They feel whatever is available in the market is already somehow "approved" and "safe" since "everyone is already using it". This sort of bias leads to handing over personal data to e.g., Facebook and Google and many times even resources e.g., Airbnb, Uber
Website	http://carealia.gr/

2.7   Kamleon

Organization	KAMLEON
Idea	Research, multidisciplinary team to simplify the process
Description	Decentralize the lab analysis for health monitoring, blood and manipulation, transform into a daily product to be used at home. Smart health toilet for daily monitoring. Cloud based platform, Collect the data analyzed in real time. Seamless sensors in the toilet, urine analysis, cardiovascular sensors in the toilet seat, optical and electrochemical analysis. It reduces costs long term, because avoiding disposable materials. In the cloud, they do data fusion, AI for analysis, encrypted data is sent to the cloud. Healthy living, remote monitoring, Patient empowerment, increases adherence. B2B with residences & sports clubs, different people use the same system, interactive dashboard on the wall with the feedback. Hydration tracking, Now 8 people in the company. Video distributed among the influencers, doctors, nutritionists, validated with a video the value proposition, 2nd stage piloting into real life, validation of the user experience. involving all stakeholders into the equation. They can still change things in the digital experience.
Methods	Validation with all stakeholders;
RRI considered	Yes
How	They are conscious, also about the impact on society, the value of the company is to help society to help healthy and safer,
Adopted	From the pilots, the expectations are really high, interest from other organizations
Successful	waiting for investments, milestones to go over this year;
Role of RRI	yes, when we decide what type of problem we want to resolve, how to improve, before the money what we are looking for is the impact on society
Comment	A sanitary company is investing in the product, competitors are working on plastic toilet, Kamleon is working with porcelain producers.
Website	https://www.kamleon.com/

2.8   DermaSnap

Organization	ColorSensing
Idea	University research project

Description	**Accurate dermatology diagnosis through smartphone imaging.** Our technology allows a smartphone camera to detect real skin colours with a lower error rate than the human eye (less than 5%). This will allow Primary Care physicians to advance in the early diagnosis of skin cancer and other pathologies.
Methods	Design Thinking;
RRI considered	I don't know
How	n/a
Adopted	Yes
Successful	We are still developing the product;
Role of RRI	The solution hasn't been adopted yet.
Website	https://www.color-sensing.com/en/applications

2.9 B-RIGHT

Organization	Consorci Sanitari del Maresme
Idea	Employee initiative
Description	The general objective of the B · RIGHT project is to create and clinically validate Artificial Intelligence therapeutic algorithms inserted into a mobile App software for crisis intervention in borderline personality disorder (BPD) and similar mental disorders and other psychiatric conditions
Methods	Design Thinking;
RRI considered	I don't know
How	n/a
Adopted	Yes
Successful	Feasibility study was positive;
Role of RRI	Addressing confidentiality may positively affect the use of the mobile App by clients
Website	https://impulse.caixaresearch.org/projects/-/caixaimpulse/project/B-RIGHT#

2.10 Renalyse

Organization	CreatSens Health SL - Renalyse
Idea	CEO push
Description	**A new home healthcare tool for chronic kidney diseases,** Renalyse provides a unique paper-based creatinine and potassium potentiometric sensors to help healthcare professionals to better manage the information that can be generated in primary care centres, doctor's office or patient's home. Our novel platform aims to improve the well-being of people by allowing decentralized analyses of relevant biochemical parameters in blood. The information is integrated in a cloud platform allowing Renalyse to predict and early detect acute conditions from home.
Methods	Design Thinking; Co-creation;
RRI considered	No
How	n/a
Adopted	Yes

Successful	Yes, in terms of interest from clinicians and patients, but we are still in development;
Role of RRI	Yes, as is one of the **basic requirements for the achievement of the CE mark** in the medical device field. **We needed to re-think the usability** of the device from patient, physician's and environment points of view to be able to create a product which could add a significant added value.
Comment	Some questions about usability studies & cost/economic outputs will add more information about the RRI and the problems that companies are finding in order to apply the RRI in their projects.
Website	https://renalyse.com/

2.11 eKauri

Organization	Fundació Eurecat
Idea	Market Analysis / Market Watch
Description	eKauri is a 3rd generation telecare system to support by one side caregiver decision-making and in the other to improve the Quality of Life, security and autonomy of elderly who are disabled or dependent and live alone, or who are alone in their home for long periods of time. Through continuous notifications received from each **connected home, we process the data**, making it available to the caregiver and family environment. The goal is to monitor the habits, activities and even health status of the users, making home a safer place maintaining at the same time privacy and independence. The high maturity level of this product ensures an effective deployment as also the early adoption by any institution once the pilot is validated and process adapted to offer services based in this innovative technology. Within an IoT context**, small sensors are placed in the house** of the resident/patient in the following places: front door, kitchen, living room, bathroom and bedrooms. Ambient information is then collected without the use of cameras or microphones (the privacy of the home is respected always). Through a proprietary wireless hub, the information received by the sensors is transmitted to the central servers. The caregiver and other professional team members (nurses, social workers, doctors, psychologists, etc.) can deal with it in real time to diagnose the patient and prevent incidents from occurring. Above all it can be used to improve the physical and emotional well-being and quality of life of the resident/patient. From the eKauri team we noticed that it was very important to take into account from the very beginning the end users of the technology: both caregivers and people who will receive better care thanks to an innovation such as the proposal. That is why **we work with ethical and law experts** to deliver documents such as informed consents, data protection and internal processes from an ethical and responsible point of view. A platform like eKauri requires not only a good operation and an adequate business model, but also a treatment of the sensitive and personal information collected that was well explained and that allows increasing the peace of mind of the people who use it.
Methods	Co-creation;
RRI considered	No
How	n/a
Adopted	Yes

Successful	Yes, we have positive feedback and continue using it in several projects, but **we need reach more users** yet and find way with one or more companies to finally transfer to market the product;
Role of RRI	Adopting a Responsible Innovation has allowed us **to improve our market validation work and build trust in these first early adopters who have opted for our solution**. We have also learned a lot to improve the design and implementation of other subsequent solutions that we have been developing
Comment	To complete some of the previous answers or ask for more information about some of the previous topics
Website	please contact enrique.delavega@eurecat.org

Category Healthy Living, including nutrition, physical activity / fitness and sleep

2.12   Do ACTIVE

Organization	tanteLouise
Idea	Consultant
Description	Persons with Mild Cognitive Impairment are stimulated to follow a behaviour change in lifestyle. This is done with a **Fitbit watch and an app on the smartphone.** The app first monitors the personality of the person via a questionnaire and based on that and the daily activities, for 3 months a personalised support is given via a personalised prompt which is sent the other day. The daily number of steps, the detailed sleep pattern and the places they visit are taken into account for **personalised behaviour change.**
Methods	Past performance and literature; Co-creation; Design Thinking;
RRI considered	Yes
How	All the time the development team **co-created with persons with MCI and their informal carer**s if they did not feel too much "pushed", if the prompts for behaviour change were not too intrusive or difficult. So, ethics have been included all time.
Adopted	Yes
Successful	We are still in the phase of finding evidence of improving quality of life and prevention of aggravation of dementia;
Role of RRI	Yes, we feel we are meeting the real needs better now.
Website	https://tantelouise.nl/innovatie/

2.13   KAUNAS

Organization	Vytautas Magnus University
Idea	scientific basis

Description	The Kaunas pilot study[5] is conducting through collaboration between community members, community-based organizations, public health agencies, and educational institutions. The purpose of the study is outlining the citizens' concerns and placing them at the centre of citizen science research presenting evidence on how the urban design and physical activity affect citizens' health and well-being. The protocol in detail that comprises citizens' suggested environment questions and actual health problems, be elaborated together with scientists and the available tools will be decided during the project. This research will enhance the participants understanding of issues that affect community health.
Methods	Co-creation;
RRI considered	I don't know
How	n/a
Adopted	For all Kaunas citizens
Successful	Yes, in terms of number of users / critical mass;
Role of RRI	This research will enhance the participants understanding of issues that affect community health.
Comment	Citizens involvement in the pilot study **only after Ethics Committee approve**.
Website	http://citieshealth.vdu.lt/

Category Wellbeing, related to motivation, mental state, etc.

2.14   MELTIC

Organization	Instituto de Salud Carlos III
Idea	CEO push
Description	Research co-creation project[6]. The aim of the project is to make research activities in ICT in Health and Biomedicine more open, transparent, and accessible in order to increase its research and societal impact and contribute thereby to improve the quality of life of European citizens in small communities.
Methods	Co-creation;
RRI considered	Yes
How	The use of smart technologies in public spaces is increasingly creating new forms of social interactions and practices, which in return creates new socio-spatial relations and promotes interactions and communication between isolated and disperse communities.
Adopted	Working in progress
Successful	Yes, in terms of number of users / critical mass;
Role of RRI	Yes, it has
Website	https://www.isciii.es/QuienesSomos/CentrosPropios/UITES/Paginas/ProyectosdeInvestigacion.aspx

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[5] citieshealth.vdu.lt
[6] https://www.isciii.es/QuienesSomos/CentrosPropios/UITES/Paginas/ProyectosdeInvestigacion.aspx

2.15   CovidAffect

Organization	University of Granada
Idea	Previous research from a research group, apply the methodology to the specific situation of COVID
Description	Monitoring affective states, moods, using mobile technology, ask participants 6 times a day, scale how do you feel from negative to positive, In particular during lock down. It provides a geographical map, to record the affective state of the population, and other questions related to income, number of rooms, database to be able to compare between affective state and the other factors. The motivation is to present the data immediately, to be used by authorities. Realtime and evolution of data. Interested in variability. Main interest is to provide real-time data.
Methods	collaborated with science citizen foundation (fundacion descubre); Citizen Consultation;
RRI considered	Yes
How	There is data acquisition, so ensure that there is interaction with the website, collaboration with a citizen science foundation & approval of ethics committee. Press release and radio interviews and social media.
Adopted	when launched, we thought it would be meaningful
Successful	It did not scale as much as wanted, in total 1000 participants, enough for research but not for the purpose; No, there were important drawbacks;
Role of RRI	Good dataset for research purpose. There was a trade-off. if the aim was research, for a massive impact, we did it with citizen science to make it more massive but less rigorous for research.
Comment	Now it is officially closed because it was for the lock down. A new project is funded to use the sensors of the phones. This time it will be more research focused. Very controlled samples will be considered. With the sensors, it focusses more on sleep quality, more overlap with ehealth, than wellbeing.
Website	covidaffect.info

2.16   PLEASEAPP

Organization	Universitat Jaume I, Universitat Obierta de Catalunya
Idea	Teachers / Researchers based on needs in real situations
Description	Application (app) designed to enable the evaluation, dynamic assessment and treatment of pragmatic and social communication skills in children aged between 3 and 12 years, using an environment that children will find attractive, fun and familiar. Could also be considered as prevention tool for children with behaviour or communication challenges to prevent integration problems. It monitors and evaluates 10 aspects of language problems, capturing data from the interaction of the child with the app, for diagnostic and pathology profiling and intervention purposes. The intervention provides feedback information. The primary target of the app is education / health professionals, they can get a report on each child performance.
Methods	theoretical foundation, research, professional practice;
RRI considered	No

Adopted	150 children, they enjoy while being evaluated
Successful	not yet, but there is a patent that Uni could exploit;
Role of RRI	For research, there was informed consent. The product is still in validation process to ensure that outcomes are reliable.
Comment	They have checked some aspects with children, but principally it is adapted from theoretical knowledge, validated in 'paper'. The large-scale evaluation currently ongoing may produce more inputs. In the future, the company deploying the app could **embed consent forms in the app functionalities**.
Website	https://www.uji.es/serveis/ocit/base/empresa/patents/pleaseapp/?urlRedirect=https://www.uji.es/serveis/ocit/base/empresa/patents/pleaseapp/&url=/serveis/ocit/base/empresa/patents/pleaseapp/

3. Analysis

The following sections present an analysis of all cases. In general, all applications have the objective of improving the wellbeing or health of end-users, in this sense they can be considered as "responsible innovations". Also, most projects respect ethical limitations, studies and use are always approved by Bioethics Committees, Scientific Advisory Boards and follow standard protocols, including informed consent.

But have they anticipated any harm that can suffer users in the present or in the future? Have they all looked at the complexity of the system? Have they considered other aspects, such as negative environmental, social, or ethical effects?

3.17   How RRI was applied and how it benefited the adoption of the solution

In several cases, the promoters of the initiatives were not familiar with the RRI concept as such, but they have taken into account elements that can be considered as 'aligned' with the RRI approach in the design of the solutions. For some projects, it is not clear how RRI methods have been applied and if it had clear benefits on end-users or society. The reason is either because RRi was considered but the outcomes do not provide evidence of the benefits or because it is not clear that RRI was considered at all.

- One project knew about RRI from other projects but doesn't know yet if it helped.
- Alternatively, another project did not consider RRI methods from the outset, and the product is not yet largely used, so it is difficult to know if it can be marked as "responsible".

For other projects, it is not clear which RRI methods were applied if any, but it appears that the initiatives can be considered as responsible innovations, and this has had a benefit in the adoption. This is the case for:

- RRI is considered as "one of the basic requirements for the achievement of the CE mark in the medical device field"[7]. The company needed to **re-think the usability of the device from patient, physician's and environment points of view** to be able to create a product which could add a **significant added value**.
- Adopting a Responsible Innovation has allowed to improve the market validation work and **build trust in first early adopters** who have opted for the solution. The company has

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[7] Kamleon

also **learned a lot to improve the design and implementation** of other subsequent solutions that we have been developing.

- The company has tried to respect ethical limitations and to adapt the final project to the potential final users. **The learning is that everything must be considered in advance, if possible**.

However, most projects have applied explicitly a methodology and the following points provide a few details:

- Among other participatory techniques, one project has created a **social awareness committee** led by directors of associations external to company, who can objectively evaluate and advise and help with the decision-making to always maintain the **social impact** at the core of development, as well as being able to measure and enhance it. **Transparency or social / ethical responsibility** is very difficult to obtain, but RRI approach allowed to build trust with health professionals, and this **has helped to differentiate from other services in the market**.

- Throughout the development of the technology the project has followed a **user-centred methodology** accompanied by clinical centres and rehabilitation units. The **patient has participated throughout this design, development and evaluation process**, where each output has brought new needs and improvements to the project. Focusing development on the patient has made it **possible to maximize the positive impact on daily life** and that of those close to them.

- The system's affordability was a key objective during development because the company aimed to make it available in low income countries, and therapies were designed in direct collaboration with patients. **The entry cost barrier would have been gigantic if they had not prioritized patient's needs**.

- **All the time the development team co-created with persons with MCI and their informal carers** to see if they did not feel too much "pushed", if the prompts for behaviour change were not too intrusive or difficult. So, ethics have been included all time. The company is still in the phase of finding evidence of improving quality of life and prevention of aggravation of dementia. However, they feel that **they are meeting the real needs better** now.

- The **use of smart technologies in public spaces is increasingly creating new forms of social interactions and practices**, which in return creates new socio-spatial relations and promotes interactions and communication between isolated and disperse communities. This approach is expected to play a role in the adoption of new services/solutions.

- The project was done in **collaboration with a citizen science foundation** to ensure enough interaction with the website and data collection. **For a massive impact**, the project counted with citizen science, but then results were less rigorous for research purposes.

- The approach is **validation with all stakeholders**. When the company decide what type of problem they want to resolve, how to improve, before the money **what they are looking for is the impact on society**.

Interestingly, one initiative remarks that the u**sers do not consider ethics when they adopt innovations**. They feel that whatever is available in the market is already somehow "approved" and "safe" since "everyone is already using it". This sort of bias leads to handing over personal data to e.g., Facebook and Google and many times even resources e.g., Airbnb, Uber. Etc.
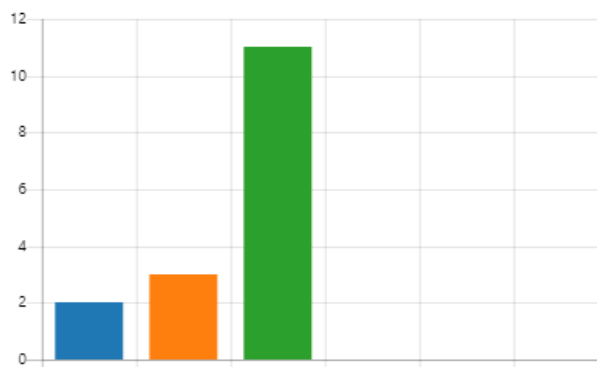
3.18   General approximations based on common answers

1. Please select a category for the case you are proposing

More Details   💡 Insights

🔵 Healthy Living, including nutri...	2
🟠 Wellbeing, related to motivati...	3
🟢 eHealth, including remote mo...	11
🔴 Prevention, policies, education...	0
🟣 Patient empowerment, tools, ...	0
⚫ Other	0

Although the original idea was to consider projects from all smart health areas identified in the knowledge unit Smart Healthy Living, Wellbeing & Prevention[8] published in the context of the LIV_IN project, as included in the question 3, almost all projects were categorized as 'eHealth'. This is mainly due to the fact that that the project contacted were not centred on prevention, policies, education, tools and patient empowerment as principal topic. Anyway, several project may fall within more categories. For example, remote monitoring can improve patient empowerment, healthy living and prevention. Therefore, in the future, more organizations could be contacted, such as: Eight guiding principles for caring technology[9], the In Fieri Assessment Tool for Responsible Innovation in Health[10], or Patient and Public Involvement and Engagement in Research - A "How-To" guide for researchers[11].

4. Starting point of the idea / innovation

More Details

🔵 CEO push	4
🟠 Market Analysis / Market Watch	1
🟢 Employee initiative	3
🔴 Other	8

To the question who started the project, most participants chose the option 'others', and referred to research projects, scientific basis or user needs.

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[8] https://www.living-innovation.net/knowledge/unit?id=11&title=smart-healthy-living-wellbeing--prevention
[9] https://rri-tools.eu/-/8-guiding-principles-for-caring-technology
[10] https://rri-tools.eu/-/the-in-fieri-assessment-tool-for-responsible-innovation-in-health
http://infieri.umontreal.ca/en/home/#section-what-is-rih
[11] https://rri-tools.eu/en/-/patient-and-public-involvement-and-engagement-in-research-a-how-to-guide-for-researchers

6. Method for the creation of the responsible innovation case

More Details

●	Co-creation	10
●	Design Thinking	8
●	Citizen Consultation	4
●	Other	4

In addition to the proposed options (co-creation, design thinking), which were relatively widely adopted, there was mention of theoretical foundation, professional practice, past performance and literature.

9. Was the product / service well adopted by the targeted audience?

More Details

●	Yes	10
●	No	0
●	I don't know	1
●	Other	5

10. Was the product / service successful?

More Details

●	Yes, in terms of monetary reve...	0
●	Yes, in terms of number of use...	5
●	No, there were important dra...	2
●	No, we abandoned the solution	0
●	Other	10

Several cases are ongoing research projects, this is the reason why products or services are not yet adopted or can be considered as successful.

7. Was the concept of RRI or similar considered from the outset of the case development?

More Details

●	Yes	10
●	No	3
●	I don't know	3

The majority of cases considered RRI from the outset, although in some cases it means that the research has been approved by an ethics committee.

3.19   Next steps

Based on the analysis, we concluded that it would of interest to organise an online meeting or workshop involving the participants in the initiatives to deepen into the techniques they have used to ensure that RRI had an impact on the outcomes. In connection with the labs experiences, we thought it could be interesting to discuss what went well, what not. Additionnally, practice around recruitement, one of the most difficult aspect encontered in running the labs would be extremely welcome. For those initiatives that had not considered RRI from the outset, or did not know if they had, it would be interesting to understand if considering it would yield more successful results. Many other questions could be proposed to inspire the agenda for an interactive workshop.

More information about the online workshop we finally organised is provided in the next section of this report.

4. Workshop "Smart Health Use Cases & Champions"

Our next step was organizing an online workshop with the leaders of some of the initiatives that had taken part in the study. The event was held on March 30th, with 5 speakers and around 100 participants. The full recording of the event can be found on youtube.[12]

4.1   Scope of the workshop

The main objective of the workshop was to share experiences and learn about successful examples of smart technologies used to support eHealth, healthy living, and preventive health, and to collect evidence of the (positive) effect of applying Responsible Innovation methodologies.

Seven speakers were invited to present their projects, five finally participated in the event (two cancelled their participation due to last minute problems) followed by an exchange and open discussion, facilitated by the team from Atos, regarding their approach to Responsible Innovation and the benefits they obtained. For an analysis of the main questions discussed at the event see D2.4.

4.2   Use cases participating

4.2.1   Inrobics [13] (Intelligent Robotics)

Speaker: Fernando Fernández Rebollo (Co-Founder & Chief Scientific Officer)

Inrobics proposes a new rehabilitation solution through a **digital health AI platform** embodied in **social robots to help people with functional or neurological limitations improve their quality of life**. Designed by health professionals within the paediatric and geriatric contexts, Inrobics is a cloud-based

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[12] https://youtu.be/sAl2Vc83DPo
[13] https://inrobics.com/

platform that can be used both in rehabilitation centres and in the patient's own home, following a personalized treatment prescribed by his/her regular therapist. The increased frequency of sessions results in a better progress of the treatment. The algorithms acquire knowledge of the patient, allowing to perform fully customized sessions to the patient's physical and cognitive condition. Sessions include a wide variety of entertainment content and game mechanisms improving the concentration, motivation, and long-term engagement of the patient.

4.2.2 KAMLEON [14] (Democratizing Health Monitoring)

Speaker: Jordi Ferré Albiol (Co-Founder & CEO)

Kamleon is a science-based early-stage company, born with the purpose of democratizing health monitoring by **decentralizing traditional laboratory analysis**. For doing so they are turning quotidian objects such as toilets, diapers, or patches into effortlessly, non-invasive, real time biomonitoring platforms. Their **smart urinalysis system allows to effortlessly monitor advanced physiological metrics, such as hydration**, in real time in a robust and non-invasive way. The company is now launching its first pilot project – Road to Tokyo 2021 – at the National French Olympic Training Center. In preparation for the 2024 Paris Olympic Games, the Training Center is undergoing an innovative renovation of its sports facilities, which will be equipped with the latest technological solutions for the tracking of athletes' performance. Kamleon's products will make part of the renovation project, and their urinalysis system integrated within the urinals will give athletes the necessary personalized recommendations for optimal nutrition and hydration, aid their recovery process, and ultimately contribute to optimizing their performances.

4.2.3 MELTIC [15] (Ideas Melting pot for TIC and Health science for Citizens in small communities)

Speaker: Victoria Ramos González (Project leader, Telemedicine and Digital Health Research Unit at ISCIII

The project aims to improve the quality of life of **citizens in small communities by co-creating and developing ICT health services with stakeholders including local residents**. MELTIC connects with diverse European policy challenges such as depopulation, health, active aging, education, youth, and climate change, and seeks to identify current and future needs of citizens. The objective is **to generate, through co-creation methodologies, suitable ideas for research in ICT in Health and Biomedicine, in topics such as self-learning, false information discrimination and addiction prevention** (compulsive gambling, gaming, and betting). The leading issue is how to use smart technologies to transform public spaces in small communities into people-friendly humane environments. The project will generate a Vade mecum of 100 ideas for research in ICT in Health and Biomedicine and a model for cooperation in small communities in rural areas

4.2.4 EVALAPPS [16]

Speaker: Carme Carrion (project leader, UOC eHealth Center)

One of the strategies currently used to mitigate weight-related problems is to use mobile apps. However, it is important to distinguish between those that may be useful and those others that are not effective or may even be harmful. The aim of the EVALAPPS project is the **design and validation of**

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[14] https://www.kamleon.com/
[15] https://bit.ly/30BxtXf
[16] https://bit.ly/3vhebo6

a tool to assess the efficacy, effectiveness, and safety of mHealth apps whose main goal is to manage and prevent overweight and obesity. The ultimate goal is to provide health professionals and users with the necessary knowledge to know which apps have proven effectiveness and are considered to be valid. As things stand at present, professionals cannot make any recommendations with confidence, because there are no specific regulations for this type of app.

4.2.5 VReal [17] (Virtual Neurological Telerehabilitation)

Speaker: Ezequiel Hidalgo Galache (Eyegress SL, Founder and CEO)

VReal is **an affordable telerehabilitation platform that helps patients with neurological deficits**, such as those caused by a stroke, to regain their independence. Using the patient's smartphone, the platform provides evidence-based, cost-effective neurological telerehabilitation **through a range of 360-degree virtual reality videos**. VReal combines three different treatments: Mirror Therapy, Action Observation, and Motor Imagery, which were traditionally used separately; patients benefit from the synergistic effect of this approach. VReal is a unified, multidimensional, affordable, efficient business-to-consumer (B2C) platform. Thanks to Google Cardboard, implantation costs have been eliminated. Moreover, therapies were designed from the ground up, which means they do not require direct supervision from a specialist. This translates to a revolution in terms of the therapy itself (the patient decides where, when and how).

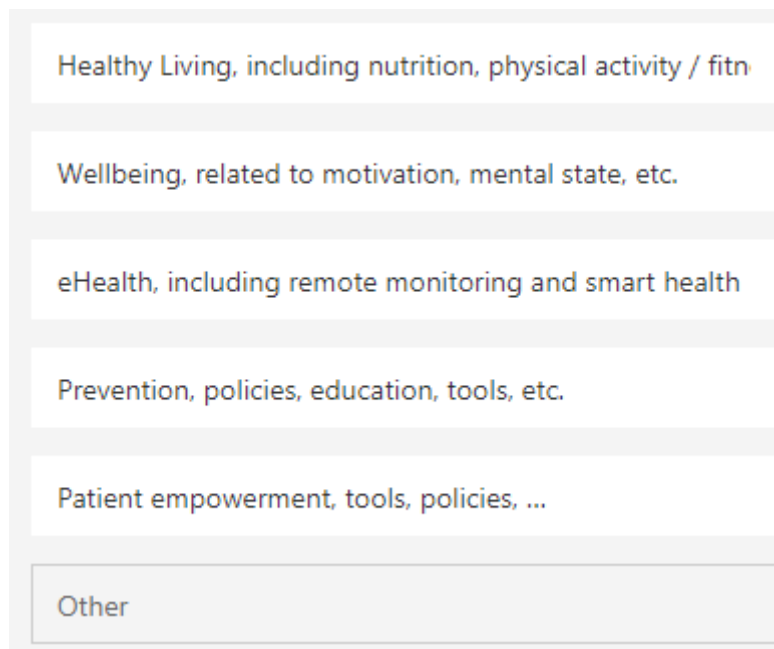[17] Projects - Caixaimpulse

5. Annex: Form to enter the data

The form to be filled by the owners of the use cases is available here:
https://forms.office.com/Pages/ResponsePage.aspx?id=xg9EM8e3LEG7cw5wsBmNWoGshr-7GsNPtA-HD23EYzJUQTJQWllRSjRCWTBNMzUyTkdKNlczWkw2WS4u

1. Please select a category for the case you are proposing

The 'case' is an innovation that is considered 'responsible' (e.g. environmentally friendly, ethical, sustainable, etc.)

Select your answer

Healthy Living, including nutrition, physical activity / fitn
Wellbeing, related to motivation, mental state, etc.
eHealth, including remote monitoring and smart health
Prevention, policies, education, tools, etc.
Patient empowerment, tools, policies, ...
Other

2. Please introduce a short name

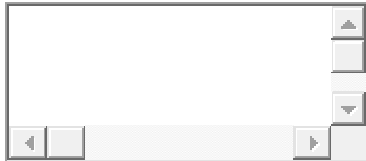For the case of responsible innovation in smart health

3. Name of the organization leading the case

4. Starting point of the idea / innovation

○ CEO push

○ Market Analysis / Market Watch

○ Employee initiative

○

> [ ]

5. Please describe shortly the innovative product / service that was developed or deployed (or provide an url)

Benefits for the user, added value with respect to existing solutions, business model, etc. Indicate why it is considered as 'responsible'.

> [text area]

6.Method for the creation of the responsible innovation case

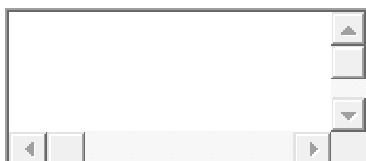You can select more than one or provide additional options

☐ Co-creation

☐ Design Thinking

☐ Citizen Consultation

☐

> [ ]

7. Was the concept of RRI or similar considered from the outset of the case development?

RRI = Responsible Innovation is about anticipating the impacts an innovation will have, respecting ethical limitations and co-creating innovations together with the people affected by them. For more info see https://www.living-innovation.net/explore/aboutus or https://rri-tools.eu/business-and-industry!

○ Yes

○ No

○ I don't know

8. If your answer to 7. is 'Yes', can you please elaborate and tell us how?

> [text area]

9. Was the product / service well adopted by the targeted audience?

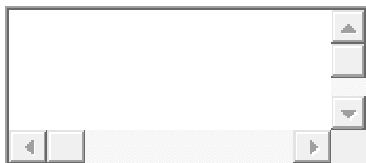Qualitatively, did the users provided positive feedback?

○ Yes

○ No

○ I don't know

○

[   ]

10. Was the product / service successful?

☐ Yes, in terms of monetary revenue

☐ Yes, in terms of number of users / critical mass

☐ No, there were important drawbacks

☐ No, we abandoned the solution

☐

[   ]

11. Adopting a Responsible Innovation approach impacted on the success of the solution's adoption?

Do you think that anticipation about ethical/environmental implications of the product/service before its adoption had an effect on the outcomes of the project?

[   ]

12.

Any consideration that may improve the process of gathering cases of responsible Innovation approaches in the field of preventive health is welcome