



# INNOVATIONS IN HOME CARE – BRINGING INNOVATIVE HOME CARE SOLUTIONS QUICKER TO THE MARKET BY USING QUADRUPLE-HELIX APPROACH

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JOINT THEMATIC STUDY OF THE HOCARE PROJECT



European Union  
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Development Fund

## Aim and target group of this Joint Thematic Study

This Joint Thematic Study – INNOVATIONS IN HOME CARE – BRINGING INNOVATIVE HOME CARE SOLUTIONS QUICKER TO THE MARKET BY USING QUADRUPLE-HELIX APPROACH - describes, summarises, identifies and analyses transferable knowledge gathered within the HoCare project relevant to one of its sub-objectives. This Study therefore looks at creation and support of new innovations in Home Care specifically from the angle of this Study topic. Other two Joint Thematic Studies have been developed and published – with focus on public driven innovation and innovation generated by addressing unmet needs identified by formal and informal healthcare providers – and for these please read through the other two separate Studies.

This Study includes the following key transferable information:

- 1) description of current situations in project partners' countries (Cyprus, Slovenia, Bulgaria, Lithuania, Hungary, Portugal-Madeira, the Czech Republic and Romania) regarding
  - quadruple-helix cooperation usage in innovation projects,
  - support from Operational Programme and Managing Authorities for using quadruple-helix cooperation for market successful innovations
- 2) summary of common problems and challenges in generating new innovations
- 3) identification and analysis of selected good practices of financed projects and of Operational programme strategic focus or management practices gathered through the HoCare project's exchange of experience process

This Study is developed primarily for stakeholders outside of the HoCare project partnership - Managing authorities of Operational Programmes supporting Research & Innovations, international, national and regional stakeholders influencing Operational Programmes, or institutions involved or interested in getting finance for their research and innovation projects in home care.

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## 1. INTRODUCTION TO HOCARE PROJECT

HoCare project (Interreg Europe, PGI01388, <https://www.interregeurope.eu/hocare/>) tackles the challenge of ageing population and the related opportunity for new potential innovations in home care. It's overall objective is to boost generation of innovative Home Care solutions in regional innovation chains by strengthening of cooperation of actors in regional innovation ecosystems using Quadruple-helix approach.

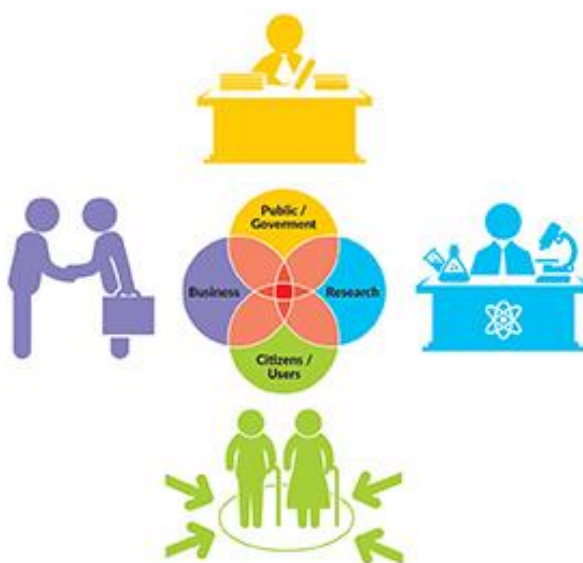


Figure 1 - Quadruple-helix cooperation model involving 4 helixes:  
Business, Research, Public/Government, and Citizens/Users

Quadruple-helix is an innovation cooperation model in which “users (citizens), businesses (industry), research actors (academia) and public authorities (government) cooperate in order to produce innovations. They work together to co-create the future and drive structural changes far beyond the scope of what any one organization or person could do alone.” Compared to triple-helix model, this model “encompasses also user-oriented innovation models to take full advantage of ideas' cross-fertilisation leading to experimentation and prototyping in real world setting.”<sup>1</sup>

Whereas traditional triple-helix actors – businesses, research and public/government actors - and their mutual cooperation inside of the innovation ecosystem is already built-in and supported in most of the countries and regions, inclusion of Citizen/User helix actors (formal and informal healthcare providers) – as home care solutions up-takers – or more active role of the Public/Government helix bodies during the innovation process is needed.

<sup>1</sup> European Commission, Digital Single Market, Open Innovation 2.0, <https://ec.europa.eu/digital-single-market/en/policies/open-innovation>

HoCare project has run extensive international exchange of experience process to reach various levels of improvements - both strategical level improvements (by governance improvement of relevant Operational Programmes supporting R&I – their strategic focus and management practices) as well as practical level improvements (by support of transfer of high quality projects financed through these Operational Programmes) supporting high quality projects, instruments' efficiency and partially also wider usage of available instruments in partner countries.

HoCare had three thematic sub-objectives related to the natural generation of innovation for Home Care in regional innovation chains:

1. The first sub-objective focused on generation of innovation through addressing unmet needs identified by formal carers (i.e. hospitals, social houses, elderly houses) and informal carers (i.e. family members) – the topic of another separate Study
2. The second sub-objective focused on generation of innovation through public driven innovation processes – the topic of another separate Study
3. The third sub-objective focused on bringing innovative Home Care solutions quicker to the market by using quadruple-helix approach – the topic of this Study

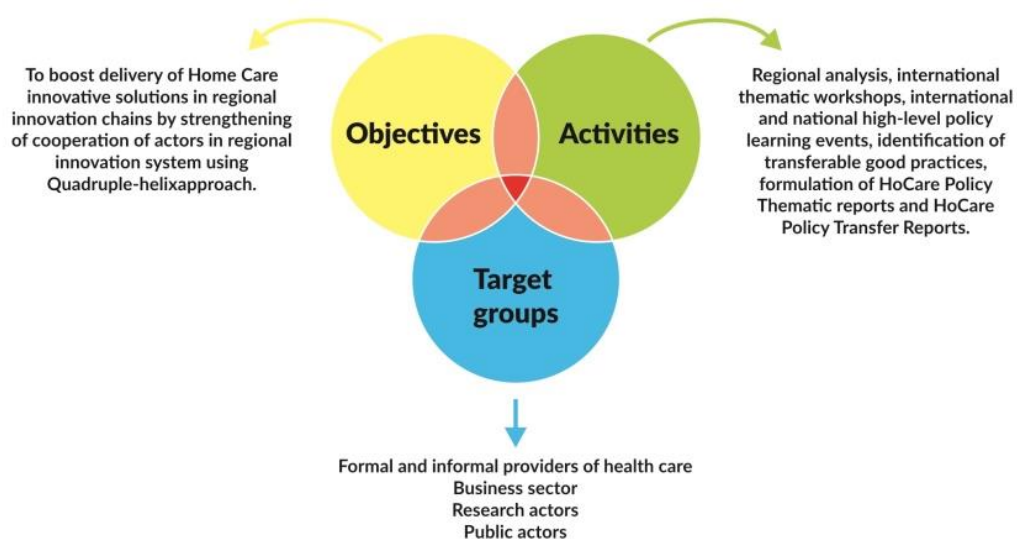


Figure 2 - Objectives, target groups and activities of HoCare project

Transferable knowledge cited in this Study was created by sequence of multiple activities: (1) detailed mapping of regional situations in Research & Innovations in Home Care and Quadruple-helix cooperation in R&I carried out in all project partners' countries, (2) three International Thematic workshops held in Madeira, Budapest and Ljubljana/Litija (each for one sub-objective of the project), (3) numerous national/regional meetings with Managing Authorities of territorial Operational Programme supporting R&I and regional Stakeholders, and (4) numerous physical and virtual meetings among project partners.

## **2. INTRODUCTION TO THE TOPIC OF THIS JOINT THEMATIC STUDY – INNOVATIONS IN HOME CARE – BRINGING INNOVATIVE HOME CARE SOLUTIONS QUICKER TO THE MARKET BY USING QUADRUPLE-HELIX APPROACH**

This Study focuses on transferable knowledge gathered for the third sub-objective of the project – “Bringing innovative Home Care solutions quicker to the market by using quadruple-helix approach”. When looking at the cooperation model used to make innovations, it focuses mainly on two or three helixes. Typically including Public authorities/Business or Public authorities/Research or Public authorities/Research/Business or Business/Research. However, in the last decade, the participation of citizens/users is gradually raising and quadruple-helix cooperation model is increasingly recognised and used in the innovation cycle. Users are usually involved in the evaluation, design and testing phase which helps with the following prototype testing, feasibility studies and larger scale market introduction of developed innovations.

Cooperation of traditional triple-helix actors and additionally inclusion of fourth helix represented by up takers of Home Care solutions (formal, informal health care providers and health care insurance institutions) is common territorial imperative for establishing effective ecosystem for new product development. Innovations are better designed and faster on the market. For the last 10 years in Europe has been a lot of effort and money spent on developing new ICT based products. However, there are few products on the market with a reasonable market success. There are still many prototypes which have usability and market sustainability problems.

Quadruple-helix approach by including citizen/user helix to triple-helix approach, is setting framework, where product can be faster developed and most important, there is a much better chance to become successful on the market. Even though quadruple-helix cooperation model is more complex than triple-helix model and therefore more difficult to execute, it still bringing successful innovations faster to the market. The “hidden gem” lies in the fact that due to active involvement of citizens/users in the initial phases of the innovation process, where gradual improvements can be achieved much faster, there is much less improvements needed in the latest phases where usually changes and corrections demands much more time. Latest phases of innovation process are oriented to market success, demands a lot of effort and resources since development is mainly done outside labs environment. Therefore, it is crucial that previous phases of the innovation model take care that developed prototypes are top quality in terms of all expectations commercially successful product must have. Users can provide maximum value for other members of the quadruple-helix helping to achieve maximum business success. In the early stage of the commercialization they act as references, which significantly help businesses for the faster „take-off“.

Market for Home Care products and services is heavily influenced by Public Authority helix. It has strong power on two main issues: reimbursement policy for Users helix and intensive regulation on type and quality of the services provided by formal and informal health care providers. Therefore, Public authorities have one of the key leverage for triggering, developing, and implementing changes in the Home Care market. For the successful and fast development of new products, they must initiate and lead the process, by clearly set strategy based on demographic trends, latest technology

achievements, new business models developed etc. Reimbursement scheme must be open for new and innovative products and services. User helix must constantly provide feedbacks on their needs and interactions with new products and services. Based on clear focus and hopefully active development support Business helix together with the Research Helix is motivated to invest into new product development, since it can clearly detect needs and evaluate potential market, which is essential for evaluating development risk. If the risk is low, many companies are interested in the sector and the new product development chain is triggered.

Integrated care and deinstitutionalization are to be recognised and well-defined trends where there is a strong push to move chronic patients out of mental and other health/social care institutions and offer physical and virtual home and/or integrated treatment and other innovative forms of care. However, this is also an opportunity since it is establishing new markets. These markets offer good possibilities for inventors, innovators, manufacturers and suppliers of medical devices and health (related) products and services that could be physical and virtual too.

When preparing action plans to bring innovative Home Care solutions quicker to the market we must consider if stakeholders of the quadruple helix would

- undertake to invest money and time in innovation in a market where the demand is big, but purchasing power is limited, and would
- provide grants for such innovation if the purchasing power is generally weak despite the market size would be wide.

### **3. DESCRIPTION OF CURRENT SITUATION IN PARTICIPATING COUNTRIES**

The participation of all four helixes (Public/Government, Research, Business, and Citizens/Users) in the research, innovation and product development activities and the trans-disciplinary knowledge creation in home care shows similarities and differences across partner regions. The following pages describe the situation in each of the countries concerning the following two key issues:

#### **1) INNOVATION ECOSYSTEM**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

#### **2) SUPPORT FROM OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

### 3.1 Cyprus

In general, the quadruple-helix approach is a new term introduced in the Cypriot society. Actors from the citizens' / users' helix are not clearly aware of this method of cooperation, however, when dealing or discussing matters in regard to R&I production or cooperation, they seek cooperation with actors from all other helixes for different reasons:

- a) the need for funding; therefore, they mostly contact the public or the business sector,
- b) the need for using specialized know-how or knowledge for a specific matter; they mostly seek cooperation with academia or research actors.

There are almost no cases in which they put forward a plan or cooperation with all helixes at the same time or for the same objective.

The Smart Specialization Strategy of Cyprus (S3CY) foresees (in Primary Objectives, Priority Sectors and in Policy Mix) several elements that put forward actions in the home-care ICT development through the quadruple helix approach. Further support for such activities is also facilitated through the programme "RESTART 2016-2020", operated by the Research Promotion Foundation.

#### **INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

Several actors, representing all helixes are involved in the field of R&I for Home Care and their part cooperation has proved positive results, such the implementation of different projects and the production of new and innovative systems and products (e.g. Tele-Rehabilitation Project, DITIS project)

**Users:** In general, the quadruple-helix approach is a new term introduced in the Cypriot society. Actors from the citizens' / users' helix are not clearly aware of this method of cooperation, however, when dealing or discussing matters regarding R&I production or cooperation, they seek cooperation with actors from all other helixes for different reasons. One of the reasons is the need for funding; therefore, they mostly contact the public or the business sector. Another reason is the need for using specialized knowledge or knowledge for a specific matter; in that case, they mostly seek cooperation with academia or research actors. There are almost no cases in which they put forward a plan or cooperation with all helixes at the same time or for the same objective.

**Business:** In the case of the actors coming from the business helix, the attitude is even more distant than any other helixes. The main reason is that private businesses and business supporting organizations are focused on activities that have the potential to produce profit in short time



therefore; they operate mostly based on their own resources.

In a comparative view for their cooperation with the other helixes, they mostly seek cooperation with the research helix because they tend to believe that it is a source for innovative ideas production, which they would apply in the market. Business people tend to avoid cooperation with the public sector, except from cases where it is required (for issuing a permit or applying for funding) due to the long lasting bureaucratic procedures that may delay any of the efforts for creation of innovation.

**R&D:** The case of actors coming from the research helix is the one that is mostly keen of promoting cooperation with all other helixes. Having their main interest in deepening in research, most academics promote the dialogue and organize seminars or other type of meetings between the quadruple helix actors to collect all necessary data to complete their research. This procedure, most of the times, leads to the definition of needs and necessary tools or equipment to be created either from an initiative coming from the private sector, or through seeking funding from any kind of funding mechanism.

**Government:** Public institutions, in general, apply the quadruple helix approach in their process of needs definition and analysis for setting up their strategic planning and action plans of operation. In their daily work, they are mainly based on their own resources (budget, human resource, facilities). As a general comment, they are open to proposals for cooperation with any actor(s) coming from the other three helixes for development of different projects, however, for doing so, they need to follow an unattractive and long-lasting bureaucratic procedure, that most of the times leads to long delays and danger for the organizations from other helixes willing to cooperate to abandon the efforts.

#### **KEY CHALLENGES:**

1. REDUCE BUREAUCRATIC PROCEDURES IN PUBLIC SECTOR AND INITIATE A WIDER TRAINING the Helixes project to bring stakeholders together.
2. TRAIN THE BUSINESS HELIX in long-term outcome investments and introduce the idea of “Venture Capitals” in the Cypriot Market.
3. EVALUATE R&D OUTCOMES AND IMPACT TO THE SOCIETY OVER THE PAST 20 YEARS. Present the results to the R&D helix to realize that what is innovative does not mean is also important. Moreover, the end user does not use what is not important.

#### **SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

The OP owner, the Directorate General for European Programs, Coordination, and Development, always applies the quadruple helix approach as a principle for the design or development of any of its policies. The DG EPCD applied this method for identifying the needs on national level for every sector for development, including the sector of home care. Through this process, the OPs are formed

including specific priorities and targeted measures on national level. The field that would need improvement is the part of the defined eligible organizations for projects' implementation through the OPs, since the clear majority of the funding schemes targets just one or two helixes' organizations.

The general title of the specific Priority Investment of the Structural Funds mentioned above (Operational Program "Competitiveness and Sustainable Development" 2014-2020, Priority Investment 2c: "Enhancing ICT applications for e-government, e-learning, e-inclusion, e-culture and e-health"), includes measures, each one of them targeting specific target groups (e.g. for some measures as "Final Beneficiaries" are defined only the Public Services, for some others only the SMEs etc). In addition, the quadruple helix approach is not mentioned in any of the evaluation criteria.

The efforts should be concentrated on establishing new methods for evaluation that could foster the facilitation of the quadruple helix method of cooperation (e.g. adding a specific evaluation criterion for adding extra marks on projects that are being promoted through this quadruple helix approach for e-home-care services).

**KEY CHALLENGES:**

1. TO CHANGE THE SUCCESS INDICATOR OF THE PROJECTS SO THAT THE IMPACT OF THE FINAL OUTPUT CAN BE MEASURED BASED ON QUALITY OVER THE YEARS.

### 3.2 Slovenia

New assistive services are continuously evolving but despite the growing body of evidence about their positive effects, Slovenia is in its infancy regarding the adoption of smart solutions for home care. The most important barriers to the implementation of ICT-based assistive services seem to be related to the lack of cooperation among key stakeholders and identification of funding frameworks and business models, as well as to difficulties with service integration, lack of implementation plans for service delivery, poor understanding of users' needs and lack of age-friendly design.

**INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

Quadruple helix model is not well utilized in Slovenia in the field of home care. While there have been some initial attempts by the policy-makers to mobilize and coordinate different stakeholders, these have not been fully utilized. The Ministry of Labour, Family, Social Affairs and Equal Opportunities established in 2016 a working group for e-care, the task of which is also a launch of a national ecosystem in the field of e-care. Apart from involvement and co-organisation of the launch of a Slovenian ECHAlliance ecosystem (<http://www.healthday.si/echalliance-launch-1/>) no activities have been conducted since the establishment of the mentioned working group.

Stakeholders do represent all four helixes and their power is balanced enough for running successful project, but there is a lack in the clear governmental focus in the field of the health and care system change. Government is clear, that we need reform in the health and care sector already for decade. It seems that we have an orchestra without conductor. Each particular helix has gotten some experience what and how ICT based home care services can contribute to their success. They have rolled out couple of successful pilot project, but nothing beyond pilot. Now government has to set the legal framework and propose a new model how health care will be organized in the future. Mandatory is to reveal the funding model for ICT based services, which will be basis for business models to evolve.

**KEY CHALLENGES:**

- 1) WEAK ECOSYSTEM WITH POOR ORCHESTRATION.
- 2) LACK IN THE CLEAR GOVERNMENTAL FOCUS ON HEALTH AND CARE SYSTEM CHANGE.
- 3) NO FUNDING MODEL FOR ICT BASED HEALTHCARE SERVICES.

**SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

The Strategic partnership for development and innovation mechanism (slo. SRIP) is a comprehensive practice of the quadruple-helix approach in a form of a government mechanism that uses a diverse set of tools and resources to promote and encourage cooperation between different partners in order to develop and diversify the Slovenian economy. The formal foundation for this mechanism was laid in the Slovenia's Smart Specialization Strategy.

The SRIP has so far focused on achieving its goals and performing its functions mostly in three concrete ways. Firstly, by encouraging and enabling an active dialogue with potential partners. Secondly, by managing an application process that will result in concrete action plans for individual partnerships. Thirdly, by monitoring the implementation of action plans.

It is planned that SRIP will be a breakthrough in the use of the quadruple-helix cooperation and will as such provide the government and other partners with invaluable experience at mutually beneficial collaboration as well as a successful example of such approach that could make such future practices easier to develop and implement.

Slovenia is supporting Home care in OP through priority axis 9. In the 2014–2020 financial perspective, the Managing Authority already issued a decision to support a public call for co-financing of projects of multigenerational centers. There are few more calls expected. The most relevant should be call for 3 national pilots for long term care support.

In the calls, there is not an explicit demand for quadruple-helix cooperation, but in general the quality of consortia is evaluated and if the partners combine different knowledge and/or are coming from different industries, more point is gained, and project has more chances to get approval. In general each sector within quadruple helix see benefits of such cooperation. Sometimes some frictions appear due to very tiny budget (very limited resources) or when overlap among partners is big.

**KEY CHALLENGES:**

- 1) OPEN UP NEW FLEXIBLE INTERVENTION SCHEMES aimed at supporting market successful innovation developed by quadruple helix cooperation inside the research and innovation projects.
- 2) PRIORITIZE HOMECARE INNOVATIVE PROJECT AT THE GOVERNMENTAL SEED CAPITAL CALLS.
- 3) NO EXPLICIT DEMAND FOR QUADRUPLE HELIX COOPERATION IN THE CALLS.

### 3.3 Bulgaria

The concept of the Quadruple Helix cooperation model is not commonly known in Bulgaria and is almost completely unknown by most of the participants in the model especially in the home care sector – only academia representatives and some NGO's are aware of it. However, even the concept is not used as a methodological tool, as a model such a cooperation exists at certain levels and its popularity slowly expands in recent years.

**INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

Bulgaria's strategic documents that represent the foundation of the public funds distribution do not recognise the concept and therefore it is not applied. But thanks to the proactive interregional learning processes that are running in recent years the cooperation model becomes more and more popular, the stakeholders in different sectors started recognizing its power and strengthen the interlinks between them. In Bulgaria, regarding the home care sector, the leading segment is the business.

Where innovations in home care exist - if at all - they are driven by business, and the innovations are related mainly with health issues that are linked with home care, not on the most popular services in home care – the complex comprehensive social services. Care-givers are usually not aware of the numerous opportunities the innovations offer for the home care improvement while the business is aware and even produces innovations for international companies or as outsourcing services. The main focus is put on telemedicine and telecare, emergency care, sensor monitoring of vital signs, beds and equipment, while innovations related to the services given by the home care givers are weak. The business in Bulgaria is aware of the innovations in home care but to start developing new

tools they need that the carers accept the ideas and pilot them in practice in larger cities first, so the intensification of the quadruple helix model development is crucial. The business is requiring more intensive networking of the quadruple helixes, creation of innovations hubs and even home care hubs. The business is interested in cooperating with end users and those who know the needs and the opportunities, especially with applied research entities and is complaining about the weak dialogue and cooperation with the public institutions that are responsible for home care financing and delivery. The related bureaucracy burdens are also a stopping factor. As the business does not believe in the PPI opportunities related to home care improvement the quadruple-helix cooperation model is probably not the best approach for the whole spectrum of long-term care but for homecare services it seems to be very useful. In general, the care-givers neglect the opportunities for improvement of their operations the innovations provide, the government and the municipalities as contractors of social services do not stimulate the introduction of innovations in home care.

On the other hand the social care providers are not initiating any kind of dialogue with innovative businesses to start discussing possible innovations in home care. There are few initiatives between business and academia mainly in the field of applied technology of health and with hospitals but not with formal carers oriented towards home care. Even if any initiatives exist it is very rare to hear about them rather to promote them. Many Bulgarian companies possess the assets to design and develop innovative solutions for home care and they work mainly for outsourcing. Many of them are not aware of the sector needs neither of possible partners from academia. There is a need for a specific platform, a hub for home care innovations based on the quadruple helix cooperation model where service providers and the related stakeholders might put their needs and possible contractors might answer with ideas and offers.

The formal and informal providers and the end users are not very active in Bulgaria in suggesting innovations or in triggering the innovation processes in home care. They are mainly focused on facilitating and deepening the integration between the different services offered in the field of home care rather than on innovations in the sector. In general, they are mostly distrustful towards innovative solutions, mainly in the less developed areas, where the needs for innovations are even stronger in comparison with the larger cities because less developed areas usually lack qualified workforce and on the other hand, all the country benefits a very good, fast and of good quality internet penetration (even in the most distanced areas) that ensures perfect conditions for remote ICT-based services in home care. Informal providers largely neglect the opportunities for improvement of their operations the innovations could provide, while the government and the municipalities as contractors of social services to the formal/informal carers do not stimulate the introduction of innovations in home care because of lack of knowledge, good practices or simply fear before the unknown.

In general, the home care delivery institutions – the municipalities and the governmental institutions that are responsible for financing the home care, and the social care providers also – are not active in communicating with the research entities and the universities. Some NGOs are cooperating with academia but mainly at the concept or design level, not at the implementation level, as most of them are not deliverers of home care. The universities are cooperating mainly within the academia segment, ensuring cross-disciplinary outputs from the cooperation between technical and medical universities working together and designing solutions to be offered to the formal home care providers and there is where the link is cut.

On the other hand we are facing a growing interest from the side of ICT companies for cooperating with academia in the field of applied research and common projects implementation. Universities have established many initiatives related to start-ups in innovations and they attract and support numerous young entrepreneurs part of which might be interested to be involved in innovative projects related to home care but the formal/informal carers should initiate possible partnership as only they could formulate the relevant needs for innovations as they keep in touch with the end users.

Public institutions in Bulgaria as a part of the quadruple helix model are more likely to be a passive distributor of public funds than a driver for innovations in the home care sector. The business and research that (rarely) cooperate with public institutions are focused mainly on health issues, not on home care. Public driven innovations are publicly valued as important but very rarely implemented. The quadruple-helix cooperation is the best solution for intensifying the innovation process in home care for the public institutions involved in the sector. There is also a discrepancy between different policies and applicable strategies that is going to be changed and it is the time to include the quadruple-helix cooperation model within them. Public institutions are not aware enough on the opportunities the networking of quadruple-helix, the innovations hubs and the home care hubs could provide for the improvement of the services in this field. Most of the people working in the public institutions need to be further convinced to agree on the benefits such a cooperation brings and to be taught how to use it in their work.

**KEY CHALLENGES:**

- 1) INCREASE AWARENESS FOR THE ADVANTAGES OF THE NUMEROUS TECHNOLOGICAL SOLUTIONS AVAILABLE today and easy to be brought quicker to the market at an affordable cost.
- 2) FACING THE LACK OF DIGITAL CULTURE AND SKILLS AMONGST END-USERS AND ALL INTERMEDIARIES BETWEEN DEVELOPERS, VENDORS AND END-USERS.
- 3) ORCHESTRATE ALL THE SEPARATE HELIXES' efforts that can enhance the innovative, comprehensive, synergic organisational models to support current and future change management initiatives aiming at shortening the way to the market of innovations in home care sector.
- 4) DEEPEN BUSINESS-ACADEMIA-USERS RELATIONSHIPS THROUGH CO-CREATION AND CUSTOMISATION.

**SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

There are currently available few policy instruments that could be exploited to finance market successful innovation in home care sector. First and foremost, Operational Programme Innovation and Competitiveness 2014-2020 (OPIC) with its Priority axis 1 (Technological development and Innovation). Within OPIC, several intervention programmes fit both home care and quadruple-helix

initiatives, i.e. support home care innovations' financing through partnerships of more types of organizations working together - either through direct beneficiaries' involvement or via involvement as external service providers. Other intervention programmes do not support quadruple-helix cooperation but can support home care innovations in general through a cooperation of less types and number of actors.

The main instrument for market successful innovation funding in Bulgaria is the intervention scheme "Support for the development of innovations by start-up companies," under Priority Axis 1: Technological development and Innovation" in OPIC 2014-2020. The support scheme promotes innovation activities in enterprises in the thematic areas of RIS3. The support scheme is linked with the thematic areas of the RIS3 within which the services and products related to ensuring high quality and innovative home care. RIS3 priority areas allow the development of innovations in appropriate services (mobile inclusive) services at home under the National Strategy for Long Term Care ("services must go to the client (in the neighbourhood, home, hospital, etc.)" that inform, assist and support the inclusion of persons belonging to vulnerable groups. The prioritization of the thematic areas (including a bonus scheme for selecting an area that is marked as of high priority of the area during the selection process) helps orientate the candidates towards selecting products and services in the areas that are relevant to home care – 3 out of 4 areas (Informatics and ICT, Mechatronics and Clean Technologies, Health life and Bio-technology industries).

But unfortunately most intervention programmes in OP IC do not ground on any kind of triple or quadruple-helix models – there are only 2 programmes oriented towards the clusters that require cooperation and 2 programmes supporting/requiring partnership between business and academia. But even the existing schemes are very rigid because of their strong dependence on the restrictions on the eligibility criteria for funding put by two strategic documents – the National Strategy for Small and Medium Enterprises and RIS3 of Bulgaria. Those restrictions put most of the activities related to partnerships for deploying innovations in home care outside the eligible conditions. The quadruple-helix concept is currently covered in OPIC only in the form of specific clusters – only clusters that are into the scope of the priority directions of the RIS3 thematic areas are eligible for financing.

Usually only the public actors (state, municipalities, and universities) are owners and operators of Innovation Infrastructure programme (science-technological parks, tech-parks and business incubators). Thus, any kind of support passes through the involvement of a public entity as an owner of the scientific infrastructure, which is sometimes unallowable for the funding schemes.

NHOs are eligible under OPIC if they are involved in projects of collective research and partly in Infrastructure services. They can be only members of the clusters and are not eligible as beneficiaries. Taking into consideration that most of the innovative home care services are initiated and implemented by NGOs – for example associations of social care deliverers or associations of hospitals – it seems that the Quadruple helix cooperation model, usually applicable through the form of an association and NGO – has not access to the public funds under the OP Innovation and Competitiveness in this programming period – 2014 – 2020, besides in the two procedures for clusters. The hospitals or the public institutions offering home care services are also not eligible as beneficiaries under OPIC 2014-2020.

To summarise, Bulgaria has the needed prerequisites in infrastructure and human workforce, a great potential and capacity for triggering a vast deployment of successful market innovations in the sector

of home care – innovative companies, qualified experts, leading researchers and available funding. What slows the process is the weak cooperation within the Quadruple-helix model participants.

**KEY CHALLENGES:**

- 1) REVIEW AND IMPROVE THE RELEVANT STRATEGIC DOCUMENTS THAT DRIVE THE PROGRAMMING PROCESS OF THE OPERATIONAL PROGRAMMES in accordance with the intensive dynamics occurred in the home care innovations' sector.
- 2) ADJUST THE OPIC SPECIFIC INTERVENTIONS' LIMITATIONS AND RESTRICTIONS to better answer the requirements of the revolutionary change in the deployment of innovations in home care sector.
- 3) IMPROVE AND INTENSIFY THE COOPERATION WITHIN THE QUADRUPLE-HELIX MODEL PARTICIPANTS.
- 4) OPEN UP NEW DIFFERENT AND MORE FLEXIBLE INTERVENTION SCHEMES aimed at supporting market successful innovation developed by quadruple helix cooperation inside the research and innovation projects.

### 3.4 Lithuania

Quadruple Helix cooperation model in reality is neglected. It is considered by ecosystem actors as a “buzzword” used in European projects, without any real influence on decision making.

Till 2014 the links in the ecosystem were very weak and the voice of end users was completely neglected. Situation improved a bit in 2014-2016 when working groups were established on the provision of nursing care at home and outpatient health care facilities, on the workload and qualification of care providers.

#### **INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

The ecosystem is highly influenced by the top-down approach, with government policy focused on improvement of formal care, preparation of care specialists, review of their funding systems, but with little focus on home care. Newly approved Government action plan foresees measures for bigger decentralization of social services (including homecare) what can open a new window of the opportunity for NGOs and social enterprises, but the debate involving all stakeholders is not developing yet.

Actors who are closer to home care services are disorganized, lack capacity and resources to initiate R&I projects, especially that there is no separate schemes for them and they will need to compete with much stronger players and the prognosis for success is very low. Some healthcare providers started pilot projects of providing home care services. Number of private initiatives also increased, but are not scaling up.



HoCare project already contributes a lot to improve this situation. Stakeholder meetings organized within the project helped to establish initial dialog first between pioneers in the sectors and then linking it to end-users, government authorities and researchers.

**KEY CHALLENGES:**

1. WEAK LINKS BETWEEN STAKEHOLDERS IN ECOSYSTEM.
2. VOICE OF THE END USERS IS OFTEN NEGLECTED.
3. CULTURE HOW POLICIES AND INSTRUMENTS ARE CREATED IS VERY CENTRALIZED WITH DOMINATING TOP-DOWN APPROACH.

**SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

Current system of funding in Lithuania only theoretically supports quadruple-helix cooperation. According to evaluations performed by Ministry of Finance of Lithuania, the biggest cooperation is seen at the programming level and the smallest at project level. At the same time, formal and informal care providers, end users and even NGOs are more interested in particular projects than in general strategic aims. Current management and structure of structural funds makes it very difficult to initiate real collaborative projects, especially those which aim to solve societal needs, so most funding goes through “verticals” (i.e. funding for formal care providers, funding for NGOs, funding for researchers, funding for business). As institutions can initiate and win limited number of projects, they are concentrating their efforts on meeting the crucial necessities and needs (public sector) or on projects with biggest return on investment (private sector). Home care area is still considered as “nice to have”, but not crucial: unclear market for business, difficult to implement projects with lots of unclear regulations and potential risks.

**KEY CHALLENGES:**

- 1) CURRENT FUNDING SYSTEM IS NOT FAVOURABLE FOR REAL COLLABORATIVE PROJECTS
- 2) HOME-CARE AREA IS NOT A PRIORITY.
- 3) WEAK ADMINISTRATIVE CAPACITY OF NGOs TO INFLUENCE PRIORITIES AND INITIATE IMPACT DRIVING PROJECTS.

### 3.5 Hungary

The state and success of bringing innovative Home Care solutions quicker to the market by using quadruple-helix approach in Hungary is determined by:

- the measure (size) of the demand (needs) for Home Care solutions in general;

- the purchasing power for gaining satisfaction of the demand (needs) for Home Care solutions;
- the need, demand and financing capacities for (or purchasing power for) innovation in defining, developing, producing and realizing (selling and maintaining) Home Care solutions;
- the frequency, effectiveness (adequacy) and efficiency (value and cost of adequacy) of using quadruple-helix approach to define, develop, produce and realize (sell and maintain) Home Care solutions;
- the policies fostering, promoting and subsidising innovation, development, production and service operations or investments in Home Care market.

Despite e-health and e-care markets are still emerging and growing, there is a tangible need for new equipment and services. However, it should be also considered that the purchasing power has to be increased in general and in regions geographically levelled off, in order to make the existing demand sound, because only a smaller but fortunately growing part of this demand is ready to pay or co-pay for the innovative services. In addition public and private insurance system is still interested to go on shifting more care services from the more expensive inpatient care to other – more efficient – service solutions.

Innovation should result not only adequate home care products, protocols and services, but affordable and accessible ones as well. All the stakeholders should benefit and earn from taking part in the innovation process and utilizing the results of it.

#### **INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

It must be emphasized that stakeholders see the advantages of open innovation and co-creation partnership in general. They would be open to take part in quadruple helix cooperation, but have no or minor experience and knowledge to prepare, organize and manage such a partnership. The most common obstacles to launch the quadruple helix cooperation partnership are finding the relevant key stakeholders and convincing them to enter a concrete partnership, to motivate them to express their needs and interest or constraints and adverse interest. Especially the issue of involvement and adherence of end users may cause difficulties to the organizer of the partnership and finally it neglected in the most cases.

#### **Attitude of different axes**

##### **A. Users:**

Elderly, patients, families, other care recipients:

- want to be part of innovative projects / initiatives in area of home care and help shape finding solutions to needs of people working with and in general;
- want to receive more information about the possibilities, goals and procedure of the innovation, such as complications resulting from taking part in trials;
- are ready to participate in POST CLINICAL TRIAL LIVING LAB programmes and projects which threaten with less or no complications, but result easier to use solutions and products;

Payers (social/public/non-profit or for-profit insurance organizations):

- are interested to get more effective (adequate) and more efficient (more value and/or less costs of adequate) solutions, procedure, protocols, products and services than those which they are paying for at the moment;
- are looking new solutions to develop the output of the cash management;

Formal care and medical providers (organizations):

- would like to solve their problems caused by lack of staff;
- try to get financial resources for investments, procurement for general operation and be competitive in recruitment and running HR management;
- are / should be interested in increasing efficiency and effectiveness of daily activities;
- are lobbying for an update of the unit prices of their services paid by insurance system/organizations, and are interested in fast reception of innovative new and/or innovated (evidence based) drugs, solutions, equipment etc. by insurance system/organizations.;
- are / should be interested in shortening “hotel” services (time per capita spent on inpatient care) by developing telecare, homecare and integrated care;
- worry about launching pre-commercial procurement or public procurement of innovation, because:
  - they are afraid of investing (own resources and/or subsidy) in a programme that might not deliver the satisfactory solution to their unmet need;
  - they have no experiences in preparing and implementing public procurement procedure/procedures for PCP/PPI (with a special regard on the reactions of bidders and PP authority).

#### **B. Businesses + business supporting actors**

Business organizations generally focus on 1 or 2 elements of the need-mix of their ecosystem, mainly on the needs of the direct buyer and the management, therefore they seldom manage to establish or join quadruple helix teamwork (QHT).

Most business organizations forget about outlining the whole stakeholder-consumption-chain (SCC) and identifying key stakeholders and their most pressing needs in the chain, so business innovation seldom delivers marketable-results.

Business (owners/management) are looking for supporting programmes which offer assistance and subsidy to define key stakeholders/needs and turn this knowledge to improve competitiveness, profit and return. Generally, business is not against such programmes. However they would like to:

- have free choice among legal ways of cooperation (consortia, partnership, subcontracting, etc.),
- get support and guarantees about royalty,
- be offered grant for preparation of their innovation and application,
- get subsidy for introducing the result of the innovation,
- do their business under solid and favourable legal conditions.

Business would welcome PCP/PPI actions and/or tenders as well, if they were meet above mentioned needs, requirement, and they would get assistance/support in administration to avoid possible irregularities or attacks about the result of the tender. However, Hungarian companies have no experience and marginal knowledge about participating in calls of innovation procurement.

### **C. research**

HEIs aim to strengthen R+D+I activities related to the field of health and healthcare industry and promote the development of professional networks, knowledge management and knowledge transfer in healthcare by fostering triple/quadruple helix cooperation among business enterprises, non-profit economic actors, higher education, academic bodies and civil organizations.

Successful participation in the calls for proposals of Social Renewal Operational Programme (TÁMOP-4.2.1.C “Knowledge-Park” and TÁMOP-4.2.6 “Developing Innovation Ecosystem”) in 2015 proved their commitment to networking, knowledge-transfer and quadruple helix cooperation.

### **D. public**

Public organizations would join quadruple helix cooperation, PPI and PCP project if:

- they would be able to make long term financial and technical plans and commitment
- conditions of calls for projects open for innovation cooperation would allow and foster to do so
- they would get assistance/support in administration to avoid possible irregularities or attacks about the result of the tender
- receive guarantees to get the result that they would really use if they are procurers
- receive guarantees to get the result that would eliminate problems they detected in a sector.

### **KEY CHALLENGES: INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- 1) PURCHASING POWER AT HOME CARE MARKET SHOULD BE MADE STRONGER in order to make the exploitation of the opportunities opened by the growing needs for new care services and products driven by the accelerating deinstitutionalization process possible.
- 2) SKILLS, COMPETENCES AND CAPACITIES (!) OF THE USERS AND PUBLIC HAVE TO BE FOSTERED in order to enable their involvement in quadruple helix cooperation (QUADRUPLE HELIX COOPERATION) for scouting (reconnaissance, identification), creation, valorisation, testing and uptake of innovation.
- 3) ENTERPRISES, RESEARCH ORGANIZATIONS AND HEIS SHOULD BE BROUGHT CLOSER TO THEIR INDIVIDUAL AND PUBLIC CUSTOMERS, and they should improve their capability to organize and manage QUADRUPLE HELIX COOPERATION in general and especially in home/remote care market.

### **SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

Since 2014 Hungary has accelerated the deinstitutionalization process and launched/continued various integrated care programmes in the social and health care systems. The Human Resources

Development OP (HRDOP 2014-20) finances actions fostering this process. There are predefined and selected projects in this OP which shift care from hospitals and social houses to assisted living, home, remote/tele and integrated services.

It must be underlined that the Economic Development and Innovation Operational Programme (EDIOP 2014-20) foster business innovation in Hungary. This OP encourages clustering and innovation partnership/cooperation among various enterprises and/or enterprises and other stakeholders on the research/HEI (and in some cases public) side. Both relevant sector OPs emphasise the significance of quadruple helix cooperation.

However, no specific calls have been opened for quadruple helix cooperation yet. Furthermore there are only few and not too serious conditions among the evaluation criteria in the project selection processes. Hungarian OPs focus on fostering and supporting cooperation between business and research/HEIs or among international/global corporations, mid-cap companies and SMEs. Involvement of end users or public has minor importance, while co-operation among all the 4 helixes is only marginal. However, the accredited innovation clusters are good basis for the quadruple helix cooperation and these clusters have been supported by the Hungarian OPs (GVOP/ECOP, GOP/EDOP and GINOP/EDIOP) since 2004.

Social Renewal Operational Programme (TÁMOP/SROP) paved the way by launching calls for proposals to support HEIs to run projects for networking, knowledge-transfer and quadruple helix cooperation.

**KEY CHALLENGES:**

1. OPERATIONAL PROGRAMMES CONCERNED SHOULD OPEN SPECIFIC CALLS FOR PROJECTS OR GRANTS FOR PREDEFINED PROJECTS FOR QUADRUPLE HELIX COOPERATION IN GENERAL AND ESPECIALLY FOR HOME/REMOTE CARE MARKET.
2. ACTIONS ACCELERATING DEINSTITUTIONALIZATION PROCESS should be followed (or combined) with measures fostering reconnaissance, identification, creation, valorisation, testing and uptake of innovation especially in home/remote care market.
3. FOSTERED AND SUPPORTED INNOVATION SHOULD DELIVER SOLUTIONS HOW TO INCREASE FINANCIAL AND HUMAN CAPABILITIES OF THE USERS AND THE PUBLIC in order to make them possible to afford buying new home/remote care services.

### 3.6 Madeira (Portugal)

In RAM region there are OPs working for the common goal of making quadruple helix cooperation to happen in which, one can see, that with cooperation among more helixes there are better cofinancing rates among projects, facilitating therefore the cost of innovation and the chances of innovation to happen with more competences and skills in the pipeline of innovation. Therefore, there exists an added motivation for partners to talk with each other and cooperate. Regional actors that quadruple helix cooperation is good for the future of RAM region and that it must be empowered and talked commonly perceive it.

## **INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

It exists lack of communication and “innovation regional RAM talks” in which possible partners can sit down together and discuss the future of projects and the future of RAM innovation ecosystem as seen for instance in the meetings of Interreg Europe – Rotterdam meetings for example after this project was approved. In these meetings interested partners join the tables and sit down and showcase themselves to enter a partnership. The leaders of the PP are the ones leading the theme of the proposal and accepting or rejecting possible partners. Most of the EU programmes also use an easy to go model to get quadruple helix cooperation partners in their PPs namely a database were a specific organization registers and put their idea online and gets requests of partnerships. It is commonly perceived that the way EU manages projects partnerships is not needed since regional actors must know each other, however that is not the case. Most of the organizations do not think on cooperation neither in innovation besides companies and R&D sector (mainly academia). Also the public helix is political therefore may be more willing to cooperate with some partners then others – linkages and connections with some partners then others is a reality.

Also by being regional this means there are factors on partner analysis that are not only due to competences and skills namely general perception of the persons leading the organizations, quality of the organization, quality of the work, etc.

In the other helixes, it is the same there are factors empowering more or less the quadruple helix cooperation to happen. Only by creating a transparent approach to quadruple helix cooperation and a real cooperation model, we will have real cooperation.

In relation with the quadruple helix cooperation within Home care stakeholders in RAM stated that the main weakness is that, effectively, there are no policies or projects based on the quadruple-helix concept focused on home care. However, there are some examples of projects that can be optimized in concept and focused on home care. Stronger relevance of industry partners in the quadruple helix might be needed, as sometimes the particular research interests overlap the potential for technology transfer with economic valuation. Better integration of the ecosystem for home care services, stronger involvement of end users in the design of new solutions.

There is a good involvement of researchers, some private companies. However, the communication with the administrations is not streamlined and easy, as well as for end user groups. Most times contacts emerge ad-hoc and bottom up without a general assessment of the regional needs, and the public policies do not seem to be informed by the researchers in the field. Another particular difficulty is that the end users are many times not the buyers or administrators of new approaches to elderly care. Formal and informal careers need to be added in the discussion because they are determinant to the acceptance of new approaches and technologies.

**KEY CHALLENGES:**

- 1) TO SUPPORT MEETINGS WITH PARTNERS TO EMPOWER PROPOSALS IN THE RIS3 AREAS.
- 2) TO SUPPORT ORGANIZATIONS THAT ARE VERY INNOVATIVE TO DO IT IN quadruple helix cooperation.
- 3) TO RESTRUCTURE AXIS8 FOR quadruple helix cooperation PROPOSALS.

**SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

The OP Madeira 14-20 supports market successful innovation namely by allowing for not only developing but also testing, creation of prototypes, international commercialization among others. RAM created Regional System for the Development of Research, Technology and Innovation (SRDITI) to foster projects in strategic areas of Research, Development and Innovation (R & D & I) in companies, between companies and entities that make up this network and institutions of higher education, fully aligned with the objectives and priorities defined in the framework of regional RIS3. This allows the development of R & D & I initiatives in business environment by strengthening the link between businesses and the authorities of the Regional System for the Development of Research, Technology and Innovation (SRDITI network) and higher education institutions through:

- I & D Projects promoted by companies, including industrial research activities and experimental development, leading to the creation of new products, processes or systems, or the introduction of significant improvements in products, processes or existing systems - may be supported proof of concept projects;
- Project advanced technology demonstrators and pilot lines, which, starting from R & D activities successfully completed, aim to show, before a specialized audience and in a real situation, the economic and technical advantages of new technological solutions are not sufficiently validated technological point of view to commercial use.

This is visible in many calls among OP "PROCiência 2020" in line with:

Priority 1.b: Promoting business investment in innovation and research, developing links and synergies between companies, R & D centres and the higher education sector, in particular promoting product and service development, technology transfer, social innovation, and co-innovation and Applications in the public interest, in the stimulation of demand, in networks, clusters and open innovation through intelligent specialization, support to applied technological research, pilot lines, early product validation actions, advanced production capacities and first production, especially in Technologies and the diffusion of technologies of general interest.

Priority 3 - Enhancing Business Competitiveness supports quadruple helix cooperation and it is available for projects that contribute for the specialization strategies of RAM (RIS3), namely:

Priority 3.a: Promoting entrepreneurship by facilitating, in particular, support for the economic

exploitation of new ideas and by encouraging the creation of new enterprises, in particular through incubators.

Priority 3.c: Support the creation and extension of advanced product and service development capabilities

**KEY CHALLENGES:**

- 1) SUSTAINABILITY OF THE PROJECTS AFTER GRANTED AND CONTINUOUS SUPPORT FOR EXAMPLE BY SRDITI.
- 2) SUPPORT ON DOUBTS AND FOSTER PRE-CONSORTIUMS FORMATION AMONG INNOVATIVE ORGANIZATIONS OF RAM.
- 3) INLINE MADEIRA14-20 WITH OTHER INNOVATION PROGRAMS (EXAMPLE H2020).

### 3.7 Czech Republic

All actors see quadruple-helix cooperation during innovation production in the Czech Republic as something natural, helping substantially to create successful innovations that are usable by target groups in large scale.

#### **INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

**Citizen/user** helix actors want to be part of innovative projects / initiatives in area of home care and help shape finding solutions to needs of people working with and in general. They think that if public and user organizations are not engaged in innovation projects and initiatives, there is a risk that something will be developed that nobody wants, or solutions will be developed only based on needs of one organization with the solution being hardly transferable then. However, when including town or region, there needs to be political stability as it happens that already agreed cooperative projects are cancelled with the political representation change and/or towns and regions battle sometimes between each other. Activities of Ministry of employment and social affairs (MPSV) and Ministry of Health (MZ) are not synchronized and linked and innovation tends to be considered as forbidden activity sometimes.

**Business** sector sees sense in using quadruple-helix cooperation, as sometimes-even businesses do not know complete knowledge of needs, therefore it is important to know what users need. This is seen as natural need and something logical, but not always used unfortunately. According to them, quadruple-helix is probably not the best for all application everywhere but for homecare it is very useful. Businesses prefer to work with end users, as it is more effective to cooperate with end users and those who know, especially with applied research than with public institutions bringing



bureaucracy and more work.

**Research actors** do also see quadruple-helix as natural as solutions are for users - research and innovations without final users do not make sense.

**Public** institutions think it is still necessary to create the mindset in public organizations, and change the paradigm as towns and regions do not know so much how to discuss and support innovations with private sector yet.

Several quadruple-helix innovation projects and initiatives however already took place in the Czech Republic both on international as well as national scale and can provide great examples of quadruple-helix cooperation models, including general health sector projects (such as InTraMed-C2C, Information technologies for development of continuous shared healthcare, Czech membrane platform, Nanoprogress) and home care projects (such as OLDES, SMART4MD, Innovation4Welfare).

**KEY CHALLENGES:**

1. POLITICAL INSTABILITY TO INCLUDE TOWNS/REGIONS TO PROJECTS.
2. A LOT OF ICT PROTOTYPES AND INNOVATIONS PRODUCED WITHOUT REAL MARKET SUCCESS AND LARGE BASE OF USERS BEING SUSTAINABLE.
3. THERE ARE RELATIVELY FEW ORGANIZATIONS WHO COOPERATE BETWEEN EACH OTHER NOW AND HAVE NO ASSOCIATION TOGETHER.

**SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

Operational Programme Entrepreneurship and Innovations for Competitiveness has currently strong triple-helix paradigm basis supporting mainly cooperation of businesses with research actors. Majority of intervention programs in OP EIC are triple-helix based currently and this approach is based also in mindset of key Ministry people. Their intervention programs are however structured and opened in a way that enables financing for each and every step of the innovation, enabling projects follow up initiative being supported from another intervention program.

Managing authority of OP EIC and research actors however think that if creators of projects / initiatives prepare and write it so, the place to include quadruple-helix cooperation is available there. Quadruple-helix is currently involved inside of Cooperation intervention program (technologic platforms, clusters) and very frequently public actors (towns, regions) are owners and operators of Innovation Infrastructure program (science-technological parks and business incubators). Associations via clusters are involved in projects of collective research and partly in Infrastructure services too. According to the Ministry, when they support innovations and research, towns or regions however do not provide products or services, they can only be a user or implementer or the

one who orders that.

According to the Ministry, the problem also lies heavily on the ecosystem actors, as there are relatively few organizations who cooperate between each other now and those who have some influence are not heard and have no association together. Those who have some technology platform already receive some finances; those with experience and knowledge keep them for their own. In fact, hospitals could be project partners easily, but for testing of research results. Hospitals or public institutions cannot get direct money; they can be only co-beneficiary (in those intervention programs where external service purchase is possible. Towns and regions can be beneficiaries only in Infrastructure services and they are primary beneficiaries there - other than that only through presence in associations (e.g Pilsen city has several incubators and science-technological parks, has business innovation centre). Towns can be part of the project as testing organization for the project in real life (Innovation or Application program) – as external service delivery) – but it is not so frequent, or as external service of research and development, if they have associated organization that does that is easier – such as BIC Plzen or JIC Brno – these are associations and they have better chances to succeed.

Despite current strong triple-helix paradigm inside of OP EIC, but with still available options for quadruple-helix cooperation inside of specific intervention programs, non-exhaustive list of ideas for OP EIC and innovation ecosystem changes were recently discussed, some of which are: common ecosystem voice and lobbying through association or influence on Monitoring Committee of OP EIC, changes of details of OP EIC (e.g. in CZ NACE and main beneficiaries categories within OP EIC) to remove some of the barriers to fit right categories in OP EIC calls, and increased joint cooperation within the ecosystem to produce more ideas and innovative projects.

**KEY CHALLENGES:**

1. MAJORITY OF INTERVENTION PROGRAMS IN OP EIC ARE TRIPLE-HELIX BASED CURRENTLY AND THIS APPROACH IS BASED ALSO IN MINDSET OF KEY MINISTRY PEOPLE.
2. HOSPITALS OR PUBLIC INSTITUTIONS CANNOT GET DIRECT MONEY; THEY CAN BE ONLY CO-BENEFICIARY.
3. TOWNS AND REGIONS CAN BE BENEFICIARIES ONLY IN INFRASTRUCTURE SERVICES and they are primary beneficiaries there - other than that only through presence in associations.
4. POST-PAID FINANCES THROUGH OP DO NOT ENABLE MUCH OF INCLUSION OF USER/CITIZEN HELIX institutions who have a clear lack of finances for the standard services.

### 3.8 Romania

The Quadruple Helix Model is considered by default when the representatives of all helixes are publicly invited to provide information and feedback for carrying out the Guides of applicants of specific Calls for Project under R&I Programmes as well as when a strategy of commerce in Romania and abroad are requested by the Ministries or Management authorities. The direct interaction between two or three helixes representatives is not evident even if the result of their feedback coincides.

The events organized by Ministry for Business, Trade and Entrepreneurship represent a catalyst for innovation valorization by inviting the representatives of each helix to know each other and interact.

The quadruple helix components are present in several clusters looking at their composition and it is expected that collaboration in common projects are based on quadruple-helix too. Order no. 5376/2017 regarding the approval of the fields and specializations programs correlated with the economic sectors with potential for growth for Romania establishes a better framework by considering 5 smart specialization fields for Romania - Bio-economy; Information and Communication Technology, Space and Security; Energy, Environment and Climate Change; Eco-Nanotechnologies and Advanced Materials; Health - according the National Strategy for R&D&I. So, it is expected an enlargement of clusters types range with Innovation Cluster including the Health care domain and implicitly the home care domain.

#### **INNOVATION ECOSYSTEM – QUADRUPLE HELIX COOPERATION TO BOOST HOMECARE SOLUTIONS FASTER TO THE MARKET**

- How is the quadruple-helix cooperation model working in the country?
- How are different helixes looking at the quadruple-helix cooperation model?

In the innovation ecosystem in Romania, existing clusters, based on quadruple helix model for innovation within certain domains, are clearly focussed on certain market for their innovative solutions. The activities of clusters are occasioned by special call for innovative projects and only then they mobilise their resources (staff and infrastructure) and provide innovative products & services considering the quadruple helix model. If the respective calls asked for marketable results then the quadruple helix are considering the priority – market for their members’ innovative outputs.

Considering the objective of the study “faster to the market for innovative solution” assisted by the Quadruple Helix cooperation model - the Citizen/user helix, Business/Industry helix, Research helix, Public institutions / Government helix - each of them has a different way to approach it.

**Users** of innovative products and services as well as of the innovative solutions for home care domain consider the QH cooperation model as an ideal framework in getting the efficient innovative solution from the market. The user is considered a way to increase the speed of marketing of new products.

**Business/Industry** represented by SMEs interested in the innovative products developed by themselves or by Research Institutes and research groups under Universities as well.

**Public** institutions play the role of catalyst of innovation to the market by imposing in the call for projects and products the consortium composition or a certification from the end-users.

**Research** is interacting with the other helixes so that the product be closer to their needs (utility for the users, profitability for Industry and good governance for Public institution) but also to its needs for self-financing (IPR revenues) for research continuation after the product commercialization. This ideal model is workable but it is slow due to the complicated organization of services intended to sustain the investment in innovative products.

The use of opportunities offered by R&I programmes at national or international level is limited.

#### **KEY CHALLENGES:**

1. LACK OF RESOURCES FOR AWARENESS OF THE BENEFITS OF QUADRUPLE HELIX

COOPERATION MODEL USE.

2. THE USE OF OPPORTUNITIES OFFERED BY R&I PROGRAMMES AT NATIONAL OR INTERNATIONAL LEVEL IS LIMITED.

**SUPPORT FROM OPERATIONAL PROGRAMME - SUPPORT OF MARKET SUCCESSFUL INNOVATION DEVELOPED BY QUADRUPLE HELIX COOPERATION INSIDE THE RESEARCH AND INNOVATION PROJECTS IN THE OPERATIONAL PROGRAMME**

- What is Operational Programme Managing Authority view on quadruple-helix cooperation inside innovation ecosystem and OP intervention programmes?
- Are there any initiatives supporting/promoting quadruple-helix cooperation model?

The Operational programmes competitiveness is by definition meant to address the development of competitiveness and economic growth by recommending the tools to make visible and marketable the products and services resulting from public or private investments.

In Romania, **OP Competitiveness 2014-2020**, at its **Priority Axe 1** "Research, technological development and innovation to support economic competitiveness and business development" has:

**-The Investment Priority 1.1.** "Promoting investment in R&I, developing links and synergies between businesses, research and development centres and higher education, in particular promoting investment in product and service development, technology transfer, social innovation, eco-innovation and public service applications, stimulating demand, networking and clustering and open innovation through smart specialization, as well as supporting technological and applied research activities, pilot lines, early product validation actions, advanced production capacities and first generation capabilities, particularly in the field of key enabling technologies and the diffusion of general use technologies" with **Action 1.1.1:** Large CD infrastructures with Section B for Innovation Clusters had a call in 2015 in which 7 projects type Innovation Clusters were approved for 56Meuro. None of them are in the health care or Homecare domain.

In 2018 is planned a new call for 31.7MEuro and it is expected that clusters in the ICT field applied to medical domain will be involved.

It is expected that Innovative clusters in Health and home care be developed and made visible.

**- The Investment Priority 1.2.** "Improve research and innovation (R&I) infrastructures and capacities to develop excellence in R&I and promote competence centres, especially those of European interest, by linking them to existing or emerging clustering structures that pursue innovation and economic development in a way that responds to the development needs of the communities in which they develop" with: **Action 1.2.1:** Stimulating enterprise research for innovation through RDI projects carried out by individual enterprises or in partnership with R&D institutes and universities, in order to innovate the processes and products of economic sectors with potential for growth with new Call in 2017 Q4 of 62,8 M Euro for Innovative Technologic Projects; **Action 1.2.2:** Credit and risk measures in favour of innovative SMEs and research organizations responding to market demands with currently no Call and budget; **Action 1.2.3:** Knowledge transfer partnerships with new Call in 2018 Q2 with 53,2 M Euro budget.

The Quadruple Helix Cooperation model use for a faster to the market aim for innovative solution of health & home care has not been clearly initiated.

In all actions there are no evidently specified the commercialisation of innovative solution and its business plan.

**KEY CHALLENGES:**

1. THE HEALTH AND HOME CARE INNOVATIVE PRODUCTS COMMERCIALISATION IS BLOCKED BY THE COMPETITION WITH THE INTERNATIONAL MARKETS PRODUCTS.
2. THE BUREAUCRATIC SYSTEM OF THE ORGANIZATIONS MANAGING THE OP COMPETITIVENESS DETERMINED R&I SECTOR BE VERY RESERVED IN APPLYING FOR FUNDS FOR HOMECARE FUNDS.

## 4. COMMON PROBLEMS AND CHALLENGES

Based on the above description of current situations in each country of the HoCare project, the common problem and challenges regarding the bringing innovative Home Care solutions quicker to the market by using quadruple-helix approach can be seen in the following sub chapter – divided per innovation ecosystem and support from Operational programmes.

### 4.1 COMMON CHALLENGES / PROBLEMS IN INNOVATION ECOSYSTEM

➤ **ENHANCE THE TRAINING FOR ALL THE PLAYERS IN THE ECOSYSTEM**

- REDUCE BUREAUCRATIC PROCEDURES IN PUBLIC SECTOR AND INITIATE A WIDER TRAINING the Helixes project to bring stakeholders together.
- TRAIN THE BUSINESS HELIX in long-term outcome investments and introduce the idea of “Venture Capitals” in the Cypriot Market.
- FACING THE LACK OF DIGITAL CULTURE AND SKILLS AMONGST END-USERS AND ALL INTERMEDIARIES BETWEEN DEVELOPERS, VENDORS AND END-USERS.
- SKILLS, COMPETENCES AND CAPACITIES (!) OF THE USERS AND PUBLIC HAVE TO BE FOSTERED in order to enable their involvement in quadruple helix cooperation for scouting (reconnaissance, identification), creation, valorisation, testing and uptake of innovation.
- A LOT OF ICT PROTOTYPES AND INNOVATIONS PRODUCED WITHOUT REAL MARKET SUCCESS AND LARGE BASE OF USERS BEING SUSTAINABLE.

➤ **EVALUATE PAST R&D ACTIVITIES, USE LEASSONS LEARNED AND INCREASE THE AWARENESS OF BENEFITS TO THE DIFFERENT STAKEHOLDERS IN THE SOCIETY.**

- EVALUATE R&D OUTCOMES AND IMPACT TO THE SOCIETY OVER THE PAST 20 YEARS. Present the results to the R&D helix to realize that what is innovative does not mean is also important. Moreover, the end user does not use what is not important.

- INCREASE AWARENESS FOR THE ADVANTAGES OF THE NUMEROUS TECHNOLOGICAL SOLUTIONS AVAILABLE today and easy to be brought quicker to the market at an affordable cost.

➤ **ENHANCE COOPERATION BETWEEN DIFERENT STAKEHOLDERS**

- DEEPEN BUSINESS-ACADEMIA-END USERS RELATIONSHIPS THROUGH CO-CREATION AND CUSTOMISATION.
- VOICE OF THE END USERS IS OFTEN NEGLECTED.
- ENTERPRISES, RESEARCH ORGANIZATIONS AND HEIS SHOULD BE BROUGHT CLOSER TO THEIR INDIVIDUAL AND PUBLIC CUSTOMERS, and they should improve their capability to organize and manage QUADRUPLE HELIX COOPERATION in general and especially in home/remote care market.
- TO SUPPORT ORGANIZATIONS THAT ARE VERY INNOVATIVE TO DO IT IN QUADRUPLE HELIX.
- LACK OF RESOURCES FOR AWARENESS OF THE BENEFITS OF QUADRUPLE HELIX COOPERATION MODEL USE.
- THERE ARE RELATIVELY FEW ORGANIZATIONS WHO COOPERATE BETWEEN EACH OTHER NOW AND HAVE NO ASSOCIATION TOGETHER.

➤ **INTRODUCE METHODS THAT WILL LEAD TO BETTER ORCHESTRATION IN THE ECOSYSTEM**

- ORCHESTRATE ALL THE SEPARATE HELIXES' efforts that can enhance the innovative, comprehensive, synergic organisational models to support current and future change management initiatives aiming at shortening the way to the market of innovations in home care sector.
- WEAK ECOSYSTEM WITH POOR ORCHESTRATION.
- WEAK LINKS BETWEEN STAKEHOLDERS IN ECOSYSTEM.

➤ **GOVERNMENT SHOULD PRIORITIZE DEVELOPMENT OF HOMECARE SECTOR**

- LACK IN THE CLEAR GOVERNMENTAL FOCUS ON HEALTH AND CARE SYSTEM CHANGE.
- NO FUNDING MODEL FOR ICT BASED HEALTHCARE SERVICES.
- CULTURE HOW POLICIES AND INSTRUMENTS ARE CREATED IS VERY CENTRALIZED WITH DOMINATING TOP-DOWN APPROACH.
- PURCHASING POWER AT HOME CARE MARKET SHOULD BE MADE STRONGER in order to make the exploitation of the opportunities opened by the growing needs for new care services and products driven by the accelerating deinstitutionalization process possible.
- TO RESTRUCTURE AXIS 8 FOR QUADRUPLE-HELIX PROPOSALS.

- THE USE OF OPPORTUNITIES OFFERED BY R&I PROGRAMMES AT NATIONAL OR INTERNATIONAL LEVEL IS LIMITED.
- TO SUPPORT MEETINGS WITH PARTNERS TO EMPOWER PROPOSALS IN THE RIS3 AREAS.
- POLITICAL INSTABILITY TO INCLUDE TOWNS/REGIONS TO PROJECTS.

## **4.2 COMMON CHALLENGES / PROBLEMS IN SUPPORT FROM OPERATIONAL PROGRAMMES**

### **➤ TO CHANGE OPERATIONAL PROGRAMME AND GIVE PLACE TO HOMECARE SECTOR AS A STRATEGIC R&D PRIORITY**

- REVIEW AND IMPROVE THE RELEVANT STRATEGIC DOCUMENTS THAT DRIVE THE PROGRAMMING PROCESS OF THE OPERATIONAL PROGRAMMES in accordance with the intensive dynamics occurred in the home care innovations' sector.
- OPEN UP NEW FLEXIBLE INTERVENTION SCHEMES aimed at supporting market successful innovation developed by quadruple helix cooperation inside the research and innovation projects.
- CURRENT FUNDING SYSTEM IS NOT FAVOURABLE FOR REAL COLLABORATIVE PROJECTS.
- HOME-CARE AREA IS NOT A PRIORITY.
- THE HEALTH AND HOME CARE INNOVATIVE PRODUCTS COMMERCIALISATION IS BLOCKED BY THE COMPETITION WITH THE INTERNATIONAL MARKETS PRODUCTS.
- WEAK ADMINISTRATIVE CAPACITY OF NGOs TO INFLUENCE PRIORITIES AND INITIATE IMPACT DRIVING PROJECTS.
- THE BUREAUCRATIC SYSTEM OF THE ORGANIZATIONS MANAGING THE OP COMPETITIVENESS DETERMINED R&I SECTOR BE VERY RESERVED IN APPLYING FOR FUNDS FOR HOMECARE FUNDS.
- INLINE MADEIRA14-20 WITH OTHER INNOVATION PROGRAMS (EXAMPLE H2020).

### **➤ TO GIVE ADVANTAGE TO HOME CARE BASED SOLUTIONS IN THE R&D CALLS DEMANDING QUADRUPLE-HELIX COOPERATION**

- TO CHANGE THE SUCCESS INDICATOR OF THE PROJECTS SO THAT THE IMPACT OF THE FINAL OUTPUT CAN BE MEASURED BASED ON QUALITY OVER THE YEARS.
- ADJUST THE OPIC SPECIFIC INTERVENTIONS' LIMITATIONS AND RESTRICTIONS to better answer the requirements of the revolutionary change in the deployment of innovations in home care sector.
- PRIORITIZE HOMECARE INNOVATIVE PROJECT AT THE GOVERNMENTAL SEED CAPITAL CALLS.
- NO EXPLICIT DEMAND FOR QUADRUPLE HELIX COOPERATION IN THE CALLS.
- MAJORITY OF INTERVENTION PROGRAMS IN OP EIC ARE TRIPLE-HELIX BASED CURRENTLY AND THIS APPROACH IS BASED ALSO IN MINDSET OF KEY MINISTRY PEOPLE.

### **➤ EXTENSIVE SUPPORT TO USER HELIX**

- HOSPITALS OR PUBLIC INSTITUTIONS CANNOT GET DIRECT MONEY; THEY CAN BE ONLY CO-BENEFICIARY.
  - TOWNS AND REGIONS CAN BE BENEFICIARIES ONLY IN INFRASTRUCTURE SERVICES and they are primary beneficiaries there - other than that only through presence in associations.
  - POST-PAID FINANCES THROUGH OP DO NOT ENABLE MUCH OF INCLUSION OF USER/CITIZEN HELIX institutions who have a clear lack of finances for the standard services.
- **ENSURE PRE-CONSORTIUM QUADRUPLE HELIX FORMATION AND REWARD SUSTAINABILITY OF THE PROJECT AFTER ITS CONCLUSION.**
- IMPROVE AND INTENSIFY THE COOPERATION WITHIN THE QUADRUPLE-HELIX MODEL PARTICIPANTS.
  - SUSTAINABILITY OF THE PROJECTS AFTER GRANTED AND CONTINUOUS SUPPORT FOR EXAMPLE BY SRDITI.
  - SUPPORT ON DOUBTS AND FOSTER PRE-CONSORTIUMS FORMATION AMONG INNOVATIVE ORGANIZATIONS OF RAM.

## **5. IDENTIFIED GOOD PRACTICES OF INNOVATION CREATION THROUGH BRINGING INNOVATIVE HOME CARE SOLUTIONS QUICKER TO THE MARKET BY USING QUADRUPLE-HELIX APPROACH**

Unfortunately, there are no finished and impactful good practices on the strategic focus or management level of the Operational Programmes relevant for the topic of this Study that could be available proved for success from the countries of the HoCare project. The following good practices in generation of innovation in home care through bringing innovative home care solutions quicker to the market by using quadruple-helix approach are all project based and have been identified during the HoCare project.

These good practices however show quite wide array of inspiration for transfer, starting from quadruple-helix international knowledge hub/platform (5.3) and technology transfer (5.1), through web platform transfer initiatives (5.5, 5.7) and innovations of concept design (5.2), to more market proven products and solutions (5.4, 5.6).



<b>GOOD SHORTCUT</b>	<b>PRACTICE</b>	<b>GOOD PRACTISE OF ...</b>
<b>AHA (5.1)</b>		Good practice of robotic assistance technology, which is transferable as a technological END PRODUCT of friendly use that can be employed directly by end users or by their healthcare providers.
<b>RehabNet (5.2)</b>		Good practice of quadruple helix cooperation, where only complex cooperation between partners overcome necessary conditions to bring solution to the market: (1) Technological: Broadband national networks, Medical equipment (Central monitoring station, wearable monitoring devices), Video conference solutions for multiparty sessions, (2) People: Ergophysiologists, Cardiologists, Pneumologists, Trained Physiotherapists, Nurses, Trained IT, (3) Management: Coordinating team, Established communication mechanisms with patients, patient organizations, public sector, (4) Strategic: National Health Programme.
<b>European Network for FALL Prevention, Intervention &amp; Security (5.3)</b>		Good practice of international quadruple helix cooperation for creation of knowledge platform, sharing of knowledge and developed ICT innovations and market opportunities in the given field (fall prevention) across countries
<b>EkoSMART (5.4)</b>		Good practice for bringing market sustainable integrated home care services nationwide with a very strong focus to intensively test the product and successfully bring it to the national market.
<b>OLDES (5.5)</b>		Good practice of ICT platform development for very low cost and easy entertainment and health care service in the home of older people. It is a brilliant example of quadruple-helix cooperation between public authority, municipality, local health authority, businesses, universities and to design, develop, test and validate innovation.
<b>GRACE (5.6)</b>		Good practise for product development in the quadruple-helix cooperation partnership with a clear focus in the development and validation of a new consumer market product. Product is designed for EU market from the scratch since from the very beginning developers took into account multi-language support and compliance with regulatory standards within Europe.
<b>Psiprof (5.7)</b>		Good practice of a web platform development by taking into account all four helixes needs. The solution offers a convenient, safe and anonymous way to find and consult professional psychologists. It is ready for implementation in a domestic and international market.

These good practices enable to target and reduce mainly the following identified challenges as they might provide inspiration for potential transfer to other territories or segments of home care:

- **EVALUATE PAST R&D ACTIVITIES, USE LEASSONS LEARNED AND INCREASE THE AWARENESS OF BENEFITS TO THE DIFFERENT STAKEHOLDERS IN THE SOCIETY.**
- **ENHANCE COOPERATION BETWEEN DIFERENT STAKEHOLDERS**
- **INTRODUCE METHODS THAT WILL LEAD TO BETTER ORCHESTRATION IN THE ECOSYSTEM**
- **EXTENSIVE SUPPORT TO USER HELIX**

## 5.1 AHA – AUGMENTED HUMAN ASSISTANCE

<b>Category</b>	Project
<b>Country of origin</b>	Madeira, Portugal
<b>Keywords</b>	robotic assistance, augmented reality, serious games, physical training, biosensors, computer vision system, indoor navigation, virtual couch system
<b>Participants</b>	Research institute of university, universities, research centres
<b>Reasons for selection for the Study</b>	Good practice of robotic assistance technology, which is transferable as a technological END PRODUCT of friendly use that can be employed directly by end users or by their healthcare providers.

### Introduction

Project developed to tackle assistance and diminishing of isolation in healthcare. The project is supported by the FCT project AHA CMUPERI/HCI/0046/2013. The total budget of the AHA project of the Portuguese partners is approximately 500k euro, which is mainly distributed to the four research institutions involved for the implementation of the scientific and technical program.

### Problem

Chronic diseases such as diabetes, cardiovascular and respiratory diseases account for nearly 40% of mortality cases and 75% of health care costs. Obesity alone accounts for an estimated 12 percent of the health spending growth in the U.S. So is the case in Portugal. Wearables and their activity trackers promise a new health care model that stresses patient-driven prevention. The chronic diseases trends make elderly people to stay in danger if not monitored, therefore the goal was to provide support and connectivity from elderly persons to their caregivers not only when they are at home, but especially when outside at streets.

### Solution

A new generation of ICT based solutions that have the potential to transform healthcare by optimizing resource allocation, reducing costs, improving diagnoses and enabling novel therapies, thus increasing quality of life. Novel Robotic Assistance Platform was designed, developed and deployed to support healthy lifestyle, sustain active aging, and support those with motor deficits.



Figure 3 – AHA project

### **Quadruple-helix cooperation for faster delivery to the market**

The AHA project involves directly research institutions from Portugal and the USA, as well as SMEs working in the healthcare domain. End users participate in the design process of the AHA solution through a user-centred design involving end-user associations and institutions that are key in validating the proposed solutions. Public authorities are involved through their collaboration in facilitating the access to spaces and community activities organized by the city.

### **Main phases of the project**

- Augmented Reality Training
- Human State Awareness
- Virtual Coach
- Robotic Assistance Platform development
- End user evaluation

### **More information at:**

- Project basic information: <http://neurorehabilitation.m-iti.org/lab/aha-augmented-human-assistance/>
- NeuroRehabLab Youtube channel: <https://www.youtube.com/neurorehablab>
- NeuroRehabLab Facebook: <https://www.facebook.com/NeuroRehabLab>
- Blog: <http://sergibermudez.blogspot.pt/>

-Project good practice in full details available at:  
<https://www.interregurope.eu/hocare/library/> - Good Practices folder

## 5.2 REHABNET – NEUROSCIENCE BASED INTERACTIVE SYSTEMS FOR MOTOR REHABILITATION

<b>Category</b>	Project
<b>Country of origin</b>	Madeira, Portugal
<b>Keywords</b>	clinical research, ICT, rehabilitation, upper-limb rehabilitation, robotics, human computer interaction (HCI), neurofeedback and neuroscience
<b>Participants</b>	Research institute of university, universities, research centres
<b>Reasons for selection for the Study</b>	Good practice of quadruple helix cooperation, where only complex cooperation between partners overcome necessary conditions to bring solution to the market: (1) Technological: Broadband national networks, Medical equipment (Central monitoring station, wearable monitoring devices), Video conference solutions for multiparty sessions, (2) People: Ergophysiologicals, Cardiologists, Pneumologists, Trained Physiotherapists, Nurses, Trained IT, (3) Management: Coordinating team, Established communication mechanisms with patients, patient organizations, public sector, (4) Strategic: National Health Programme.

### Introduction

RehabNet project has been financed by the EC under the call FP7-PEOPLE-2011-CIG - Marie-Curie Action: "Career Integration Grants".

### Problem

Chronic diseases such as diabetes, cardiovascular and respiratory diseases account for nearly 40% of mortality cases and 75% of health care costs. Obesity alone accounts for an estimated 12 percent of the health spending growth in the U.S. So is the case in Portugal. Wearables and their activity trackers promise a new health care model that stresses patient-driven prevention. The chronic diseases trends make elderly people to stay in danger if not monitored, therefore the goal was to provide support and connectivity from elderly persons to their caregivers not only when they are at home, but especially when outside at streets.

### Solution

RehabNet is a highly interdisciplinary project that addressed several research areas including clinical research, robotics, Human Computer Interaction (HCI) and neurofeedback / neuroscience. RehabNet proposed to develop a novel rehabilitation paradigm, based on low cost technology that can deliver motor rehabilitation for all patients, anywhere they are. An ICT based novel upper-limb rehabilitation system allowed not only to effectively train motor function, but to monitor and collect extensive synchronized brain activity and behavioural data on patient performance during the recovery process. This unique system provided extremely valuable data that allowed to propose a generalization of it to a neurofeedback paradigm that can eventually be used by all stroke patients,

either at home or in the clinic. Through different interaction interfaces, RehabNet is accessible to a wide range of patients. Via a user-centred design strategy, it created computational models for the automatic generation of cognitive rehabilitation content precisely adjusted to each patient. Finally, it combined Virtual Reality (VR) with a gaming approach to allow patients to be active agents in the rehabilitation process by providing a controlled and motivating intensive training targeted to their motor and cognitive deficits. The result of the RehabNet project is an integrative platform for neuroscientists, engineers and clinicians to further study stroke recovery and improve the impact of rehabilitation strategies. During the project, 4 novel rehabilitation scenarios were developed: (1) a bimanual motor training, (2) a dual motor cognitive-motor training for attention and memory, (3) a simulated city for the training of Activities of Daily Living in an ecologically valid context, and (4) a Motor Imagery based brain computer interface (BCI) system that combines VR with EEG based neurofeedback for motor rehabilitation. All scenarios are implemented with state of the art game engines, are platform independent and most of them are freely accessible through a web browser or as an app.



Figure 4 – RehabNet project



Figure 5 – RehabNet project

### Main phases of the project

- Development of 4 novel rehabilitation scenarios:
  - o a bimanual motor training,
  - o a dual motor cognitive-motor training for attention and memory,
  - o a simulated city for the training of Activities of Daily Living in an ecologically valid context,
  - o a Motor Imagery based brain computer interface (BCI) system that combines VR with EEG based neurofeedback for motor rehabilitation.
- Pilot Testing and Evaluation
- Clinical trials of all developed components

### Quadruple-helix cooperation for faster delivery to the market

The RehabNet project involved partners from Industry, academic institutions and the public health system of Madeira (SESARAM), through which end users and health professionals were involved.

### More information at:

- Portuguese partner information: <http://www.m-iti.org/>
- Project basic information: <http://neurorehabilitation.m-iti.org/lab/rehabnet-2/>
- Open Rehab Initiative: <http://www.openrehab.org/>
- NeuroRehabLab Youtube channel: <https://www.youtube.com/neurorehablab>
- NeuroRehabLab Facebook: <https://www.facebook.com/NeuroRehabLab>
- Blog: <http://sergibermudez.blogspot.pt/>
- Project good practice in full details available at: <https://www.interregeurope.eu/hocare/library/> - Good Practices folder
- News coverage:
  - <https://www.youtube.com/watch?v=DrtIG6yvBZM>

- <https://www.youtube.com/watch?v=LTIc03DgfNc>
- <https://www.youtube.com/watch?v=HcSjXC40SGQ>
- <https://www.youtube.com/watch?v=-ThF4du5DaY>

### 5.3 European Network for FALL Prevention, Intervention & Security

<b>Category</b>	Project
<b>Country of origin</b>	Romania
<b>Keywords</b>	Business and science cooperation, elderly care, fall prevention, ambient intelligence, business model
<b>Participants</b>	Foundation Ana Aslan International, universities, Research organization, social cooperative, foundation for research and technology, private foundations, charity
<b>Reasons for selection for the Study</b>	Good practice of international quadruple helix cooperation for creation of knowledge platform, sharing of knowledge and developed ICT innovations and market opportunities in the given field (fall prevention) across countries

#### Introduction

The main goal of E-NO FALLS thematic network has been to integrate and bring together knowledge, experiences and best practices acquired at European and international level in the area of fall prevention, intervention and safety. In this way, the E-NO FALLS thematic network is intended to be a forum for all stakeholders within the value chain (such as industry, users organizations, informal and formal care providers, public authorities, investors, housing and insurance companies and service providers across Europe) to share knowledge, expertise, resources, best practice experiences and to build consensus to highlight the remaining obstacles to be overcome and to eventually provide guidance for ICT-enabled solutions and their roll-out.

#### Problem

Falls account for 40% of all injury deaths, and are the sixth cause of death among elderly. In recent years, ICT technologies have experimentally demonstrated their potential to enhance the autonomy and quality of life of elderly people, through improving prevention/intervention of falls in older people. From a technological perspective a variety of ICT solutions for fall prevention, detection and intervention have been introduced spanning the areas of assistive training devices, biofeedback solutions, fall detectors, fall risk assessment systems and more. However, before this project no consolidation effort has been made to make these systems available for wide deployment in real settings.

#### Solution:

E-NO FALLS has been envisaged to act as a HUB, in the sense of becoming a single point concentrating conclusions, references and links to all what is being/has been done in all issues (research results, policy recommendations, market uptake...) related to fall prevention, detection, intervention and safety. Furthermore the project provides in its website a “repository” of already available ICT technologies for both falls prevention and detection.

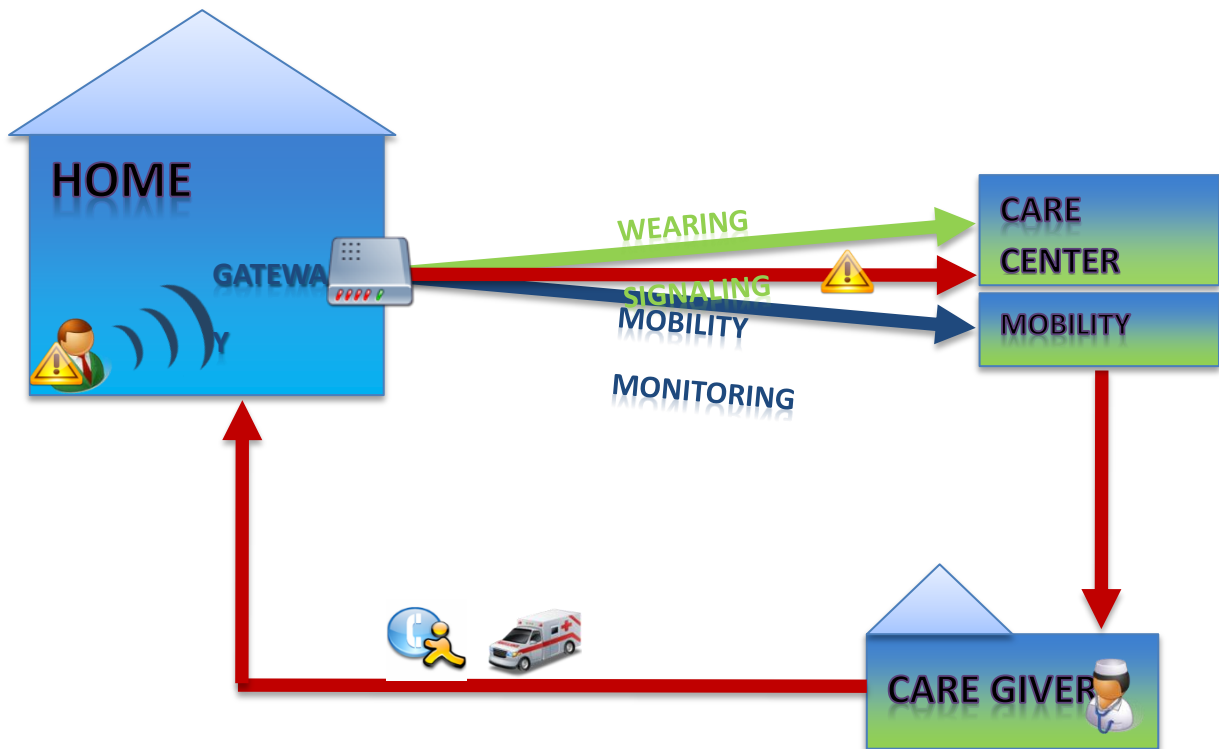


Figure 6 – E-no falls

E-NO FALLS followed a well-designed work-plan which aimed to allow:

- The Emergence of national/regional programmes on innovative approaches to fall prevention across Europe.
- Creation of a sustainable stakeholder platform for promoting the take-up of innovative and ICT based solutions for fall prevention and intervention across Europe and strengthening partnerships across the active and healthy ageing value chain (from innovators, industry players, users, public authorities).
- Contribution to the creation of an EU wide market for ICT-enabled Ageing Well solutions, and to European industry establishing a world leading position in this field.

#### Quadruple-helix cooperation for faster delivery to the market

The thematic networks E-NO FALLS and PROFOUND together with the EIP AHA A2 act as facilitators of the repository of ICT based solutions with the main objective to publicize ICT fall prevention and detection initiatives and deepen knowledge through the interaction with all different stakeholders of quadruple-helix cooperation model - from end-users up to the decision makers. The repository is strongly related to the on-line innovation factory, a collaborative tool for the developing of new ideas for falls prevention technology.

#### Main phases of the project

- Gathering information
- Stakeholders & partnerships boosting
- Creation of an EU wide market



**More information at:**

- Project basic information: <http://www.e-nofalls.eu/index.php>
- Project good practice in full details available at:  
<https://www.interregeurope.eu/hocare/library/> - Good Practices folder

## 5.4 EKOSMART - Integrated healthcare services

<b>Category</b>	Project
<b>Country of origin</b>	Slovenia
<b>Keywords</b>	telecare, telehealth, chronic diseases, quadruple helix, living independent at home, IoT
<b>Participants</b>	Telekom Slovenije
<b>Reasons for selection for the Study</b>	Good practice for bringing market sustainable integrated home care services nationwide with a very strong focus to intensively test the product and successfully bring it to the national market.

### Introduction

It is a national wide research project implementing telecare and telehealth services for elderly and physically less able people. Telecare is being implemented as a first part of integrated healthcare system including telemedicine treatment of chronic diseases. The services will be offered in following groups: e-care, e-diabetes, e-CHF, e-Cardio, e-astma, e-COPD.

### Problem

Due to the rapidly growing percent of elder population in Slovenia, it is estimated to reach 14% elder than 70 years and 6% elder than 80 years by the year 2020. The existing social care system is expected not to provide financially sustainable solution by traditional approach which also does not support enough care and reassurance for elderly people needed to allow them to remain living independent in their own homes.

### Solution

The project with the aim to enable elderly population, people with chronic diseases, dementia or other difficult health conditions, longer, more active and safer conditions to remain living independent in their own homes, resulted in a social care service based on IoT and person-centered technologies, available 24 hours a day. The technology supporting the service detects a need for intervention also if a user is due to falling or other difficult health condition not able to make an urgent call.



Figure 7 – EKOSMART solution

#### Main phases of the project

- Development of a model of integrated healthcare provision and the establishment of related infrastructure,
- Development of a systemic foundations for extending the model of integrated healthcare provision at the national level,
- Raise the quality of life and safety of chronic patients and extended care in the home environment,
- Safe use of medicines and reduced number of referrals to clinical pharmacologists.

#### Quadruple-helix cooperation roles

The EkoSmart project is using the quadruple-helix approach as the service was developed taking in account the needs from patients, the needs from professionals, the needs from business companies and the needs from Public actors. All the stakeholders are project members. Additional end user groups were collaborating in the development in all research and development phases.

#### More information at:

- <http://ekosmart.net/en/ekosmart-2/>
- Project good practice in full details available at: <https://www.interregeurope.eu/hocare/library/> - Good Practices folder

## 5.5 OLDES

<b>Category</b>	Project
<b>Country of origin</b>	Czech republic
<b>Keywords</b>	entertainment and health care platform, medical sensors, tele-assistance, clinical monitoring
<b>Participants</b>	national agency for new technologies, energy and the environment, municipality, businesses, universities, local health authority at town level, applied research centre in ICT
<b>Reasons for selection for the Study</b>	Good practice of ICT platform development for very low cost and easy entertainment and health care service in the home of older people. It is a brilliant example of quadruple-helix cooperation between public authority, municipality, local health authority, businesses, universities and to design, develop, test and validate innovation.

### Introduction

The number of older people in the EU is strongly increasing and the related burden in terms of public expense is getting higher and higher. Today more and more older people are living alone; in many cases those people are not supported by a “social/family network” capable of assisting them and in many other cases they hardly can afford private carers.

### Problem

1. The number of elderly people is increasing significantly and rapidly in all EU countries, creating substantial problems in terms of resources needed for assisting them
2. Lots of seniors are immobile and are socially excluded
3. Social/family networks not available always to support them and private carers hardly affordable

### Solution

The OLDES project offered new technological solutions to improve the quality of life of older people. It aimed at developing a very low cost and easy to use entertainment and health care platform designed to ease the life of older people in their homes. In order to achieve this, new concepts developed in Information Technologies were integrated and adapted.

The developed platform was based on a PC corresponding to Negroponte's paradigm of a 100 device, giving the guarantee of an affordable system. OLDES project provided: user entertainment services, through easy-to-access thematic channels and special interest forums supported by animators; and health care facilities based on established Internet and tele-care communication standards.

The system included wireless ambient and medical sensors linked via a contact center to social services and health care providers. Project also covered the definition, implementation and evaluation of a Knowledge Management (KM) program, an advanced user profiling system enhancing the communication between all the stakeholders of the system.

The system was tested at two different locations: Italy over a group of 100 elderly (including 10 suffering with cardio disease) and the Czech Republic over a group of 10 diabetic patients. OLDES puts older people at the center and made their needs the main priority in all developments.

This was achieved using modelling and animation tools to create scenarios designed to elicit responses from older people, their carers, and service providers. Animation and simulation helped to ensure that developments were, at all stages, grounded in the realities of social and health care, the cultures and economies of the specific pilot contexts, and as wide a range as possible of other European public service contexts.

To maximize the flexibility and exploitability of its products, technical outputs were packaged appropriately into highly configurable service components.



Figure 8 - OLDES software prototyping tests

#### Main phases of the project

- Definition of the needs by all relevant stakeholders via focus groups
- Design and development of the entertainment and healthcare platform
- Pilot testing in 2 sites
- Follow up project for additional specific diseases

#### Quadruple-helix cooperation for faster delivery to the market

OLDES shows a brilliant project example of quadruple-helix cooperation between public authority (national agency for new technologies, energy and the environment), municipality, local health authority, businesses, universities and end-users (elderly people and family carers) to design, develop, test and validate new innovation and even build a follow up project enabling to progress in developing/using finalized product to a more specific target group of a specific additional diseases

functionality. New project proposal (SPES) was initiated to transfer the approach and results achieved in the implementation of the OLDES platform into 4 new geographical areas focusing on new target diseases (respectively dementia, handicapped people, respiratory problems and social exclusion).

**More information at:**

- Project website: <http://www.oldes.eu/index.html>
- Project good practice in full details available at:  
<https://www.interregeurope.eu/hocare/library/> - Good Practices folder

## 5.6 GRACE – GUIDANCE AND RECOVERY AGING CARE ENVIRONMENT

<b>Category</b>	Project
<b>Country of origin</b>	Portugal - Madeira
<b>Keywords</b>	Human Computer Interaction, well-being, health, interaction, data mining
<b>Participants</b>	Main Lead: Wowsystems Informática Lda. (PT) Other partners: NUUMStudio Designers (PT), Madeira Interactive Technologies Institute (PT), Madeira Medical Center (PT), JPADesign (UK)
<b>Reasons for selection for the Study</b>	Good practise for product development in the Quadruple helix cooperation partnership with a clear focus in the development and validation of a new consumer market product. Product is design for a EU market from the scratch since from the very beginning developers took into account multi-language support and compliance with regulatory standards within Europe.

**Introduction**

GRACE is a novel health care monitoring platform that combines wearable devices, mobile apps and Cloud solutions in order to bring together patients, families, health carers, emergency services, insurance companies and other players. The GRACE device is offered in the form of a jewel in order to reduce the stigmatization that users might feel towards heavy, ugly, medical devices that they usually are given. However, the platform is conceived in order to support the most used wearables in the market (Apple Watch, Xiaomi Band, Samsung Gear, etc.).

**Problem**

One of the main challenges that Europe (and most developed countries) is facing is its ageing population. Nowadays, modern families suffer several dilemmas with their loved ones: in a first stage, the elderly population starts to manifest relevant health issues (including mental) yet, they refuse to upset or interrupt their sons’ and daughters’ busy lives and refuse to see their own independence as humans to become more limited. On the other side, families’ worries increase, naturally, observing this kind of evolution. This puts more stress on the family, both mentally, physically and financially. Families try to cope with this through either contracting nursing/care systems that accompany their loved ones through a significant part of their days and nights. In more severe cases, they need to intern their loves ones in specific care homes and day- care centers. Both solutions are very costly for the families and the alternative is for the family itself to try to manage the problem and take daily direct care of the senior member - which implies quitting a paid job or

trying to cope everything and getting burnt out. Moreover, many of the nursing/caring staff don't have a proper complete medical education or all the means in-site to correctly take care in case of an emergency and the majority of accidents - such as falls - occur when the seniors are briefly left alone or unattended. So, after spending quite a lot of money, families still can't feel less stressed about their loves ones' conditions. While at the same time these still feel that they are losing their independence and are being a burden.

### Solution

Given the above, GRACE - acronym for Guidance and Recovery Aging Care Environment – aims to provide a set of solutions to allow people to age actively and in good health, both physically and mentally, by also reinventing - at the same time - the current system for health and social care through the delivery of an innovative ICT-product that delivers in a more efficient (and cheaper) way health care monitoring services and improves the mental well-being of elderly people and their families, through the use of a tracking web-platform connected to mobile apps and existing wearable devices (e.g. necklaces, bracelets) that monitor health parameters, providing a constant non-invasive monitoring and alert platform, tranquilizing families, offering independence and safety to elderly people and providing important health- data in real-time to doctors, emergency services and carers online.



Figure 9 – GRACE idea

### Main phases of the project

- Requirements and technical draft

- Technical development of the software, sensors implementation, data collection and transfer
- Design. Involves ergonomic studies, 3D design of possible wearable-jewels taking into account the sensors defined to be used by the team
- Prototype implementation. On this stage the team will keep implementing/iterating prototypes, firstly in a skeleton basic form until embedding into 3D prints of the designs
- User testing. Feedback on usability, comfort, problem-solving.
- Final prototype. Deployment and final user-testing of the first two models (yet still prototypes) that will be used for marketing dissemination, investor pitching and polished to be a final commercial product.

### **Quadruple-helix cooperation for faster delivery to the market**

GRACE makes use of the Quadruple-Helix approach in order to achieve a better innovative solution. Industry partners have been providing feedback in possible business opportunities for the solution (e.g. adapt to insurance companies) and technical challenges that production might face; Scientific partners have been providing info and feedback on specific questions relative to sychology/emotion-appeal issues (how to make people use the device daily), usability challenges and data transfer problems; public partners have been surveyed to underline their most immediate needs and problems they face daily in this sector and “what-if” scenarios; Health partners have been participating by making clinical validation of the data collected from the prototype sensors and by defining other use-case scenarios.

#### **More information at:**

- [www.grace.care](http://www.grace.care)
- Project good practice in full details available at:  
<https://www.interregeurope.eu/hocare/library/> - Good Practices folder

## **5.7 PSIPROF**

<b>Category</b>	Project
<b>Country of origin</b>	Madeira (Portugal)
<b>Keywords</b>	psychology, human-computer interaction (HCI), e-health
<b>Participants</b>	Psiprof Lda. and Wow!Systems Lda.
<b>Reasons for selection for the Study</b>	Good practice of a web platform development by taking into account all four helixes needs. The solution offers a convenient, safe and anonymous way to find and consult professional psychologists. It is ready for implementation in a domestic and international market. Demo can be offered within 24 hours from the request.

#### **Introduction**

PSIPROF is a novel web platform that allows users to anonymously have a consultation online with professional psychologists.

The system supports chat, voice and real-time video consultations with several durations. Users can book consultations according to their own agenda, choose the psychologist that best fits their needs and pay online. The system works respecting the confidentiality between patient-psychologist and it removes the stigmatization that some patients feel from society when they need to consult a psychologist.

### Problem

Mental well-being is becoming a major issue in Europe's society since everyday stress – ranging from financial pressure and work-related problems to family/illness-problems, even, security/terrorism issues – is taking its toll mostly among the active population. This leads to the decay of the mental and physical condition of people and all together to less effective workers and distressed families with the National Health Services feeling the pressure to attend to these problems and having more costs in order to cope with the rise of patients.

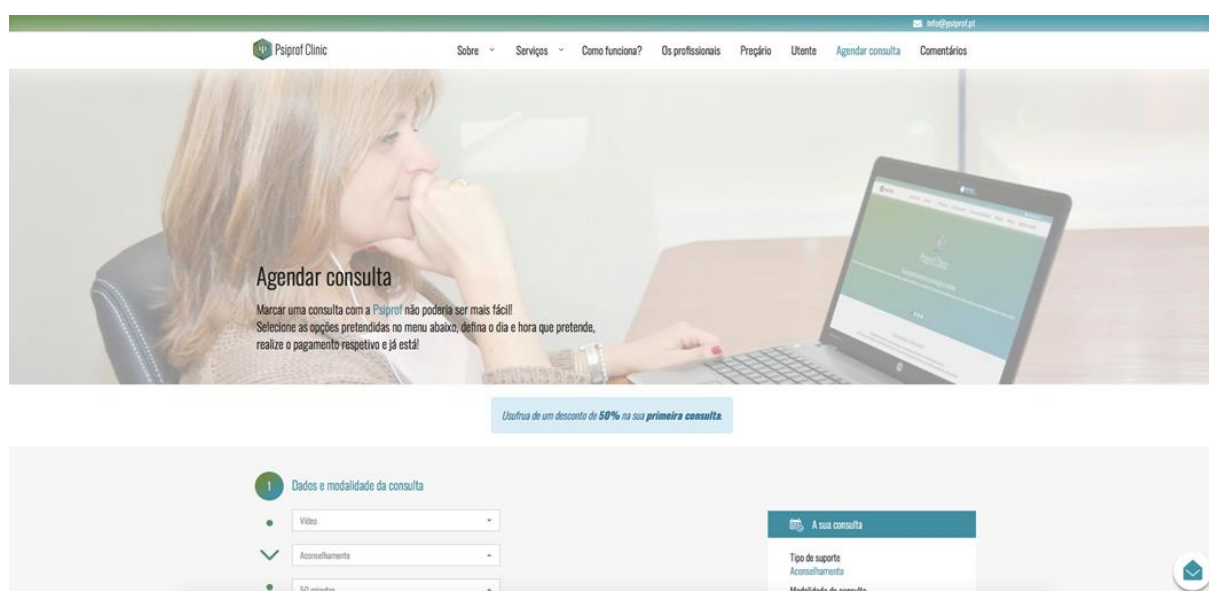
Plus, there is an overall stigmatization feeling from society towards people who need to attend a psychologist which makes it harder for people in need to seek for help with a significant percentage simply quitting the idea or spending more money with private professionals.

### Solution

PSIPROF tries to attend to this problem by offer patients a convenient, safe and anonymous way to find and consult professional psychologists right from the comfort of their home and with controlled costs.

The platform offers several types of consultations, either by mail, chat, voice and video, all with distinct durations and prices, allowing patients to search and browse professionals that better suit their needs.

The solution ends-up being a telemedicine platform as professionals can keep track and maintain a history of their patients and from each consultation and public health services are taking note of these kind of solutions, since there are many remote locations that need health care services but the services can't offer a continuous offer to them. Telemedicine may be the answer to this problem too.





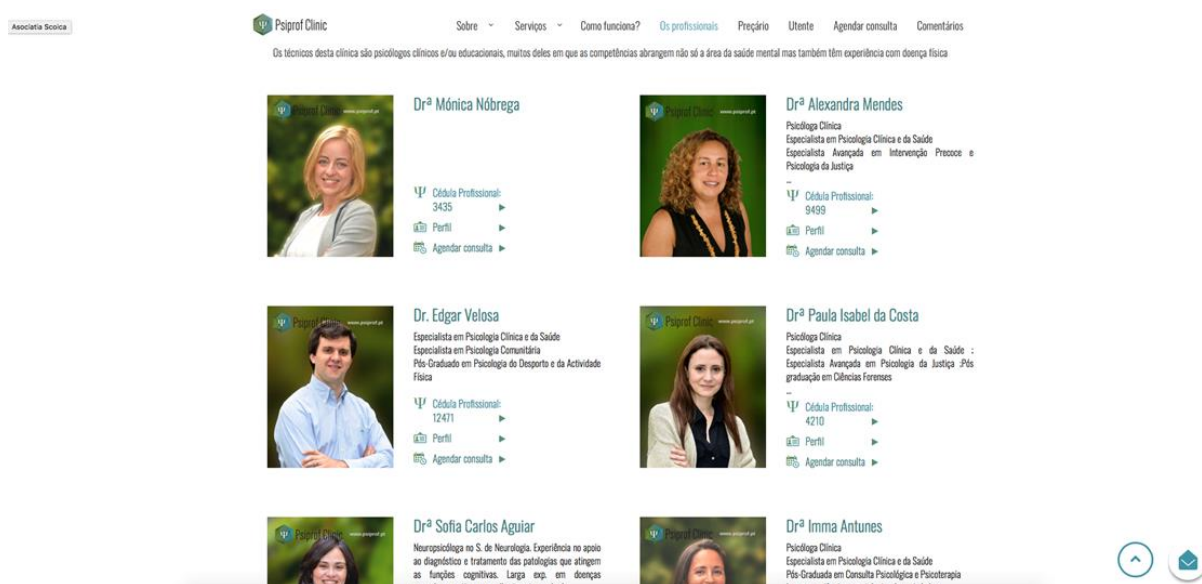


Figure 10 – PSIPROF project

### Main phases of the project

- Research and Requirements Draft
- Design and development
- User testing
- Deployment

### Quadruple-helix cooperation roles

The PSIPROF projects used the quadruple-helix approach as the platform was developed taking in account the needs from patients (privacy online, controlled costs, access to experienced professionals), the needs from professionals (track patient’s history, confidentiality between patient and professionals), the needs from other companies (ability to quickly scale the platform to accommodate other type of professionals, ability to integrate the PSIPROF platform on their own websites/products) and the needs from Public actors (either National Health Services that need telemedicine solutions as well as R&D Centers who study the relation between health, psychology and online presence).

### More information at:

- <https://www.psi-prof.pt/>
- Project good practice in full details available at: <https://www.interregeurope.eu/hocare/library/> - Good Practices folder

## 6. REFERENCES AND LINKS TO ADDITIONAL INFORMATION

- HOCARE PROJECT ILLUSTRATION VIDEO (only first part of the video)  
<https://www.youtube.com/watch?v=NWmFF63ua70>
- HoCARE VIDEO FROM THIRD INTERNATIONAL THEMATIC WORKSHOP:  
<https://www.youtube.com/watch?v=5B8VKXRMNFI>

- HOCARE PROJECT WEBSITE: <https://www.interregeurope.eu/hocare/>
- HOCARE PROJECT MAIN OUTPUTS AND DOCUMENTS:  
<https://www.interregeurope.eu/hocare/library/>
- CONTACTS FOR MORE INFORMATION ON GOOD PRACTICES:  
<https://www.interregeurope.eu/hocare/contacts/>

## AUTHORS – PARTNERS OF THE HOCARE PROJECT

