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# REPORT FROM REVIEW OF E-CARE AND BEST PRACTISE CARE MODELS AND TECHNOLOGICAL SOLUTIONS

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# Report from review of e-Care and best practise care models and technological solutions

## Introduction

The objective for the best (or good) practice (GP) selection is to improve coordination, workflow and support associated with patients discharged from hospital particularly if they are fragile or less capable of selfcare. This exhortative topic is generally known but solutions are not simple due to complexity of the issue that persist for long. It is subject of various solutions in EU counties that are candidates for transfer to other countries such as Czech Republic, where improvement in this area is needed. The complexity is given by combination of social and healthcare requirements on one side and available services provided by diverse services providers on the other side, with some financial reimbursement and administrative conditions. Acceptable seamless solution for a given group of patients being discharged and destined to either return to their homes or special facilities with subsequent specific health and social care should be minimize workload for workers involved its planning in implementation. This establishes a need for good and reliable coordination supported by credible information, all this with observation dignity and under of safety and confidentiality requirements. If there is a model solution well-functioning in one region in a country, then there is a question whether it can be transferred to other region in another country (adopter) – into different context. This task, scaling up of good practices has been subject of intensive study and methodologic design in European Innovation Partnership on Active and Healthy Ageing (EIP on AHA) and related EU projects.

The best practice Methodology is designed according to European Scaling-up Strategy in Active and Healthy Ageing, EC 2015, amended in line with the results of national project of Technology Agency of the Czech Republic (TACR) Programme Omega TD03000364 (Analysis of the applicability of European examples of good practice in the field of active and healthy ageing), 2016-2017, containing methodology for targeted transfer of good practices to national contexts.

The partnership's activities focus on practical measures and their dissemination within the regions and between the countries. EIP on AHA is divided into 6 action areas (Action Groups), which coordinate work in the relevant fields and create tools to support the implementation of knowledge in practice. Successful measures that have demonstrated a positive effect or impact at least in part of the monitored areas are formulated into so-called Good Practices (GP, sometimes also Best Practices - BP).

EIP on AHA partners who make a significant contribution to the development of cooperation and who have themselves established exemplary good practices may participate in calls for EIP on AHA Reference Points, which have been announced by the European Commission in three-year periods (2013, 2016 and 2019).

The European Scaling-up Strategy in Active and Healthy Ageing consist of 5 steps scheme. Three first steps focus on “What” is to be scaled up, while the last 2 steps are about methods “How” to scale up.

- STEP 1: BUILDING A DATABASE OF GOOD PRACTICES
- STEP 2: ASSESSMENT OF VIABILITY OF GOOD PRACTICES FOR SCALING UP
- STEP 3: CLASSIFICATION OF GOOD PRACTICES FOR REPLICATION
- STEP 4: FACILITATING PARTNERSHIPS FOR SCALING-UP
- STEP 5: IMPLEMENTATION: KEY SUCCESS FACTORS AND LESSONS LEARNT

  The enhancements introduced by project Omega TD03000364 performed in University Hospital Olomouc, the National eHealth Center, mainly focused on deeper, more concrete assessments of the original good practice from the view of local conditions and needs by a panel on experts. For this purpose, a set of specific questions was designed. As the answers can be given only by the representative of the GP, who knows its details and operational aspects, in this case representatives from Bologna Region involved in nice-Life project.

The MAST (Model for assessment of telemedicine) methodology has been proposed in Europe for ICT-based systems for telemedicine purposes. MAST enables multidisciplinary evaluation of telemedicine applications in seven outcome domains (characteristics in the context of the disease, safety, clinical efficacy, patient perspective, economic effects, organizational aspects and, social, ethical and, legal aspects).

In practice, however, even the MAST methodology may not guarantee success in the implementation of a specific eHealth service. Therefore, the European Momentum project has designed a set of 18 success factors that are a prerequisite for the successful deployment of telemedicine services. A number of requirements from critical factors are also included in the analysis of good practices (especially in stages focused on viability and classification) in this project with regard to the specific health care system in the Czech Republic, nevertheless, the methodology proposed by the Momentum project is recommended for the fifth stage of transfer of good practices. - in preparation for implementation.

In addition to the above-mentioned methodologies, which are applicable to assessing the impact of good practices, it is worth mentioning that the WHO HIA (Health Impact Assessment) methodology, which makes it possible to assess the impacts of policies, plans, and impacts on health. The use of the tools of this and other methodologies will be decided, if necessary, in the next phase of dissemination of project results, if the thoroughly described methodologies were not sufficient.

The viability of good practice is a prerequisite for assessing implementation in another country. Before proceeding to the preparation of such a transfer, each practice needs to be assessed in terms of its applicability in a given context, in specific conditions and in another area that is being practiced. The five-step methodology for disseminating EIP good practices to the AHA refers to this step as the Classification of Good Practices for Replication.

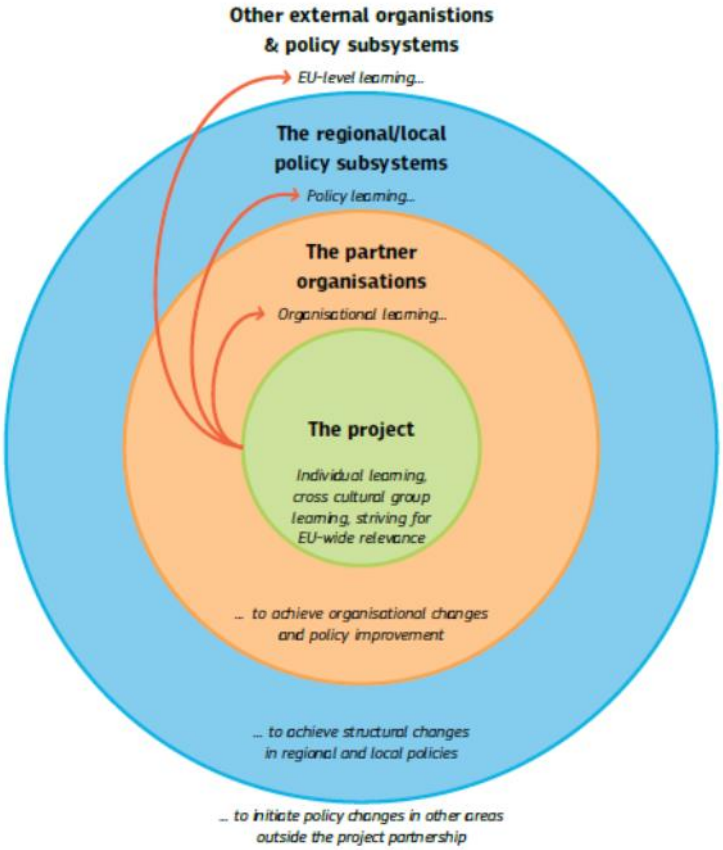


Fig.1: Interregional exchange of expertise - a multidimensional process of sharing knowledge according to the INTERREG IVC program.

## The practice to be reviewed - e-Care

The Emilia-Romagna region is faced with a significant population ageing process: as of today, almost one million people are over 65 years old, out of a total population of about 4,5 million people. As of January 1st, 2008, 968,000 people were over 65 (22% of the total population), - of whom 291,000 octogenarians (6.6%) at risk of incurring a dependency condition. The evolutionary scenario, designed by the Prevention Plan (2010-2012) of the Emilia-Romagna region, estimates a further increase of the elderly population over 65 in 2028 (22.8% of the total population) and of the very old people (people aged over 80 years will account for 7.5% of the total population), with an increase of healthcare needs associated with ageing.

This ageing process is also found in the province of Bologna. In particular, in the city of Bologna, the capital of the region, people over sixty are more than 100,000, accounting for 27% of the population, exceeding the regional average of no less than 7 percentage points. Among these, more than 33,000 are aged over 79 years old (8.9% vs. 6.6 at the regional level), with an increase of more than 40,000 people aged over 80 in 20 years. Older people who live at home alone are also the majority of single-person households (more than 40% of households).

Italy is one of the top-ranking countries in Europe with reference to the average life expectancy at birth, which is known as one of the most significant population health status indicators. The Emilia-Romagna region

and the province of Bologna, in particular, rank among the top ten areas in Europe by percentage of octogenarians (as shown in Figure 1). In 2012, the national average stands at 79.4 years for men and 84.4 for women, while it achieves 80.4 years for men and 85.1 for women in the province of Bologna.

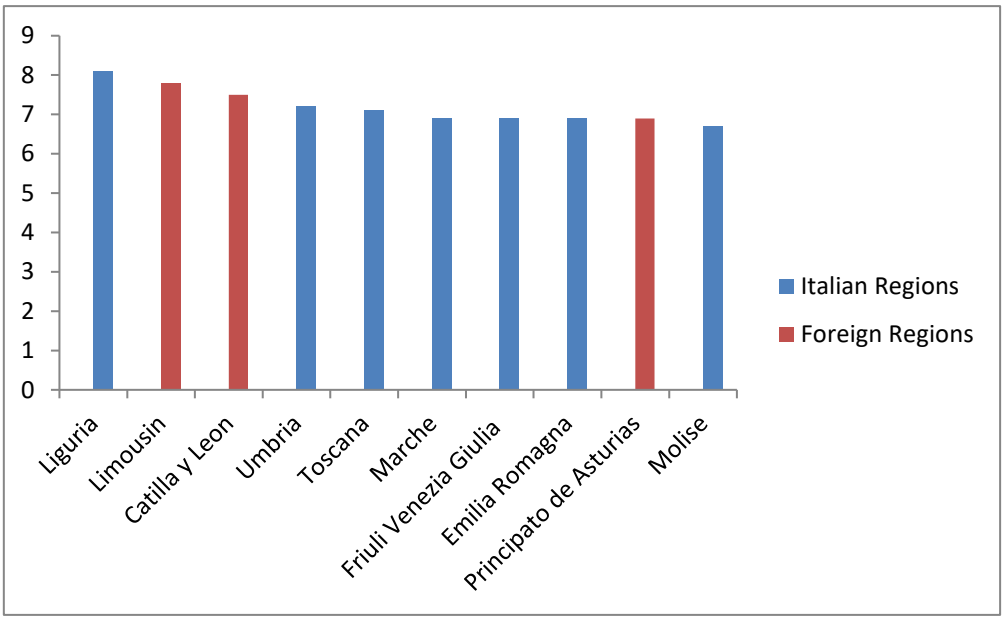


Figure 2: Top 10 regions in Europe by percentage of +80 elderly people out of the total population

The complex demographic change is, however, intertwined with other social transformation processes, including, in particular, the labour market and family aspects. This data is even more important in relation to deep changes concerning the family institution, having a lower potential for care faced with increased needs: the Bolognese households are increasing in number, but are much smaller in size than in the past, taking new and different forms, with fewer children and fewer different generations coexisting in the same household, thus being unable to rely on an extended family network and generally being more at risk of poverty.

In such a context, the new and complex social needs of the elderly residents in the province of Bologna are likely to remain confined within their family, which continues to be a resource for social integration and support, but which is now subject to new tensions. Most older people affected by chronic diseases relies on the surrounding social fabric. The social network outside the healthcare system provides indeed a fundamental support to the elderly, although it becomes increasingly clearer that the burden of pathological conditions affecting the elderly on family structures and kinship networks becomes too heavy and makes it increasingly more difficult for them to provide adequate and continuous care for the elderly. This difficulty is emphasized also by inadequate levels of information on the supply and availability of (public, but also voluntary) services and access procedures, which point out the need for a better communication competence among users and their families. Hence, the need to create new forms of home-based social and healthcare services and customized actions taking care of the elderly, based on an integrated service network and effective care continuity (eCare network).

## The Bologna context

The city of Bologna needed to face the challenge of having one of the Italian highest rate of people over 65 (27% of the whole population). Differently from the past, the so called “informal help”, the support received by the family and by the community is progressively reducing; nowadays elderly live generally far from their children, and they have very few contacts with the neighbourhood and with friends and fellows. At the same time, one of the main guidelines of the care policies of the municipality is to maintain the elderly at home as long as possible.

Of course, one of the most important issues of the increasing need for elderly care, is the parallel increasing need for funding. Since 2007, Emilia-Romagna region has introduced a targeted funding system called FRNA (Fondo Regionale per la Non Autosufficienza - Regional Fund for not self-sufficient people). FRNA constitutes the majority of funding but it’s not the only one. Some more funding was raised, for instance, by EU and national projects.

The increased budget for elderly care is spent both individuating and financing several consolidated care paths and also financing experimental projects.

## The origin of eCare

Since 2005, a new experimental service, called eCare Network, was started, focusing on a sample chosen among all the 50 municipalities catered for by the Local Health Authority of Bologna. This service was addressed to frail and/or lonely elderly people, through the setting up of a network providing support to already operating services, according to the subsidiary principle. This experimental service was introduced also following the events that occurred in Italy in summer 2003: an exceptional heat wave with high temperatures, lasting unabated for over two months, caused the death of a much higher percentage of elderly people than the average seasonal trends. For the first time, these events caused resounding echoes within the public opinion and raised the awareness that it was not enough to provide a protection and prevention network for those brackets of population at highest health risk during very hot periods. These events also highlighted that the lack of knowledge of potentially available services specifically designed for senior citizens, living at home alone and not being fully informed about them, constituted exponentially growing risk factors of incurring serious or irreparable emergency situations.

The project was promoted and coordinated by the Provincial authority of Bologna. It was intended to test a relational model with citizens that would be able to promote accessibility, transparency, usability and operational efficiency of social and health services. It was a very innovative service at that time, aimed at providing eCare services to (over 75) senior citizens living on their own, already known by local social services, but not yet users of public services.

The project was primarily designed to follow up over 75-year-old people living alone enrolled in the trial, through periodic calls made by a specialized Call Center, to detect early signs of deterioration in their social and health conditions, especially during particularly adverse weather events (long-lasting excessive snow, frost and heat waves, etc.). This action was aimed at promoting their stay at home, within their own social and housing environment, thus allowing them to delay access to costly senior housing facilities, to reduce their hospitalization and length of stay, also using solidarity social networks.

The project was thus intended to improve the quality of life of older people living alone, enabling them to remain at home, in a safe and secure environment through a daily help and psychological support, as well as through daily phone calls aimed at providing companionship and detecting any situations of “discomfort”, which would not be otherwise perceived by local services, while maintaining contact with users until the solution of the detected problem would be found. As well-known, health problems often hide and exacerbate not otherwise perceptible social problems and they require a twofold integrated management of health and social care. For this reason, these two aspects have never been separated in the testing of the project.

## The current eCare

Current e-Care system has started in 2011 when was adopted the English method to calculate Frailty Index (0-100%). More than frailty index adopted by LHA BO, Bologna municipality started a professional education for social assistants to improve their comprehension of frailty's phenomenon. Retired trade unions stopped to ask for beds in nursing home residences. They started to understand how much is important to prevent severe ageing also improving and reinforcing home services. From 2011 sociologists and statisticians denounced the growth of elderly in our country but operators and associations were not ready to change their behaviour, running activities and expectations.  Without the community projects we could only phone to elderly, and they could only watch to television. People over than 75, retired from work 10 years before, are isolated, without digital knowledge and they lose relationships progressively.

From 2011 Lepida and LHA BO tried to build a mix between the Welfare State and Welfare Community, with the aim to realize Web Communities.

## Brief description of the original good practice:

The main objective of this branch of intervention performed in Bologna, Emilia-Romagna is to guarantee a socio-assistential network, aiming to favor the possibility for the senior to anticipate his return to home from the hospital, “protecting” the discharge in a prospective of assistential continuity and of prevention of a further hospitalization.

The actual implementation modality consists in the provision to the senior of a temporary service supporting the hospital discharge, according to the real necessity of the citizen, allowing therefore a return to home that is earlier than what would be possible in standard times, without the service. This way, a double important result is obtained: on the one hand, to reduce the length of the senior’s hospitalization, allowing him/her to be back at his/her domicile as quickly as possible; on the other hand, to produce a significant reduction in hospitalization costs, notoriously very high.

The service target is constituted by the senior population, with a special attention dedicated to citizens over 70, selected according to the following criteria:

- Conditions of partial self-sufficiency, that are expected to be temporary and depending on the event which caused the hospitalization;
- A family that is present and able to collaborate, but not to take charge of the need or part of it;
- Co-presence of socio-assistential exigencies and necessity of a health support, of whatever entity.

The selected subjects, that are signaled by the hospitals before the actual discharge, are provided with a temporary support, with a variable lengths from one to six months, according to the real necessity of the senior; such support can consist in a professional intervention with highly specialized personnel (professional nurses, other paramedical staff and so forth), in addition to the presence of a familiar assistant, full time or part-time on a daily/weekly basis, able to take care of the daily domestic errands (shopping, cooking of meals, house cleaning, personal hygiene and so forth).

In these cases, the e-Care service performs the extremely important role of “hub” of the entire service: through the Contact Center, in fact, the persons discharged from the hospital are monitored in all the aspects related to their condition: the patient of his/her relatives can, in fact, call on a 24/7 basis to signal problems of any nature, and the operators take charge of the problematic situation. The involved professionals also regularly refresh the information provided in the socio-health file of the citizen, in order for all the subjects that are involved in the assistential process to remain always updated on the evolving situation in all its aspects, as well as on the treatments or services that have been implemented for the assisted person. In addition, the Contact Center monitors the state of the relationship between the assisted person and the familiar assistant, in order to try to solve all the possible cases of friction or conflict that can occur in the daily exchange.

## The technological and organizational background of the e-Care Service

The experimental project was made possible in Bologna and in the Emilia-Romagna, region starting from five major technical and organizational "Enablers":

1. The presence of a high-tech network that connects all the 4,000 General Practitioners and Primary Care Paediatricians with the public hospitals of the entire Region (the S.O.L.E. – Sanità On LinE – Health On LinE Network), which makes it possible, among other things, the exchange of information and advice between professionals and the integration of General Medical Practitioners' records with medical reports and examinations carried out in all regional facilities, as well as the hospital discharge letters;
2. The well-established Electronic Personal Health Record, made possible by the Health On LinE Network, and developed on the basis of Ministerial Guidelines and European Community legislation. The Electronic Health Record, through a customized "My Page", presently allows citizens to collect and manage all their health data; in the next future it will be possible to also collect their socio-health data;
3. The presence of a public company, such as CUP 2000 S.p.A., which works as "in-house provider" operating on behalf of its public shareholders (the Emilia-Romagna Regional authority, the Municipal and the Provincial authorities of Bologna, all 17 Local Health Authorities, including local out-patient and Hospital facilities at the regional level). CUP 2000 is a major Italian company with very high expertise in eHealth and eWelfare, entrusted by the Regional authority with the task of implementing the two above mentioned projects, which are two best practices at both Italian and European level;
4. The experience acquired by CUP 2000 and by the Local Health Authority of Bologna, in several projects funded within the framework of European research programmes, focused on the themes of Telemedicine and Information & Communication Technology services for home-based care of the elderly;
5. The Decision by the Emilia-Romagna government which has set up the Regional Fund for Non Self-Sufficiency. Emilia-Romagna is the only Italian Region that has set up a special *ad hoc* fund, fed through a specific tax income dedicated to interventions in furtherance of the prevention and care of dependent elderly people. About 450 million euros are allocated each year to the Regional Fund for Non Self-Sufficiency, that is aimed at the development and enhancement of an integrated flexible service network, evenly distributed throughout the region, centered on the needs of dependent elderly people, of their families and caregivers, with a specific focus on activities in support of frailty and prevention.

   As we will see in more details, the technological innovations that represent the basis of the project are the aforementioned technological and organization premises.

Other technological instruments, like the devices that are necessary for the telemedicine applications and the fall sensors, have been utilized in the course of the service development, but have been considered as a "state of the art" technology, therefore no scientific experimentation on these devices has been performed, give the high number of European projects already existing in the field.

## The review and assessment of the practice e-Care

This deliverable summarizes Mapping methodology for needs assessment at the local level, that means it deals with steps 2 and 3 of the scheme in the EIP on AHA scaling strategy outlined above.

The viability assessment in step 2 is assessed using a methodology based on multidisciplinary assessment of 7 domains of outcomes, which were taken from MAST (Model for Assessment of Telemedicine) as they sufficiently cover the scope the assessment covering besides health and care aspect all the other important ones for this step. The generic questions related to each of the domains are listed below and relevant information is to be provided as answers to then set of next detailed questions. The answers should be made available by the operator of the good practice (application) to the adopting partner.

Multidisciplinary assessment in seven domains of outcomes (MAST domains):

### Health problem and characteristics of the application

Does the application contribute to solving a health problem in question? Are there alternatives? Does the application respect international standards, including technical standards for data communication and data privacy protection?

e-Care is built to answer the needs of frail old people. Frailty is defined as a difficult condition and it affects many aspects of people's health and social environment. In the Italian welfare system, municipalities organize social services and social operators decide which kind of support they can provide to citizens with low income. In Italy, National Health System is of free access for everyone and General Practitioners decide therapies, examinations and hospitalizations.

Frail people have both conditions of weakness (social and health issues) and frailty does not only depend on poverty or low education but above all it depends on loneliness. Social services and medical care assistance are not well integrated. Operators of each system do not communicate with each other.

Since 2011, Local Health Authority Bologna (LHA BO) has studied a mathematical algorithm that would combine data from social and clinical reports, public databases and repositories, and presented the result in simple way suitable for operational purposes. The crossing of existing social and health databases allowed to build the social and health history of the patient, and to calculate his/her risk of frailty. The algorithm provides a Frailty Index in a percentage scale in order to predict the death risk of seniors for the next 12 months. The Municipality of Bologna and LHA BO share data coming from the application of the index with

company Lepida ScpA and social operators, especially to protect elderly people during summer heat waves or in winter.

### Safety

Can the GP be considered as safe? Can the results be transferred to other patient groups without harm? Was any safety assessment conducted, e.g. Failure Modes and Effects Analysis (FMEA)?

Every year in May, Mayors write a letter to senior citizens who have a frail index over than 80%. Mayors share the plans to fight heat waves with e-Care services. Then e-Care operators call seniors and inform services in order to obtain a privacy consent form. Subscription and consensus to the plan programme are provided verbally. The specific methodology FMEA and similar approaches cannot be applied to e-Care GP as it is not a product or a productive process but a model of caring people in need with the cooperation of a multiplicity of actors.

### Clinical effectiveness

Can the results or impacts of the good practice be considered as valid? Is there any evidence? Can you share the numbers for relevant papers that were published?

Frailty depends on many factors which affect senior people in many different ways, e-Care service's goals are prevention and support. In 2009 LHA BO run a study on elderly in order to assess initiatives aimed at preventing inappropriate access to emergency rooms. At the first evaluation stage, they have found that e-Care users accessed the Emergency Admission in the same percentage as non e-Care users, because of the complexity of frailty conditions under evaluation. But at a further stage, when LHA BO considered elderly patients by only single disease, for example cardiovascular or orthopaedic disease, e-Care users resulted advantaged. The study showed that whole monitoring of frail seniors makes the difference in the care process, as every single medical specialty has its own appropriateness, but the health outcomes for a patient are poor without integration of the different care interventions.

### Patient perspectives

Is it suitable for the target group of patients and is it friendly to them? Is there any feedback about the practice collected from the patients? Was any user experience and product acceptance analysis conducted?

Senior citizens could be categorized in 3 groups depending on ICT skills.

1. Most people older than 80 years are affected by digital divide. When they have a disability they stay at home alone or with a caregiver (senior too). They often live in buildings without lifts and with steps and staircases. So, they can be reached by phone only and their main activity is watching television.
2. People aged between 70 to 80 years can use ICT but they are not experts. They have a smartphone or a tablet but they are unable to surf the Internet. They use e-mails, sometimes skype with their grandchildren, messages like Whatsapp, sometimes Facebook. The Internet is not accessible everywhere. Internet connection is weak in the mountains (Apennines) and also in the peripheral areas of the towns. They often attend libraries, cinemas, theatres and social entertainments like courses and laboratories.
3. People aged between 65 to 75 years, retired from work and employed in voluntary associations are our active partners in the e-Care system.

e-Care reaches and monitors the first group through the operators of the contact centre once a week (or every 10 days). This group is composed of females for about 86% of the population over 80, and females alone for about 82% of them. Males are alone for about 59%. 25% of e-care users live with self-sufficient people, caregivers. Often caregivers are old people or working adults. During the day 88% of them watch television, 69% cook their meals, 54% listen to the radio. Home and, at last, garden is the center of daily life. They only go out for grocery shopping or ambulatory visits. In 2009 Lepida tested customers' satisfaction and the results showed that there were improvements in the following feelings:

72% safety, 78% friendliness, 66% health, 62% trust in services, 35% knowledge about the surrounding environment (territory and services).

The second group is involved in 40 projects per year funded by LHA BO. The Third sector leads projects which aim at re-building socialization and relationships. Every team, while showing its own project, has to disclose how customer satisfaction is evaluated. Before providing any payment, LHA BO verifies the customer evaluation and satisfaction of participants.

The third group is involved in voluntary associations. In Italy volunteers are always part of Associations because these groups protect people with insurance policies. Associations often have headquarters in a public building where they pay utilities like electric consumptions but location is for free as a reward for their commitment. Associations have a governance committee who has to report expenses to the management yearly.

Once a year, LHA and Lepida ScpA organize a course for volunteers to learn about frailty conditions.

There is a thin line between the second and the third groups. Volunteers often become frail because of a disease or a fall or a loss (for example grief or divorce). Sometimes, frail people become active if they find a good group and friends.

### Economic aspects

Cost effectivity of the good practice - investment and operation. How does cost change with the number of patients?

In order to understand the costs, it is important to distinguish the role of the actors involved in the e-Care GP.

1) Contact centre is the bridge between senior users and the world outside their homes (projects, health and social services, associations). Six operators call more than 1500 senior users; a manager leads these operators and translates the needs from users to into social and nursing services; a psychologist supports the group, chooses and checks the contents of the portal www.bolognasolidale.it, interviews senior users at the first contact; a computer technician works to adapt and solve problems on the portal or on the users' files when needed.

2) The contact centre manager and the psychologist are involved to organize, manage and monitor projects. This activity also involves social operators of municipalities because Associations are strictly connected with them.

Two supervisors coordinate all e-Care services, one from LHA and one from Lepida, but they do not work full time on this activity.

Regional Government allocates specific funds for disabled and not self-sufficient people. The fund is called FRNA and is managed by a local Board called Conferenza Territoriale Sociale e Sanitaria Metropolitana di Bologna (CTSS). Associations' projects can receive an amount of 50.000€ per year and all e-Care service is provided with an amount of 370.000€ per year. Additionally, at the beginning in the period 2005-2007, a further amount of about 300.000€ per year was requested for the development of the software platform for the call center operators and the implementation of the monitoring grid/dossier to assess and monitor the senior frailty periodically.

### Organisational aspects

Requirements for organizational measures for the good practice. Can barriers to its implementation be removed?

The most important issue before starting is related to the social operators' involvement. e-Care is aiming at cooperating with them not at dismissing their job. The limited resources available in the social services sector do not allow to provide real and frequent contacts with people. Social assistants have to allocate the appropriate resources. E-Care can contribute to improve home life and social activities.

Volunteers need guidelines and training to learn which are the institutional goals. Municipalities and LHA BO have to trust them and, at the same time, frailty support must not be taken for granted. Volunteers are often seniors and they often refuse to consider problems regarding their old age. But this is the strategy to allow them to promote their active and healthy aging. Associations' payment is provided to encourage and incentivize them toward these goals.

### Socio-cultural, ethical and legal aspects

Was there a need for any changes in legislation? What changes in code of practice were necessary? Does good practice fit from an ethical and cultural point of view? Does it comply with GPDR?

Dealing with personal data is of utmost importance, thus LHA BO and Lepida put in place all the necessary actions to be compliant with GDPR. In particular according to the different situations in e-Care the data controller would be the different municipalities of the Province of Bologna or LHA BO, Lepida is the external data processor and put in place all technical and organisational procedures for the security of data.

These generic questions derived from MAST methodology give picture about viability in general and serve as introduction to the set of concrete 25 questions to which the answers by the operator of the good practice are sought. To assess transferability of the practice, more detailed information is needed as listed below. These answers will serve to stakeholders in the adopting organization to assess applicability of the good practice in the new location.

These questions describe several characteristics for the good practice and will facilitate detailed assessment of the practice by the adapting party (performed in step 3).

## Specific questions for stakeholders/providers enabling classification of the good practice:

1) Does a Good practice strengthen the role of citizen? If yes, how? (Does the GP include patient empowerment)?

LHA BO has 3 main goals: prevention, diagnosis and cure.

In Bologna about 30% of citizens are older than 65 years and LHA BO is obliged to promote empowering and prevention to guarantee the system's sustainability. In this context many prevention actions are addressed to the engagement of the population as frail seniors are very often supported by relative and friends and neighbours.

During the last 10 years, The Italian National Health System intensively reduced the hospital length of stay to save resources and improve efficiency. Indeed, relatives are often entrusted with the care at home. Social and nursing services verify the situation at home of the frail seniors, teach them how to solve problems, provide daily services (meal, cleaning, bath).

Caregivers' empowering is an important element to increase the effectiveness of the health systems and to engage frail seniors in their health. Good practice can contribute to this reinforcement.

Communities are milestones, without them health and care systems would collapse. In addition, people who cure and care seniors learn how to prevent their own health problems.

The web portal www.bolognasolidale.it (BOS) contains information of about 500 associations which work with elderly. About 100 of them are involved in e-Care support projects. They change every year, in this way the Bologna Team has been involving about 3.500 volunteers.

Involvement consists in a persuasive partnership with volunteers in order to define positive and appropriate messages, choose communication styles, adapt medical language to current speech, adopt correct ways to cook, walk and play sports, read newspapers and books, debate and socialize. Volunteers have to promote and to adopt good lifestyles for themselves but above all for their users.

Bologna team trusts on peer to peer education, because seniors do not change lifestyles easily.

We encourage volunteers to learn and teach the right ways of taking care of themselves and the other seniors.

This policy gives high results in emergency situations, as it happened during last earthquake, flood, attack, heat waves. In all these difficult situations, personal relationships are the most important protection against fears and worries.

When e-Care operators are overwhelmed for emergency status, volunteers come in support and call in their turn people registered under their projects or associations. This special engagement of volunteers took place especially during the last 4 years (2016.2019).

Thus, the empowerment has been increasing not only for a single citizen but for the whole community.

2) Does GP have potential for use in the home environment? What are the requirements?

Reducing the need for patients to travel and stay in institutions providing health and social services is one of the key ways to increase the effectiveness of systems and improve the quality of services provided to citizens.

e-Care's GP consists in reaching the best information as fastest as possible thanks to the operators' hotline. Frail people and their caregivers spend a lot of time searching for help or ways to find solutions to their problems. Problems can have low or high impact on adults or workers, but they are always a big issue for frail people. A burnt light bulb, a broken shutter, the sick dog, cell phone out of power, the appropriate form to ask grants, the desire to go to the cemetery, the need to buy clothes, an help to do a bath, how to adapt the bathroom for safety, how to request a lift in the building, how to sale properties, how to write legacy and last will.

These needs are not technical needs, they are human necessities, frail people lost friendship and capabilities to organize their daily requests. Frailty inside of resilience, this is the core to understand what seniors need.

Furthermore, associations produce and send to the portal BOS, videos, games, old recipes, memory exercises, recordings, poems composed for seniors, with seniors, by seniors. These are entertainments to do at home to strengthen mental skills.

3) What are the investment and operating costs of GP in region Bologna?

In 2007 Emilia-Romagna Region introduced a special tax to sustain people with disability in order to create a fund, the Regional Fund of Not self-sufficiency, FRNA. Every municipality can obtain resources according to the age of its population. LHAs spend this fund to pay for beds in retired homes, daily hospitalities, home services, and prevention. e-Care is under the prevention's chapter.

Lepida publishes twice a year its tariffs. Costs are related to the level of complexity of the different seniors' users' situations:

- 170€/year for senior with no severe condition (a call a week or 10 days);
- 300€/year for senior with complex situation (psychiatric problems);
- 16€ Patient Approval from hospitalization
- 8€ emergency monitoring for an unspecific frail senior
- 1450€ for single socializing project

At the beginning of every year LHA BO establishes an agreement to define a budget with municipalities and Lepida. Lepida is "in house society" where LHA BO and Municipalities are its public members. This amount would be about 370.000€ per year.

The amount for the project includes the building of the associations' network, the project proposal, the monitoring of the project, the web portal addressed to citizens and associations. LHA BO funds approved projects only.

Out of this budget there is an amount of 50.000€ for the associations which manage projects. The grant is from 500 to 2500€ per project per year.

The governance of the allocation of this funding is guaranteed by politicians. LHA of Bologna includes 45 municipalities, their mayors' board decides about social and health subjects. This board is named CTSS social and Health territorial conference.

4) How did you design GP in context of patient use?

15 years ago the e-Care starting group was composed by a geriatrician, a nurse, a social assistant, sociologist, a chemist. Their knowledge about seniors' difficulties guided the design of the Good Practices to be adopted. This knowledge together with seniors' associations and retired trade unions expertise have created the e-Care GP. To understand what the elderly difficulties and needs are one would need to attend senior's group or trip and see them often. In these meetings, it is possible to understand what is important, step by step. Hospitality in the clubs, first of all, regular attendance, dedication to call and recall in order to invite people, involvement to define activities, appointment and time to start events.

· User experience is important above all;

· e-Care uses pilot testing when it is necessary to introduce an innovative idea. In this case a small-scale pilot project is funded before upscaling.

To make an example, a lot of seniors were farmers. They moved to the town after the Second World War, so they love gardening. This is a heavy work for elderly backs. e-Care gave a little fund to build a raised garden with large plastic tanks that people can farm standing up.

5) Is the GP in line with the priorities of the Health care Strategy? What had to been done to implement it in strategy?

Regional Government of Emilia-Romagna defined goals for LHAs in the period 2017-2020. Some of these goals are absolutely in line with e-Care GP. Active and healthy aging links to volunteer's involvement, caregivers supporting, citizens' empowerment, strategic involvement of communities, health Literacy, opposing inequalities, are the most important goals that e-Care activities.

Today the biggest question is: how is possible to fight digital divide of old people? We have to embrace digital literacy for people who often live at home, or that need to stay at home to care elderly or disabled. Our larger audience communicate only with phone or watch television.

Thanks to Lepida that manages a TV channel, we are thinking to provide brief daily lessons to become familiar with technologies (internet, use of devices like smartphones, App, medical devices to monitor health parameters, personal electronic health records, social media).

The comprehensive criterion that enables you to assess the position of practice in the legal system and, at the same time, with the security requirements, the protection of personal data, which over time also develops in EU countries. Older good practices may therefore require additional adjustments to ensure compliance with the new legislation.

Dealing with personal data is of utmost importance, thus LHA BO and Lepida put in place all the necessary actions to be compliant with GDPR. In particular according to the different situations in e-Care the data controller would be the different municipalities of the Province of Bologna or LHA BO, Lepida is the external data processor and put in place all technical and organisational procedures for the security of data.

How did you cooperate with professional societies?

e-Care cooperates with professional ethical Associations of nurses and social assistants above all the educational programmes of operators. When Municipalities and medical groups organize educational events, e-Care collaborates to encourage participation, empowerment and engagement of elderly.

Is the GP in relation with national strategy for eHealth?

- mHealth, pHealth

Is GP based on EU standards for eHealth?

National/regional strategy for health and social care etc.

Active and healthy aging is also a national Italian strategy because the local and national Governments cannot bear the welfare and healthcare costs. Every large municipality adopted prevention strategies to implement actions to delay the worsening of health conditions and the starting of disability of its citizens.

6) Personnel demands of the application (does the application solve the lack of medical staff?)

Good practice may be related to the multi-year problem of various health care systems, which has a noticeable deficit of medical, nursing and other staff. Good practice can either contribute to the relief of staff by, for example, managing more patients or reducing the number of scheduled visits to a healthcare facility.

- What kind of professionals are needed and how many in total are involved?

English language distinguishes 3 words to classify a disability status. Disease is the medical way to describe signs and symptoms; illness is the human status, how people feel themselves; sickness is the social sense of a not well condition.

Italian National free health system intercepts and cures diseases. e-Care cannot replace General Practitioners and nurses. e-Care can help elderly people to feel good at their home instead of asking for hospitalizations, assisted apartments or daily services. Emilia-Romagna organization establishes beds in elderly home hospitals until 3% of citizens. Bologna cannot reach and pay this percentage because of the high number of seniors, from 27 to 30% of citizens. Bologna Municipality is forced to care for seniors at home.

The reason is the public and private loan. Three funds make a contribution to pay the resources of a single place in an elderly assisted residence. Health system bears 30% of the costs, social system bears 30% and private (personnel or family) bears the remaining costs. Social and health systems could not afford to hospitalize more than 2,7% of citizens.

e-Care contributes to support the welfare system, empowering relatives and communities. Every social assistant of hospitals and municipalities can recommend and register seniors to e-Care at the time of their discharge from the hospital.

7) Compliance with the legislation including requirements for safety and data protection (GDPR)

A comprehensive criterion that allows us to assess the position of practice in the legal system and, at the same time, with the security requirements for the protection of personal data, which has recently developed EU countries. It means that older good practices might have therefore required additional adjustments to ensure compliance with the new legislation.

- How is GP in relation with GDPR

The different potential privacy issues have been treated starting from mapping and defining the roles of all the actors involved in e-Care (call center operators, nurses, seniors, caregivers, Public Authorities, small service providers, volunteers, IT operators). For what concerns the collection of personal data, the users are informed on what we do with their data and we are guided from the principle of the minimisation of the gathered data and access of the different operators is tracked by IT systems that are well implemented with security measures. A Data Protection Officer has been appointed. e-Care is well engaged to examine how social and health data are shared while requirements of data protection regulations are complied. Among the mechanisms for privacy and data protection, e-Care secures computation and needed principles for privacy and security by design.

8) Technical readiness for application - compatibility with existing ICT infrastructure

Available telecommunications networks, transmission capacities, computing and storage capacity, existing eHealth services and other infrastructure conditions may be limiting to the introduction of some good practice.

- Integration of each IT systems
  - Requirements
  - Connection with government
  - Data storage/cybersecurity
  - Communication between GP´s, social carers, hospitals, family members, voluntary, informal etc.
    - What kind of communication standard is used?
    - How do you exchange data between regions?
  - Digitalisation - EHR, PHR, care plans
  - Data processing

Each senior user can have his/her Personal Electronic Health Record (FSE in Emilia Romagna) and in special cases it might be shared with caregivers (thanks to a specific delegation). As stated in this document, Lepida is the data processor and put in place all the necessary measures to be compliant with privacy and security rules.

- How do you choose technologies?
  - What kind of public procurement is used?
  - How do you procure innovations?
  - Do you use only technologies available on the market or do you cooperate with R&D companies?
  - Certification
  - How do you test technologies?

Lepida, among the others, is in charge of the design and development of the software platforms used by the GP. In its organisation the management has envisaged a dedicated Software and Platforms Division which is addressed to the design, development and maintenance of the SW products and services.

- Technologies and system maintenance
    - What kind of networks are used/necessary to achieve the goal of the GP?
    - What amount of data and how often they are transmitted to achieve the goal of the GP?
    - What are the relevant biophysical or other signals that are measured to achieve the goal of the GP?
    - Are any parts of the system in need of periodic maintenance and why?
    - How often do the additional sensors and other parts of the system needs recharging or batteries exchange?

LHA BO is a public organisation and Lepida is an in-house providing organisation of public entities. They are bodies governed by public law and need to follow the Directive 2014/24/EU on public procurement. In addition as public entities they would need to use the services offered by Intercent-ER, the Emilia-Romagna's agency for the development of electronic markets. It offers several e-procurement services, such as Framework Contracts, an Electronic Market and Dynamic Purchasing Systems.

9) Relation of the application to the prevalence of diseases in Italy, the applicability of the application to solve a specific problem in health. care in Italy.

This criterion assesses the importance of good practice for the frequently occurring diseases in Italy and how it is applicable to addressing a problem within a given disease or diseases.

At point 6, we have underlined the differences between disease, illness and sickness. The kind of diseases a senior is dealing with is not important for the e-Care services, but involvement of associations and local communities is essential. e-Care would be non-existent without volunteers. In this COVID-19 emergency, for instance, e-Care called about 3500 seniors in 15 days, to offer help, medicines, foods, advice and more. 10 new volunteers helped the six call centre operators and they are going to call 5000 seniors starting on 15th April. Two health conditions can limit e-Care: dementia and hearing loss, but in these cases e-Care can talk to caregivers, which turns out to be a very important practice in case a caregiver must handle a person affected by dementia. We are studying how to involve deaf people, the only way is by using technologies, but they have to learn using a smartphone, as a first step.

People with physical problems which compromise mobility (Parkinson, walking, standing up) prefer to rely on the contact centre and portal BOS, in this case the senior can go outside home. frequent socializing groups, one a week, at least.

10) Relation of the GP to the national laws for health and care services.

- How the GP respects national law – What are the requirements?
- What are the barriers
- What had to be changed?
- What was the acceptance process?

The Italian welfare system is highly unbalanced towards the provision of cash benefits (accompanying allowance) with respect to the offer of support services, leaving the burden to the actions on families. There is a marked imbalance between formal professionals and informal assistance (provided directly by family members and volunteers) or paid by families with private care work (through family assistants, often foreigners). Data on quality, affordability and access to care are scarce and fragmented. The fragmentation of the institutional subjects that intervene on care for frail people makes the governance and effective provision of services complex. The private offer of care services itself is limited, uneven, scarcely accessible, oriented towards residency and almost non-existent with respect to home care. As for the context of the Emilia-Romagna Region, which represents one of the points of excellence in the Italian context, the legislation framework is detailed in 2 main instruments: Regional Prevention Plan 2015-2019 and in the Regional Social and Health Plan 2017-2019.

11) Relation of the GP to the question of accessibility of health care - geographical and temporal

The basic requirement for a network of health services is to ensure their local and time availability to patients

- How cooperate each of the providers (hospitals, care providers, GP´s) with region?

Regional fund defines that until 3% of costs for disabled (adults and seniors) can be reserved to the prevention of the disability risks. The Local Health Authorities decide how to invest in prevention. Public health departments encourage correct behaviours and health literacy, but this is a long-term investment. Bologna needs to perform this goal quickly. 100.000 seniors are too many to take no action, particularly if 13% of those are older than 80 years.

Each hospital recommends entering e-Care seniors who are discharged from ordinary stays. The seniors who are recommended are over 75 and living alone. e-Care operators call them to accept to enter the monitoring service.

- How do you define use cases?

e-Care has implemented a protocol to assess the condition of each senior. These rules of admission were defined by a professional group. Seniors can enter the e-Care if they are older than 75 years and they live alone or with an old caregiver. e-Care provides services to caregivers or to a few adults with depression or insomnia or handicap as well.

- How do you choose end user?

Social operators, nurses and volunteers can enrol senior users to e-Care. In the case of the volunteers, their proposals are first validated from social operators. This process is followed only for users who will be actively monitored, about 1500 e-Care users.

Generally, everyone can call the toll-free number e-Care and everyone can participate in socialization groups, e-Care operators call directly just the users who are actively monitored and invite active users to participate by communication activities through associations and BOS.

At the beginning of the project, the exclusion defined which were the conditions do not allow to enter in e-Care services. As it was declared e-Care cannot follow patients with dementia, but e-Care can support caregivers who deal with people affected with dementia. Also, deaf or mute patients are excluded because they cannot communicate by phone. Some users can be reached by phone but they are unable to socialize so their involvement in events or active groups is impossible. All seniors with any psychiatric condition, even if light, are excluded. In this case e-Care asks for suggestions from a representative psychiatric nurse of each patient.

- What kind of online tools are used?

A detailed Monitoring Grid for the management of “frailty” has been set by pooling together all the individual specialists’ skills. Depending on the types of frailty identified for each user, the Grid points out a series of "sentinel events" to be kept under close monitoring by the Call Center operator, thus constituting a true "guide" to handle phone interviews, to ask beneficiaries the appropriate questions on a daily or weekly basis, to monitor the critical elements for each category. This methodology allows to detect early signs of deterioration of the health or social conditions of the elderly, by verifying the state of the user’s psycho-physiological health and the consequential onset or worsening of frailty factors. From the technological point of view, the Grid is managed automatically through a specific software, which translates the modalities for the identification of questions to be posed into informatics instruments, and transposes into algorithms the semantic rules that provide the activation of alarms, in case of a certain combination of sentinel events. The Monitoring Grid is not just intended to manage and facilitate phone interviews with frail elderly people, but also to check the users’ state of health and, if one or more sentinel events are detected, to report and refer these cases to the e-Care network health and social services, that is, nurses or social workers, who will then take immediate action to assess the situation reported by the e-Care Call Center.

“Alerts” may be related to a deterioration of the patients’ clinical picture, or to the worsening of their social situation (a typical case happened last winter, when an old person was discharged from hospital and suddenly found himself alone at home, with no food and no help from any family members or neighbours). Following the directions contained in the Remote monitoring Protocol, shared with health and social services, the alerts (depending on the type) are handled locally by different social workers or nurses, who perform a general health check-up of the reported cared persons and, only in case of necessity, may require medical intervention by the General Practitioner or, in situations of extreme seriousness, by the hospital

Emergency services. As already mentioned, for every type of frailty, targeted questions to be asked to users have been identified, intended to verify the state of health related to each specific disease, the degree of independent living of the elderly, unsuitable behaviours (improper diet, failure to report early warning signs) and critical situations that may trigger (social and healthcare) network actions and/or the provision of services (accompanying the elderly person to see the doctor, companionship at home, etc..).

An important instrument that allows an integration between the hospitals and the territories is weekly supply to e-Care of the list of frail people discharged from the hospitals. The data are managed firstly by the local health districts and then sent through secured access to the databases managed by Lepida.

Another online tool is the Bologna Solidale web portal (BOS, https://www.bolognasolidale.it/). It supports the social workers and the citizens who are interested in knowing the events targeted to frail people. It is a very supportive tool to identify actions that promote socialisation and it is useful to family members who care for frail elderly. In the emerging period for Covid, BOS has been enriched with a lot of sections addressed to provide accessible and trusted (by LHA BO) information and useful links to seniors and their caregivers and to spread advice on how to deal with the emergency.

Thus, every week public hospitals of the province of Bologna send to e-Care a list of seniors discharged from hospitalization. Seniors introduced to e-Care are over 75 years old and live alone. Before discharge, nurses inform frail patients about e-Care and give them leaflets. Nurses ask patients' consensus to be called by e-Care and collect telephone numbers. The weekly lists from hospitals contain these telephone numbers. The list is charged on e-Care server by authorized operators. Then e-Care operators call seniors and verify the will to be monitored. Anyway, seniors are willing to renounce at e-Care if they do not wish to join the service.

12) Demands on GP operation - training and personnel demands during its operation

Good practice can include elements, especially technological, which generally require training and can either be easily handled by designated healthcare (or social) personnel or, on the contrary, difficult to control in practice.

- How do you train staff?
    - Nurses, doctors, carers, family members etc

e-Care staff is formed by call centre operators, social assistants, nurses and volunteers. Once a year the e-Care managing organisation meets volunteers, social assistants and nurses who collaborate with services. Usually, it happens in May, before summer, in order to organize staff against heat waves. During two meetings, e-Care gathers information to prepare summer protocols which will be considered as valid for 12 months. If a specific emergency status occurs the protocol has to be adapted. Covid-19 required adjustments, as you can easily imagine. Lepida manager for e-Care in May considers new human resources to be trained by educational training, login to platform, privacy rules, knowledge about active local projects.

In the protocol, e-Care provides contacts to ask for medicines, foods, transports and accompanying. There are as many bodies as the needs are, so each body works with specific local agents and one of the most important goals is to combine demand and offer. It happens both for institutional services and volunteer services.

- How do you educate end-users?

Every year, in May, the Municipality's Department of Wellbeing sends a letter to elderly frail people and it informs them about the support plan. The toll-free number is the cornerstone. Every association is informed and involved. Everyone can give advice or ask services for elderly through the toll-free number. Active volunteers have a special communication line to talk to social assistants and nurses. Caregivers can call the toll-free number and/or dedicated volunteers for information.

At the end of May, LHA organizes the Caregiver's day which hosts discussions and debates on services. In November, e-Care organizes a benchmarking day for associations.

13) Verifiability of GP before the pilot study was introduced

Good practice is appropriate and necessary to first verify on a test sample of patients, or to simulate its operation under given conditions. This will provide valuable information to refine GP to provide maximum technical benefits to its users.

Already back in 2005, a new experimental service, called e-Care Network, was started, focusing on a sample chosen among all the 50 municipalities catered for by the LHA BO. This service was addressed to frail and/or lonely elderly people, through the setting up of a network providing support to already operating services, according to the subsidiary principle. This experimental service was introduced also following the events that occurred in Italy in summer 2003: an exceptional heat wave with high temperatures, lasting unabated for over two months, caused the death of a much higher percentage of elderly people than the average seasonal trends. For the first time, these events caused resounding echoes within the public opinion and raised the awareness that it was not enough to provide a protection and prevention network for those brackets of population at highest health risk during very hot periods. These events also highlighted that the lack of knowledge of potentially available services specifically designed for senior citizens, living at home alone and not being fully informed about them, constituted exponentially growing risk factors of incurring serious or irreparable emergency situations.

The project was promoted and coordinated by the Provincial authority of Bologna. It was intended to test a relational model with citizens that would be able to promote accessibility, transparency, usability and operational efficiency of social and health services. It was a very innovative service at that time, aimed at providing e-Care services to (over 75) senior citizens living on their own, already known by local social services, but not yet users of public services.

The experimental project mainly had a social value. Upon its launch it involved about 100 users, who rose to 420 by the end of 2006. It can be regarded as a prototype stage during which technology was limited to a mere IT support to remote companionship services through phone calls. This, however, should not suggest a low-profile activity. Tele-company for senior people alone is rather to be placed within experimental research areas. The positive evaluation of the first experimental phase of the 2005-2006 Project by the Provincial authority of Bologna, in charge of the project coordination, led to the extension of the e-Care service to the entire territory covered by the Bologna Local Health Authority in 2007. Therefore, on behalf of the Local Social and Health Conference, the Local Health Authority entrusted the company Lepida with the task of managing the second phase of the project, which had already accomplished the first experimental phase, through the Non-Self Sufficiency Fund. Starting from the 2007-2008 period, the e-Care service was consolidated, expanding both the number of users and the scope of the activities to be achieved by further extending the service network dedicated to frail and/or lonely people aged over seventy-five, integrating and coordinating already existing local social and health care support "networks".

Today e-Care is well established and is looking for innovation on the organisation and taking advantages of the digital transformation.

14) Reach of GP - number of senior users

How much of the population with the risk of disability can this practice serve? Some practices do not allow excessive expansion in terms of number of senior users.

- What is the maximum capacity in total amount of end users?

Up to date 1860 seniors are enrolled in the service and receive a periodic and regular monitoring trough the call center. In addition, during summer (so called hot waves), a group of volunteers are engaged to call 2.500 seniors over 75 who are alone and have a level of frailty classified as 3. This additional service is activated in the premises of Lepida during periods of emergency (summer or winter). The list of names of the senior people to be monitored is provided by the LHA BO. An extraordinary monitoring activity has been realised during the Covid emergency and they have called about 4500 frail seniors.

15) Ethical aspects of application

In assessing of good practice, it is appropriate to consider the age composition of future users and other specific ethical considerations for which the practice may have varying degrees of acceptability.

The range of population age is very important for ethical issues. Bologna has 60.400 citizens older than 65 years and, in this group, 36.600 are older than 80 years. The total number of citizens in Bologna is 392.000. LHA BO and Municipality would enrol people depending on the degree of severity of their conditions, not only because of age, social poverty, literacy, or diseases in general. The Public Health Department gave an answer to this ethical problem by using statistics. They tested an English algorithm to obtain a percentage Frailty Index linking social and health data. This high concentration of elderly people in our town depends on history and on the costs of apartments. Young couples and families moved on peripheric zones. In Bologna

there are entire blocks of flats where seniors live. Most of these blocks, built in the '60s, have no lifts. In some cases, there are lifts in the building but there still are some steps to reach the entrance door. This building environment represents a terrible obstacle for mobility and socialisation.

The socio-cultural aspects include the social-cultural arenas where the patient lives and acts during use of the application. The ethical analysis appraises the ethical questions raised by the application itself and by the consequences of implementing it or not. Legal aspects focus on the legal obligations which must be met and any specific legal barriers that may exist to the implementation of the application

- Ethical issues
- Legal issues
- Social issues

16) How long it took to implement all requirements?

- Time plan of implementation

The e-Care service is constantly renewed and since 2005, in addition to the consolidation of the original services in the period 2005-2008, new tools and actions are designed, developed and implemented to respond to emerging and changing needs.

17) What kind of authorities has been involved to prepare whole system?

Governance and monitoring progress of the project were secured by a Technical-Strategic Committee composed of four representatives appointed by the bodies involved (Municipal and Metropolitan authorities of Bologna, Local Health Authority of Bologna, the Conference of Mayors of the involved municipalities of the province) expressly wanted to fully involve all the institutional actors in the most important decisions relating to the management and development of the project. The Technical Committee was entrusted with the main task of making strategic decisions and setting guidelines for the best performance of the project as well as periodic checks on the progress and compliance with the objectives set.

The Technical-Strategic Committee also promoted the establishment of an Operational Task Force, consisting of General Practitioners representatives, Social Workers, that is home Nurses, a geriatrician, a psychologist and a representative of the Elderly Health Department of the Local Health Authority of Bologna. Both working groups have received technical and organizational support by Lepida, i.e. the in-house Company of the bodies involved, which was entrusted with the task of organizing and managing the e-Care service.

The Operational Task Force, made up of a multidisciplinary team of experts and practitioners in the field of services to the elderly, has been entrusted with the task of taking all the decisions aimed at the

implementation of strategic choices and guidelines set by the Technical Group. In particular, this multidisciplinary team encompasses all the necessary skills to take care of a few aspects of fundamental importance for the service, such as the identification of criteria for the selection of eligibility characteristics of frail elderly people to the e-Care service.

18) Time for preparation and deployment of the practice

See questions 13, 14, 15.

19) Sustainability of GP

- Time plan of GP

Every year the resources available to e-Care are allocated by LHA BO in agreement with the CTSS through a formal deliberation.

20) What kind of change management is used?

Training and education of operators and volunteers are ensured regularly during the year. The governance model of e-Care is linked to regional laws and strategic priorities, the services to be delivered and the amount and typology of resources to be used are identified and allocated accordingly.

21) Evaluation of GP

- How do you evaluate GP?

- What kind of tool are used?
- How do you evaluate technologies?
- How do you evaluate services?
- How do you evaluate the QoL?
    - How did GP improve quality of life of elderly in comparation without e-Care service?
    - What methodology has been used?
- Effects on mortality
- Effects on morbidity

See answer 22 and 3) Clinical effectiveness

22) Stratification of end users (patients, seniors)

Starting from 2009, Bologna, realised a multi-varied predictive model able to evaluate frailty, defined as the risk to incur one of the following events in the subsequent 12 months: urgent hospital admission, state of non-self-sufficiency, death. The risk score (Synthetic Index of Frailty) is calculated individually for every subject over 18 of age, resident in the whole city (over 300.000 subjects), through an algorithm combining over 50 indicators, calculated on the basis of socio-health data coming from different informative sources (repositories and databases from municipalities, health data from hospitals, local health authorities and regional aggregated data). It was thus possible to realize an informative socio-health system able to identify the frailer subjects and the conditions which determine the most risk of non-self-sufficiency, to make them available to clinicians, socio-health operators, primary care equips on the territory, with the aim to favour a preventive take-into-charge. The crossing of existing social and health databases allowed us to build the social and health history of the patient, and to calculate his/her risk of frailty.

23) Transferability of GP

- Regional/national/international

  The network is also well established in the city of Ferrara. Moreover, the experience of e-Care network is the base for an upcoming evolution of the service and its experimentation in other regional cities and regions. The e-Care Service can be considered as a reference model for the integrated care and monitoring of the frail elderly and can be placed within the systems promoting active and healthy ageing with the purpose to delay the onset of serious diseases. The service can be addressed towards different levels of frailty and particularly towards elderly with a lower level of frailty, to whom prevention should be focused the most. The scaling up of the service and the provision of support to a greater percentage of elderly is sustainable with a larger engagement of local organizations and volunteers. The model can be easily transferred and adapted to the different social and territorial contexts.

24) Any additional useful information, description, illustration

25) Barriers – organizational, technical etc.

Scepticism is the first barrier. None of social and health workers tend to recognize the role of a light prevention service such as a friendly-word approach. They often don't consider loneliness a need. If you never test frailty you cannot understand this kind of difficulty. Caregivers, for example, became more and more frail because of their condition. They are completely alone with sickness. Frailty is a complex condition, a sickness because each operator thinks to have given assistance enough. But caring is not a sum of pieces of answers. e-Care considers frailty from a social point of view of sickness. In fact, e-Care obtains a large approval in emergency time, when traditional care explodes, and when operators have not enough resources. This is a big mistake; it is an attitude against preventive organization.

e-Care wants to involve community. When a problem is very large, the solution has to be large. None can think to solve frailty alone, in Italy. Social assistants think to be excluded by e-Care. Because they don't recognize the strength of listening ability. This is typical of health operators, too.

e-Care operators are confident and seniors trust in them.

## Frailty index description

**A new way to tackle the issue of frailty in the elderly**

Frailty is not tantamount to disability, but it is a direct precursor that connects the biological and subjective dimensions related to the loss of strength and adjustment to negative events and change factors. Providing support to frail individuals thus means to prevent and delay the time of loss of independence, when the care need arises.

Frailty factors can be broken down into three groups: functional, clinical and social ones. Functional factors are related to the person's difficulties of performing daily living functions, such as feeding, exercise, personal hygiene, care of one's living environment and reduced sensory perception and postural stability. Clinical frailty is instead characterized by the presence of multiple pathologies often related to complex multi-drug treatments, chronic disorders and pain, falls and loss of weight, memory loss and disorientation, as well as many cases of depression. Finally, social frailty is determined by social isolation, inadequate housing, in remote or disadvantaged areas, low-income, loss of social role, lack of help from family members and friends.

Frail people are, however, still able to live independently, although in a high-risk disadvantaged situation (due to functional, clinical and social reasons). They must therefore receive help to retain their residual independent living capabilities and to enhance their socialization skills. As stated in the 2007 Emilia-Romagna Region report[i],

"Traditional approaches to the elderly population's demands and needs are still characterized by a specific, if not exclusive focus on care needs, according to the equation comparing the elderly to sick or disabled subjects. This pessimistic view engenders direct and indirect effects on mental well-being of the elderly by acting as a catalyst of dependency conditions. The lack of social opportunities and resources, be they professional and/or recreational ones, reduces, in fact, older people's social involvement in the community. On the other hand, biological life and mental life work in close and essential relationship with the surrounding environment and the deprivation of environmental stimuli reduces the individual's adjustment capabilities, regardless of their age."

Furthermore, according to the Regional Fund for Non Self-Sufficiency programming Resolution,

"the promotion of a network organization involving the various institutional stakeholders in charge of issues related to old age as well as non institutional partners, who although not playing a formal role, are available

to make their competences available for the well-being of the elderly, is the most suitable tool to implement successful actions and to enhance existing resources"[ii].

It is therefore necessary to think about frailty not only as a situation of need, but especially as a phase of ageing, which, sooner or later, will be reached by all older people, regardless of their social/economic/physical/psycho-relational conditions. Everyone, in fact, is confronted with a risk of progressive reduction of social relationships, loss of interest, decreased functional ability, growth of apathy and inactivity, loss of motivation and reason of living. With this principle in mind, acting on frailty means not only focusing on the elderly needs, but also promoting new pathways to be explored so that any senior citizen can learn to retain one's skills and discover new interests and relationships. In particular, it will be necessary to address/involve individual seniors in projects/activities that can stimulate and enhance their skills. Thus, acting on frailty can, first of all, become a means to analyze knowledge, interests, stories, skills, capabilities, expectations of the elderly and then be an incentive to keep under control all those situations/relationships, in which these aspects can be maintained and expressed.

Therefore, the voluntary sector, third sector organizations as well as profit-making companies were able to play an important and decisive role within the Network, since its very beginning. This is even more important, in consideration of the limited resources available and the inability by health and welfare services to take action on the problems inherent to frailty, both because traditional services are not very effective and also because they are burdened by the growing demand for care from the dependent frail elderly and their families.

The project developed in Bologna enhances the important role played by the partnership between local authorities, third sector, voluntary associations, social partners and citizens and their agreement on a common strategy to identify, prioritize and monitor frail elderly people (both in relation to their needs and potentials) in order to promote a more active life and more appropriate behaviors for the prevention of disability, or to guide them towards more adequate services to receive care, in the event of more critical situations. Hence, there is an increasingly greater awareness of the need for a "holistic" approach to population ageing related issues. Healthy ageing depends on one's ability to maintain an active lifestyle and on a variety of factors, which are closely interrelated, involving all aspects of life at community and individual level. People are becoming more aware of the fact that health initiatives alone are not sufficient for the prevention of risk factors and protection of health. Nor is it any longer acceptable that social services continue to assume that those elderly people not demanding for any types of services are healthy, socially integrated and active elderly people, and thus tend to take action only when it is undelayable, often during an emergency.

If it is true that all the factors that make up the life of an individual in one's community are associated with their ability to better cope up with ageing and with the onset of the first signs of frailty, then it is high time for the community as a whole to act, involving all its stakeholders, in order to take charge of these issues and contribute to their solution. Over the past few years, much has been said about Smart Cities and Smart Communities: the Digital Agenda for Europe 2020[iii] focuses on these very concepts. Local Digital Agendas have been developed by individual European nations, regions and cities. What is still not sufficiently clear

is that the “smart” notion is not only linked to citizens’ right to high-speed connectivity and to access to services with high digital content, but also to the development of a real “smart” community that is able to promote welfare for all citizens and, in particular, for the most vulnerable and frail ones, such as the elderly, and do so in a coordinated manner, also through innovation made possible by ICT technologies.

# Care and technical solutions at EU level

## Baseline Assessment of Frailty application

Organisation name:

**Biomedicine and Prevention Dept, University of Rome "Tor Vergata"**

http://www.longlivetheelderly.org


The Baseline Assessment of Frailty (BAF) app is a computer app that allows to fill the BAF questionnaire. The questionnaire will initially be developed on the open source application platform "limesurvey", distributed under the GNU GPL license, installed on our server and by a mySQL database, developed specifically to achieve questionnaires and online surveys. It is possible to use for individual assessment and get an immediate answer, or to store and export data for analysis of a group of questionnaires.The set up of a mobile app that works even in offline mode to facilitate data collection in areas not served by the Internet, is under development in order to allow the storage of data when the infrastructure allow it . This is a first level questionnaire to assess the frailty status, made up by two questionnaires already validated: the Risk Instrument for Screening in the Community and the short version of the Functional Geriatric Evaluation (SFGE).

The RISC  can be used to quickly screen large numbers of patients to identify and stratify those at greatest risk of three adverse healthcare outcomes (institutionalization, hospitalization and death). These patients can then be triaged for further assessment, investigation and treatment with integrated care bundles or other management strategies that are location or service specific. The RISC tool collects demographics, records concerns, the severity and ability of the caregiver network to manage three main domains (mental state, ADL state and medical state issues). It then summarizes the perceived risk using a subjective, global score of risk based upon a five-point Likert scale measured from 1 (minimal-rare risk) to 5 (extreme-certain). The RISC was developed as an exemplar under the EIP on AHA reference site COLLAGE, Ireland’s only

reference site for active and healthy ageing. It has been translated into multiple languages including many of the languages of the SPRINT (English, Dutch, Italian, Spanish and Portuguese). It has been validated in multiple sites in the EU as part of work conducted in Action Group A3 of the EIP on AHA including in Porto and Barcelona. The RISC stratifies risk of adverse healthcare outcomes by measuring the magnitude of functional, physical or state mental concern. Sometimes although the concern may be minimal, the lack of formal and/or informal caregivers may elevate or even multiple that risk. It is scored as a five-point global risk score from 1 to 5, where 1 is the lowest risk and 5 is the highest of an adverse healthcare outcome. Patients can be grouped into minimum (RISC scores 1 & 2), moderate (RISC score 3) and maximum-risk (RISC scores 4 & 5) to facilitate analysis.

In case there are no concerns in these three domains a second instrument, the SFGE, assesses the risk of negative outcomes in individuals with no or minimal physical and/or cognitive impairment by exploring mainly socio-economic domains. The Functional Geriatric Evaluation (Scarcella 2006) has been validated for the predicting of negative outcomes within 5 years from the administration in an Italian population. It is also a multidimensional instrument derived by the Geriatric Functional Rating Scale, designed, tested and validated by Grauer in 1975 and introduced in Italy by the working group of the Epidemiology Laboratory of the University of Tor Vergata, Rome (Grauer 1975, Bartoli 1990, Scarcella 2006 Palombi 2000). Five years later, the survival and institutionalisation rates of the enrolled elderly were checked. In its original version the questionnaire had been already tested successfully for its predictivity on a follow up of 60 months (end-point) for deaths and institutionalisation (Scarcella 2006). The scale is composed of 7 sections plus one introduction section where socio-demographic data are collected. The other sections are aimed to evaluating: Physical condition, Mental Health, Functional Status, Community Support, Housing, Social Relationships and Financial situation. For each section a score is drawn up which represents the sum of the scores from each question in the section itself. The seven sections are gathered into two major areas: the first examines physical and mental abilities; the second, functional abilities and socio-economic resources. Finally, the sum of the synthetic scores provides a final synthetic score (FSS) that varies between -118 to +91. At the end of the questionnaire it is possible to calculate the Final Synthetic Score (FSS) of the subjects. It has been studied, through methods of multi-varied analysis (analysis of the multiple correspondences – statistic packages SPSS 9.0), a kind of subdivision that can scale the care needs of the elderly, based on FSS. The questionnaire identify three level of risk of death and institutionalization: low ($FSS \geq 50$), moderate ($10 < FSS < 50$) and severe ($FSS \leq 10$). The questionnaire has been already used for risk assessment in several population studies in Italy. The Short Functional Geriatric Evaluation (SFGE - Appendix 5) is the synthesis of the Functional Geriatric Evaluation (FGE) questionnaire already validated for the predicting of negative outcomes within 5 years from the administration in an Italian population. The SFGE shows good correlation with the FGE (Spearman Correlation = 0.82, $p<0.001$ tested on 203 individuals) and share with the FGE the classification of patients in the same three level of risk of negative outcomes in the following 5 years.

The interviewed are defined frail if one of the two questionnaires indicates a moderate risk of negative outcomes, and very frail if a severe risk is indicated by one of the questionnaires

## Identification of frail elderly by HIS and GPs

Organisation name:

**Department of Epidemiology, ASL Roma 1, Lazio Region**

VIABILITY CRITERIA

★★☆☆ Time to deployment
★☆☆☆ Investment
★★★☆ Evidence
★★☆☆ Maturity
★☆☆☆ Impact
★★☆☆ Transferability

In Lazio, a prognostic indicator applied to data available in HIS allows for the identification of frail population subgroups. The information accounts for socio demographic characteristics, hospitalizations, emergency room visits, drug consumption. Regarding the population at high risk of multiple hospitalization, about 25% of 65+ year old are classified as “intense” users of the health care system.

## PERsonalised ICT Supported Service for Independent Living and Active Ageing

Organisation name:

**Federico II Univerity Hospital, Naples Italy**

VIABILITY CRITERIA

★★★☆ Time to deployment
★☆☆☆ Investment
★★★☆ Evidence
★★★☆ Maturity
★★★☆ Impact
★★☆☆ Transferability

PERSSILAA, a FP7 funded European project, develops and validates a new service model, to screen for and prevent frailty in community dwelling older adults, integrating nutrition, physical and cognitive function. PERSSILAA develops remote service modules for screening, monitoring and training. Screening - easy to use tools to get an overall picture of a person’s health status. Monitoring – unobtrusive monitoring of everyday functioning. Training - remotely available health promotion programs. PERSSILAA innovates the way our care services are organized from fragmented reactive disease management into preventive personalized services

offered through local community services, supported by a proactive team of caregivers and health professionals and integrated into existing healthcare services. PERSSILAA realizes a technical service infrastructure to support these multiple services and users in an efficient, reliable, easy to use way and therefore works on gamification, interoperability and clinical decision support. PERSSILAA builds on activities within the European Innovation Partnership on Active and Healthy Aging and on results of various earlier European projects. In the project, there is continuous end- user involvement and evaluation with 350 older adults in real implementation environments in Enschede (the Netherlands) and Campania region (Italy) to ensure increasing system efficiency and easy end-user acceptance. Outcomes focus on daily activities, quality of life and risk of hospitalization. PERSSILAA builds business models for sustainable implementation and develops recommendations for European guidelines.

## Population Risk Stratification: Deployment of Stratification Methods in the Basque Country

Organisation name:

**Basque Ministry of Health, Region País Vasco, Spain**


Within the Basque Country healthcare system, a customized version of the Adjusted Clinical Groups (ACG) Predictive Model is used for risk stratification (RS). The aim of the risk stratification is mainly case finding; RS is deployed to stratify the entire population of the Basque Country being by next year' healthcare cost. Then population is classified in four groups according to the presence or not of a chronic disease, with a special focus on the 95th percentile of chronic population. To stratify by use of healthcare resources allows identifying and selecting target populations that may benefit from specific programs of action. The RS model is based on diagnoses, socio-demographic data, pharmacy data, prior health care utilization, and socio-economic data. Currently work is being carried out to develop mechanisms to perform a periodic evaluation and optimization of the RS model, and to improve the tool enabling data collection in a more regular basis.

## Advanced Risk Modelling for Early Detection

Organisation name:

Digital Health and Care Institute, Glasgow, Scotland


Aspects of health and social care The shifting demographics will continue to have a significant impact on the demand for health and social care services. There is a gap between normal, independent living and the telecare services someone receives after a major fall and / or hospitalisation. This practice focuses on allowing a person to use ubiquitous and non-stigmatising consumer technologies to act preventatively, pre-empting negative events and remaining independent for longer. General and specific objectives By identifying at-risk individuals sooner, there is potential to improve quality of life and save millions of pounds from the public purse, by changing care delivery, increasing self-management and reducing hospital admissions. Specifically, to recruit 150 users in year 1 (completed), 750-1,000 users in year 2 (in progress) and 7,500-10,000 in year three. Main methods, processes and organisation ARMED focuses on key metrics associated with frailty and risk of falling, such as low grip strength, muscle mass, hydration levels, low heart rate and heart rate variability. These can easily be monitored and measured from the comfort of an individual's own home using the latest wearable technologies. Data captured helps identify a variety of frailty indicators that would have previously gone unnoticed, such as Service Users who are significantly dehydrated or have a reduction in grip strength. It helps identify risk trends through Service User weight loss or a reduction in muscle mass, despite an increase in weight and direct fat. It highlights restlessness at night, which flags up ongoing risk during the day.

## ICT services for Life improvement for Elderly

Organisation name:

**HOPE - European Hospital and Healthcare Federation**


Almost 10 million Europeans live with Parkinson's, Alzheimer's, and other dementias today. As a result of ageing, the number of people affected by one of those conditions is forecasted to double by 2030, making them a major health challenge. Those people want to live at their own homes, but because of their symptoms, they face difficulties in the daily life both in managing their own care and in living independently. ICT4Life is a three-year project funded under Horizon 2020, the EU Framework Programme for Research and Innovation, with the ambition of providing new services for integrated care employing user-friendly ICT tools, ultimately increasing patients' quality of life and autonomy at home. To reach this goal, ICT4Life is conducting breakthrough research and radical innovation and will implement the ICT4Life Platform. Such a platform will deliver a series of innovative services to patients affected by Parkinson's, Alzheimer's and other dementias but also to health professionals and formal and informal carers. All solutions are developed following a user-centred methodology and tested in real life scenarios. The real case scenarios concern three European countries -France, Hungary and Spain to test ICT4Life services, measure the effects of treatment and evaluate project developments and acquired knowledge about co-morbidities related to these diseases. The project consortium brings together nine partners representing academia, industry and users' groups, all committed in improving patients' lives and advancing Europe leadership role in personalised services for integrated care.

The objective of ICT4Life consists in implementing an innovative platform that connects patients, families, health professionals and care-givers through user friendly tools, using results of a research on emerging technologies. The platform is aimed at facilitating patient empowerment, supporting care-givers and establishing cooperation channels within professionals for integrated care.

Main goals of ICT4life project are:

- Monitor the patients in real-time to alarm and call for early intervention;
- Prevent fall risk, social isolation, depression, poor well-being and inadequate medication management;
- Promote patient's independency, safety and social involvement;
- Provide on time support to care-givers, helping them to feel less stressed.

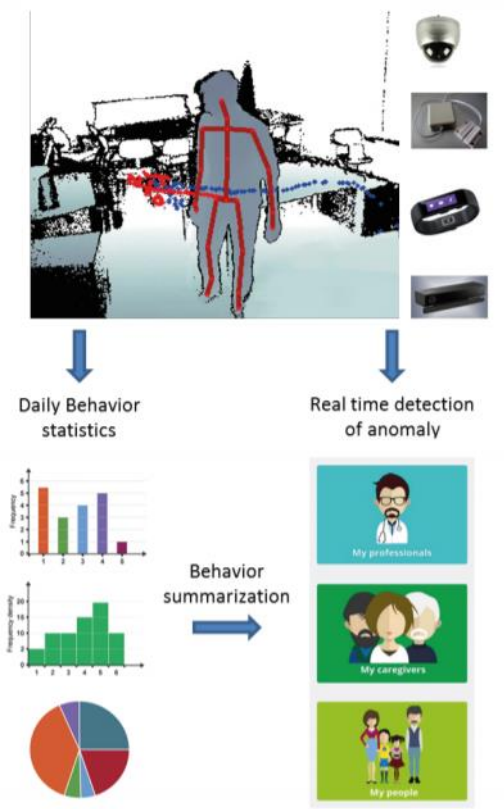


Fig. ICT4LIFE platform

## Catalan open innovation hub on ICT-supported integrated care services for chronic patients

Organisation name:

**Institut d'Investigacions Biomediques August Pi i Sunyer (IDIBAPS); Hospital Clinic de Barcelona (HCB) & Universitat de Barcelona (UB)**


The Catalan Open Innovation Hub on ICT-supported integrated care services for chronic patients aims to foster a collaborative network at European level in terms of generation, deployment and evaluation of digitally-supported innovative health services. The practice is conceived to serve the entire population of Catalonia (7.5M citizens), Spain (ES). However, the target group are chronic patients with focus on multimorbidiy management and on coordination with social support and dependence. Accordingly, it encompasses both vertical (specialized vs. community-based care) and horizontal (healthcare vs. social support) integrations, combining a population-health orientation with a collaborative adaptive case management approach. The Catalan Open Hub promotes and assesses the transfer of care complexity from hospital-based to community-based care aiming at generating health value both at provider and at health system level with a triple aim approach (i.e., Improve Population Health, Improve Care Experience and Reduce per Capita Cost). Ultimately, the practice fosters the transfer of biomedical knowledge and technologies to healthcare service providers, health-related actors and industry. The initiative would like to generate a significant contribution of Catalonia toward a more efficient healthcare scenario in the 21st Century, based on the following strategic areas: Deployment and assessment of ICT-supported integrated care services. Priority is given to services focused on prevention, enhancement of patients' resilience to disease and rehabilitation. Application of holistic strategies for subject-specific risk prediction that consider multi-level covariates influencing patient health in order to increase predictive power and enhance clinical decision-making based on sound estimates of individual prognosis. Alignment with the Big Data Analytics Master Plan promoted by the Catalan Health System (SISCAT) fostering adoption of cloud-based services in real world settings.

## Home Care for Early and Protected Hospital Discharge (Assistenza Domiciliare per Dimissioni Protette)

Organisation name:

**University of Salerno, Department of Medicine and Surgery, Scuola Medica Salernitana**


Chronic multimorbid patients often have access to hospital for the reacutization of one condition, but once in the hospital, often the discharge is delaied by the exacerbation of the other conditions. The longer the stay, the more the conditions exacerbate. FOr this reason, early discharge represent an important target in the management of hospitalized patient. To favor this strategy, ADD protection has developed an ICT based home monitoring provided as a service by a private company of home care, that allow the hospital staff to follow the patient at home, like it was still in the hospital. The data collected at the place of the patient are made available to the staff of the hospital through a web based platform, that feeds the hospital eHR of the patient

## A Maturity Model for Adoption of Integrated Care within Regional Healthcare Systems (B3 Action Group)

Organisation name:

**European innovation partnership on Active and Healthy Ageing - B3 Action Group**


B3 members have worked together to develop practical tools that support service local service delivery. One of them concentrated on Maturity models focusing on three key areas: organisational models, change management and the development and adoption of eHealth programmes and teleservices to support integrated care and service innovation, were developed.

These models were subsequently converged into one comprehensive model - the B3 Maturity Model. This model covers a broad range of areas relevant for implementing integrated care and functions as a self-assessment tool that provides objective measurement and guides regions how to improve their capacity to deploy services.

The SCIROCCO tool is a participatory tool which helps regions to:

- Understand the strengths and weaknesses of their regional context and inform national, regional and local policy-makers about potential areas of improvement;
- Adopt and transfer integrated care good practices by identifying their maturity requirements, thus facilitating knowledge transfer;
- Facilitate multi-stakeholder dialogues focused on progress towards the implementation and delivery of integrated care;
- Facilitate twinning and coaching activities between regions by helping them to understand the local conditions that enable the successful deployment of integrated care.


Fig. SCIROCCO Maturity model

## Digital Home

Organisation name:

**Consellería de Sanidade de Galicia (The Galician Health Ministry)**


Digital Home was promoted by Consellería de Sanidade through its healthcare service provider (SERGAS) involved a PPI contract gained by a Joint venture formed between two ICT companies. Telemedicine is one of the clearest proposals to successfully solve the needs of improvement of chronic patients care and at the same time improve the sustainability of the system. Under the Digital Home Assistance concept is encapsulated products and innovative services to improve the citizens quality of life in the home as well as in other social environments in general, which materialise through the implantation of intelligent information devices and systems which support the communication of health information orientated around the prevention and promotion of health, the vigilance and monitoring of pathology (especial the chronic type) or which constitute an access channel to the Health Services used by patients or citizens themselves. The implantation of these services constitute the primary steps in the transformation of the care model towards a new paradigm which look to improve the efficiency of the current processes and the quality of the services delivered to the patients, pursuing the implication of these services so that they contribute to the management of their health, converting them into an agent of the Health system and, in the medium term, into experts managers of their illnesses. Hogar Digital Platform was created to empower patients affected by various chronic diseases. Patients can send and receive health information to/from clinicians. The platform allows the development of a care and self-care and treatment agenda, prescribe diets, offer recommendations for exercise, and it can include a variety of multimedia content like videos, presentations, etc. to support the patient and/or caregiver. Hogar Digital also includes seamless integration with a sensor network to monitor some basic patient features and it represents a powerful tool to establish a double communication between patient and clinicians. The system works effectively with patients that introduce their health data, symptoms and diets in the Platform. Moreover, it is needed to highlight that all this information is integrated in the Galician Electronic medical record. The implantation of these services constitutes the primary steps in the transformation of the care model towards a new paradigm which will look to improve the efficiency of the current processes and the quality of the services delivered to the patients, pursuing the implication of these services so that they contribute to the management of their health, converting them into an agent of the Health system and, in the medium term, into experts managers of their illnesses. The benefits obtained with this new model include:

- Minimize the number and the duration of hospital admissions of chronically ill patients, by establishing a better control of the monitoring parameters, early detection of possible alterations that require modification in the pathological treatment.
- Optimally re-using the time of Health professionals by reducing the number of follow-up consultations generated by the high number of chronically ill patients.

Establishing collaborative environments that generate medical knowledge and making this available to the health professionals quickly and accurately. One of the existing challenges is making the system useful for a population without knowledge of IT or disabilities. Besides, Hogar Digital is likely to be connected in the future to social media and third party medical apps providing a powerful tool for patients and clinicians, as it has the capability to be connected to EMR systems. Despite the current powerful and relevant features, the system should be completed with more advanced tools and methods for assessing adherence, detection of the defaulting patient, analysis of the factors that determine the failure or implementation of strategies directed to the patient or caregiver. It also lacks of "smart algorithms" to provide reactive information (like alerts of inappropriate adherence by patients, of absence of enough exercise, etc) to patients and clinicians.

## TELEMEDICINE FOR REAL LIFE INTEGRATED CARE IN CHRONIC PATIENTS

Organisation name:

**Salvatore Maugeri Foundation, Pavia Italy**


The Service consists of a structured telemedicine program differentiated for the types of chronic disease involved. From year 2006 up to now chronic patients (chronic obstructive pulmonary disease and chronic respiratory insufficiency, chronic heart failure, amyotrophic lateral sclerosis, post-stroke and post-cardiac surgery) discharged from our Istitute after a period of in-hospital rehabilitation were admitted to our program. The length of the program differed among diseases. The Telemedicine service consists of a structured physician-directed and nurse-managed telephone support and telemonitoring. An educated and dedicated health team is involved, including specialists, nurses, physiotherapist and technical personnel. A nurse-tutor has the key role in the service, connecting all the hospital and home personnel by telephone.

The intervention consists of four principle components:

1) pre-discharge education sessions on the disease and its therapy,

2) regularly scheduled telephone coaching,

3) home telemonitoring in reale time of different parameters (weight, blood pressure, heart rate, saturation, etc.) and assessment of scales to help patients to detect worsening symptoms,

4) A specialist second opinion for nurse or patient' GP if necessary. The devices supplied for remote telemonitoring depend to the principle problems of the patients. Where rehabilitation sessions are present, a videoconference solution is provided.

## Integrated health and social care/services in Policka region

Organisation name:

**Svazek obcí AZASS (Association of municipalities), Polička region, Czech Republic**


General and specific objectives of the practice is to provide holistic set of support/care/services (health and social care) tailored to the needs of people with reduced self-sufficiency due to illness, disability or frailty and to support their carers so that they can stay at home or in their community as long as possible. It includes close interdisciplinary cooperation within Association of all local/regional municipalities (AZASS) facilities and services (post-acute and long-term care hospital, primary care physicians/specialists, social rehabilitation and occupational therapy as well as home care, respite and residential services for elderly and housing) to assure person centred and continuous support to those in need in the region. - Main methods, processes and organisation. The services are operated by purposely formed association of 27 municipalities (AZASS) to share decisions, strategy, property and services.

The structure was designed to assure stability, subsidiarity, democracy and to face instability of political cycle. AZASS owns the hospital and all the services mentioned previously that have one executive leadership. Each municipality has proportioned vote according to number of citizens, but none can have a majority (so they need to look for common agreement). Executive board (5 mayors) manages and set rules for the director of the services. Supervisory board is formed by professionals (doctor, economist) and 3 mayors. Ad hoc commissions are formed to prepare strategic projects, so that experts and public can participate to create solutions for local problems.

The director is negotiator in all those activities, suggest and recommends to mayors, but has to respect their final decision. Key aspects that can be transferable: Structured rules of cooperation on the development of AZASS shared by municipalities Intense personal cooperation and communication with stakeholders and municipalities Whole person approach to planning and provision of care/services including caregivers (carers) and their environment Close ties to the region and its citizens (inhabitants).

## Carealia

Organisation name:

**Carealia, Thessaloniki, Greece**


Carealia aims to bring affordable, cost- and time-effective ICT solutions to dementia care for the wider public. Specifically, the company builds smart monitoring systems to assist in the care of dementia in homes and nursing homes. Interconnected devices, such as wearable and ambient sensors, combined with intelligent algorithms and clinical knowledge, support doctors and nurses to accurately and reliably assess symptoms and behavioral patterns relevant to the disease, leading to effective interventions for improved care and quality of life. Carealia is a spin-off company of the Multimedia Knowledge and Social Media Analytics Laboratory (MKLab) of the Information Technologies Institute (ITI) and the Centre of Research and Technology Hellas (CERTH), specialized in the provision of intelligent systems for the assessment, remote monitoring and support of people with dementia and their caregivers. The company was founded in 2016 after CERTH's coordination of the Dem@Care (FP7 IP - www.demcare.eu) project during 2010-2015, in order to further exploit its findings. In detail, our vision is to disseminate affordable, time- and cost-effective eHealth solutions to the wider public at an international level. Our mission is to contribute to the timely diagnosis, assessment, maintenance and improvement of the quality of life of people with dementia, by deepening the understanding of how dementia affects their everyday life and behaviour. Carealia's experience originates from the participation of its founders to several EC-funded and national ICT and clinical research, through which valuables synergies with nursing homes, memory clinics and patient organizations in Europe have been forged. The interdisciplinary team is comprised of clinical psychologists, IT and market experts. Since its foundation in 2016, Carealia has established installations and partnerships in Greece and Sweden, reached the top ten finalists (out of more than a thousand) of the Hellenic Entrepreneurship Award the same year and been featured in multiple nation-wide events and media.

## EMILIA ROMAGNA: E-CARE NETWORK

**Organization name: AUSL Bologna, Italy**

The eCare Network for frail elderly people was created in 2005 and consists of a technical and social network of citizens, associations, institutions and professionals. It provides a relational and support ecosystem to frail elderly people and is organised in an innovative management model which anticipates care needs in order to delay non self-sufficient conditions. The e-Care service in Bologna was launched in 2005, counting a little over one hundred senior users. Since then, the service has evolved into a relational network, given both the number of assisted seniors, and the number of citizens, institutions and professionals involved. By the end of 2012, about 12 000 people were assisted by the e-Care service (80% women and 20% men). The growth is due, partly to the offer of provided services, which has continuously grown throughout the years, and partly to the inclusion of frail persons identified thanks to the “Frailty Database” established after 2011.

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### INNOVATION, IMPACT AND OUTCOMES

Including the third sector, such as associations and volunteering organisations, is one of the most distinctive and unique characteristics of the experience in Bologna. The eCare Network operates with the objective of a growing and always better involvement of all subjects, especially non-institutional ones, offering some form of support or service to seniors and frail people. Currently, the associations belonging to the network and actively collaborating at the municipal or neighbourhood level are approximately 225. Moreover, over 90 social and recreational centres are involved, while approximately 30 are volunteering associations operating at the entire provincial level. The portal Bologna Solidale (www.bolognasolidale.it) was developed as part of the e-Care Network, to provide an easy to use tool for social workers, seniors and their families to gather information on organisations and events and promote socialisation. Evidence on costs and quality of life is an undergoing activity, results will be made available shortly.

ETHICAL ISSUES

The service is fully compliant with rules on privacy and data security and regular agreements with the Local Health Authority of Bologna have been signed.

TRANSFERABILITY TO OTHER REGIONS

The ageing of the population is one of the highest priorities of action for any public organisation. The e-Care Network is a new and sustainable method which can optimize the use of healthcare resources, delaying the onset of non-self-sufficiency conditions. The support of a well-structured population based database and the involvement of different categories of social and healthcare professionals is an example of good practice appreciated and studied all over the country.

## Discussion and Conclusion

The main goal of the deliverable was to analyse and recommend good practices in the field of active and healthy aging, which in an innovative way will positively affect the aging process and significantly increase the quality of life of seniors. Of course, support for the transfer of such examples of good practice into practice also aimed at the sustainability of the health and social system.

The assessment of the good practice was performed by its insiders from the Region with the aim to enable informed decision by the adopters. Assessment by MAST model confirmed that the practice is viable but certain conditions are necessary to observe. More detailed insight into the practice and its operation can be found in step 3 where the answers to specific questions provide invaluable information including existing barriers, costs, timing, education and training and management aspects this part will the part of final model description. It is clear that concept and design of a new service at the adopter with similar objective as in Bologna will have to respect local conditions given by the local health and are systems as well as culture and economic conditions.

The review performed in this part of WP1 can be considered as important step in the development organizationally better care of fragile patients discharged from the hospital, with coordination of involved parties based on ICT technologies.

A structured template was created for processing the outputs, which was created by describing the individual health and social systems in order to be able to distinguish individual differences in the partner regions. The formulation of questions in the next part corresponds to the structure of the use of individual methodologies for the evaluation of good practices based on the methodologies Momentum, MAST and MAFEIP with a focus on integrated care. The output consists of a general description of the specifics of individual systems and focuses mainly on digital tools which were designated to the partners according to the responsibility matrix.

Good practices that can positively influence the onset and progression of a chronic disease, or its gradual development and self-sufficiency of seniors are most relevant. Those are the ones that focus on prevention,

screening and early diagnosis of diseases, treatment and care and those that support independent living and active aging.

As an extensive approach to the provision of care, ie. the introduction of measures that will only require additional material and human resources (such as the establishment of additional long-term care institutions, the expansion of bed capacity and the deployment of additional staff), is difficult to sustain, it is appropriate to focus critically on innovations using information and communication technologies that will help to improve the organization and the use of existing resources and can to some extent replace routine human work at the place of residence of the patient without always having to travel, eliminating human factors negatives, such as accuracy, early notification and recording of past events.

Global trends in the field of health and social services are characterized by the need to integrate services, strengthen the position of the patient, strengthen the role of prevention, education from an early age, increased role of communities and the patient's (client's) close surroundings, deinstitutionalizing of the care and striving to keep the senior in his home environment. This is also evident from the current outputs of the project.

As was mentioned in introduction section good practice from has its own organizational and technical specifications:

**The technological and organizational background of the eCare Service**

The experimental project was made possible in Bologna and in the Emilia-Romagna region starting from five major technical and organizational "Enablers":

1. The presence of a high-tech network that connects all the 4,000 General Practitioners and Primary Care Paediatricians with the public hospitals of the entire Region (the S.O.L.E. – Sanità On LinE – Health On LinE Network), which makes it possible, among other things, the exchange of information and advice between professionals and the integration of General Medical Practitioners' records with medical reports and examinations carried out in all regional facilities, as well as the hospital discharge letters;
2. The well-established Electronic Personal Health Record, made possible by the Health On LinE Network, and developed on the basis of Ministerial Guidelines and European Community legislation. The Electronic Health Record, through a customized "My Page", presently allows citizens to collect and manage all their health data; in the next future it will be possible to also collect their socio-health data;
3. The presence of a public company, such as CUP 2000 S.p.A., which works as "in-house provider" operating on behalf of its public shareholders (the Emilia-Romagna Regional authority, the Municipal and the Provincial authorities of Bologna, all 17 Local Health Authorities, including local out-patient and Hospital facilities at the regional level). CUP 2000 is a major Italian company with very high expertise in eHealth and eWelfare, entrusted by the Regional authority with the task of

implementing the two above mentioned projects, which are two best practices at both Italian and European level;

4. The experience acquired by CUP 2000 and by the Local Health Authority of Bologna, in several projects funded within the framework of European research programmes[iv], focused on the themes of Telemedicine and Information & Communication Technology services for home-based care of the elderly;
5. The Decision by the Emilia-Romagna government which has set up the Regional Fund for Non Self-Sufficiency. Emilia-Romagna is the only Italian Region that has set up a special *ad hoc* fund, fed through a specific tax income dedicated to interventions in furtherance of the prevention and care of dependent elderly people. About 450 million euros are allocated each year to the Regional Fund for Non Self-Sufficiency, that is aimed at the development and enhancement of an integrated flexible service network, evenly distributed throughout the region, centered on the needs of dependent elderly people, of their families and caregivers, with a specific focus on activities in support of frailty and prevention.

There are many technical solutions across the EU that support frailty people in order to prolong their active lives. Most of the solutions are based on the principle of integrated care and for this reason the good practice from Bologna was chosen. It ensures the connection of health and social care. A great benefit of the Bologna good practice is the transferability of the whole solution across Italy. As part of the search for technical solutions it was used a verified database of good practices, where the criteria were such that good practice must use ICT solutions or contain elements of integrated care, focusing on the fragility of seniors.

Within the European Union, there are many approaches to the integration of care and therefore it was necessary to evaluate good practice from several perspectives (see the introductory part of the document). The evaluation was based on the MAST methodology, which was supplemented by the Momentum methodology and elements from the so-called Scirocco Maturity Model. In the subsequent search, it was found that there is a similarity of individual solutions that use the principle of integrated care and in comparison with other good practices, the Bologna practice is at the same level in terms of its transferability.

Digitalization of health and social care is still in many cases considered as a complementary tool that fully fits into the existing model of health and social care, at best it will improve this care and speed up administrative procedures. Ambition in the form of systemic adjustments so that the citizen is at the center of care and is enabled to age actively and healthily in his home environment, similarly to the most advanced states and regions in the EU have recently started to do so.

The need for coordination of several care providers, while the current financial flows are not properly adjusted to motivate entities, regardless of the type of ownership, to activities beyond the scope of contractual ties with insurance companies and financing from central births. An appropriate approach to

the integration of care, either only within health services and also including social services (some good practices show a certain degree of integration). In some cases, extending the powers of certain care providers (eg GPs) is also an issue.

Legislation that in many cases does not contain eHealth measures.

Motivation to expand or introduce new services enabling the support of the patient, the citizen in the home environment (ie the introduction of something new).

- supporting the elderly at home through information, listening and support;
- reducing risk factors of individuals, by monitoring any types of frailty, and alerting the most appropriate (health, social, voluntary...) services for a preventive or emergency action depending on each individual case;
- improving socialization and quality of life;
- facilitating communication between local seniors, social and healthcare workers and social partners through remote companionship, guidance and monitoring services, integrating and coordinating (social and health) support "networks" that can help retain the elderly at home, through activities aimed at improving their quality of life, such as social, recreational and cultural opportunities for companionship and entertainment, thus countering the risk associated with "involuntary loneliness".

The analysis identified the following barriers that most affect the adoption of good practice:

- Barriers associated with the organizational structure
- Absence of interdisciplinary communication and cooperation
- Absence of interoperability and system integration elements
- Absence of wider awareness among professionals and patients
- Barriers to time and effort in implementing good practice
- Financial provision of good practice and its reimbursement from health insurance
- Technical barriers (infrastructure, connectivity)
- Low digital literacy associated with the target group
- Resistance to change / skepticism in relation to efficiency

Based on the above, the elements on which the Bologna good practice is based (Frailty index, Monitoring grid) were selected and supplemented by other digital tools, such as GPS localization, monitoring of the senior's natural environment, but also monitoring of senior sleep habits through an actigraph built into bracelet. Based on this, a model of care is proposed that will use a combination of these tools.

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The updated complete list of present and past European projects participated by CUP 2000 is available online on the English version of the company's website homepage, see: http://www.cup2000.it/en (retrieved October 3, 2013).