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**Latvija-Lietuva**

European Regional Development Fund



Project LLI-1 **Joint competence center for smart elderly care social services development**,  
Joint smart social services

## **Report on Requirements specification on new smart social e-services ICT system for elderly care in cooperating partners' network**

By discussing in common meeting of project partners as community members of Latvian and Lithuanian social care providers (PP\_2 and PP\_3), informatics engineering science representatives and other education Project participants (LP\_1) prepared common requirements on new smart social e-services for elderly care based on ICT solutions. Their input was discussed during last training session and the following results were developed.

The requirements were defined for physical and functional needs, which the new smart social e-services ICT system for elderly care is fully capable to perform. These requirements enable to form strategy of Joint Competence Center, develop trends and guidelines for the methodology of smart eldercare services.

### **ASSESSMENT: METHODOLOGY FOR PHYSICAL AND MENTAL ASSESSMENTS**

Population aging is a global issue. One concern is a shortage of hospital beds, making it necessary to provide more complex ICT care to the elderly with chronic or comorbid health conditions while they are living at home. At the same time, an aging population also reduces the availability of family caregivers. The problem is especially critical in EU societies, such as Latvia and Lithuania, where there has been both rapid aging of the population.

Body composition equipment showed a good way to develop new eating habits and to develop new regulations for physical activity improvements. Inability of an elderly to perform activities of daily living (ADL) and instrumental activities of daily living (IADL) necessitate external assistance, the amount of assistance necessary is a function of their level of independence. For many long-term care residents independence in certain areas is not obtainable therefore these areas are identified as functions necessitating assistance or total help.

In other scenarios, where people are simply unable to perform some procedures due to lack of limbs or dementia problems: other examples are Hypertension, Depression, dementia, arthritis, diabetes mellitus, allergies, anemia, congestive heart failure, cerebrovascular accident (stroke)., there exist better ways of determining blood pressure, oxygen level in blood and to determine other crucial parameters that affect the daily routines of the residents also surrounding them. Pattern of loss in these function categories vary by underlying disorder. People with chronic arthritis will have difficulties with all IADL and ADL involving mobility. Individuals with dementia will generally lose IADL before ADL because IADL require more cognitive skills while



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individuals suffering from severe depression may lose both ADL and IADL simultaneously. Admissions diagnosis change as resident progresses in a long term care facility.

**The aim of the report** is to highlight the necessity of the new developments of social services with ICT introduction. We suggest that a better solution for the both cooperating regions is to understanding the levels of the services currently in place and to segregate the outputs achieved. To separate good caring services from ordinary nursing home routines, we must determine for us that we are promoting and developing a client centered/oriented care services and homes as opposed to system centered. This means that to the greatest extent possible the system must be arranged so that it meets the needs of the residents and influences their daily routines in a positive manner. This influence must be seen through increased autonomy in daily routines and less dependency to the system/routine. This means that the people working in the system can understand the client/resident point of view and make an effort to working with his needs autonomously. To be client centered, the home has to involve ICT e-services in care planning and decision making as well as policy development.

**Physical assessment includes** the ability of a resident to make rational and issue related decisions and to have functional capabilities of performing them. Subjective health normally involves a perceived assessment of physical condition, as well as an evaluation of functional performance in activities and tasks of daily living. It is evident that health has a significant influence on life satisfaction in later life. Taking this in to consideration, it can be proposed that technologies impairments represent a factor of health that may also influence life satisfaction and provide agility to client oriented services. Nursing homes meet the physical, emotional and social needs of its residents with the introduction of the methods for autonomy. The assessment includes the resident's ability to move, his or her rehabilitation needs, the status of skin, any medical conditions that are present, nutritional state and abilities regarding activities of daily living. In the current situation, a care plan is prepared and this plan is subject to change as changes in the resident's condition occur. During previous trial before the start of the project there was obvious lack of autonomy that one of the issues that residents were not pleased with, they felt that they were not allowed to make choices in matters concerning their care; they also felt that they had to fit in the routine. Resident lacked personal space or privacy, and they lacked independence. Residents felt that they were not allowed to do thing that they were capable of doing, instead things were being done for them.

In some cases, the nursing home residents are unable to communicate their needs to the staff, therefore we have developed an opportunity for them to look for problems and solutions despite unable to having physical contact at 100% time for the



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assessment. Such opportunities gave positive feedback from residents involved in the trials.

Communication results show that nursing residents after the trials with the new equipment appreciated care that was offered to them remotely and autonomously, while also suggesting improvements. To some it was a relief. Some residents had much positive relationships and communication with their care givers while delivering data from monitoring equipment mentioned previously.

It must be noticed that the primary goal of the innovations and ICT solutions is to stop any negative experience related to data collections during simple procedures of blood samples taken, blood pressure of body analysis performances. There were no target group participants who experienced negative relationship with nurses during testing, no one felt abandoned by care givers during trials. Every one of the target groups was given an opportunity. No one lacked autonomy; still they could not make choices concerning their own care. In some situations, residents felt that the care givers had authority over them. They also felt powerlessness; residents also felt that they lacked privacy when using the same equipment.

Lack of autonomy was dealt with the introduction of new communication standards for the personnel. The following issues were solved:

- Loss of independence, control, dignity and integrity.
- Residents were not included in decision making therefore they had to fit in the institution routine.
- Residents were denied making choices in matters concerning their care and living arrangement.
- Lacked flexibility in running institution.
- Residents were denied doing things they were capable of doing.

During the trial of the newly purchased equipment and with the help of the personnel working in Klaipeda care home, also during the common training and meeting a working scheme was designed to affect the working and living conditions of the residents and medical personnel. A scheme includes in iHealth equipment evaluation and full introduction to the residents among the target groups. This initial plan for the methodology includes the development of a common technological and information platform for all. All layers will be covered. This includes information, communication and application layers among the others. Figure 1 demonstrates the intention of the project initiative.



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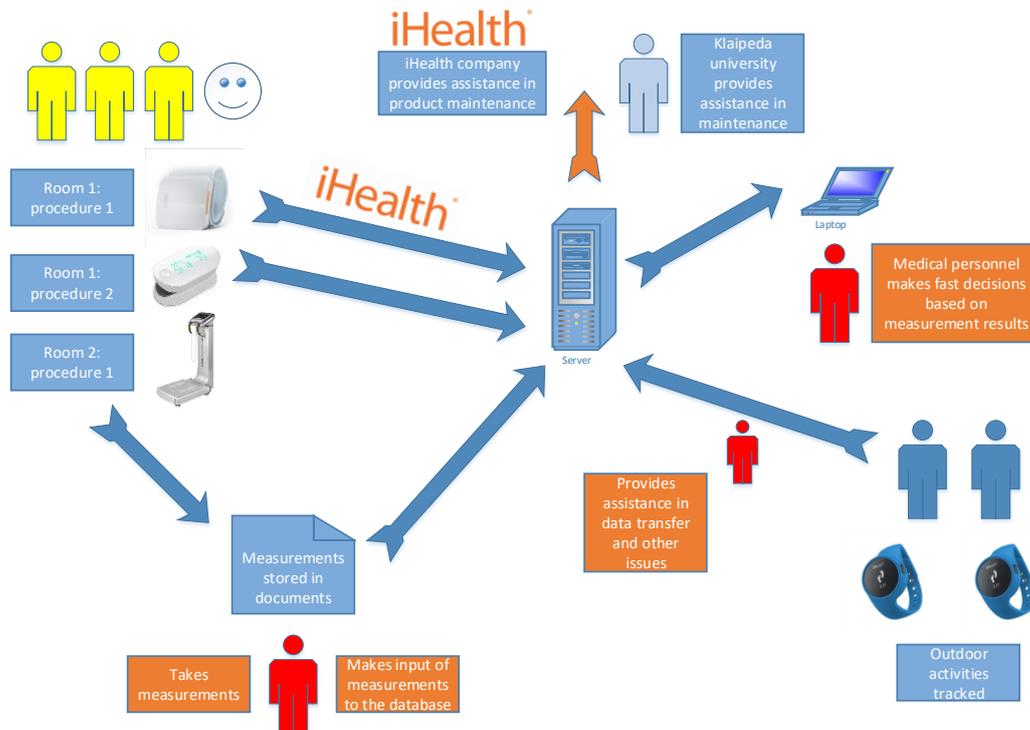


Figure1: Technological platform for all layers: Communication, Information and Technological.

This methodology initial phase works as a demonstration for the personnel that a system can be deployed and will address all the necessary issues in the care homes. This system will focus on communication and autonomy of the residents and personnel, but also will address the individual mental, psychological and physical conditions of the residents. These new communication standards will assess the necessity of measurements in determined time and will allow agile deployment schemes for personnel (medical) to take the measurements only when needed, including autonomous readings when residents will become more active and be outside the facilities.

**STEP I – to evaluate elderly people medical and mental condition and physical activity state**

Mental status testing is an essential element of evaluating elderly patients. A structured examination is performed on a regular basis by personnel of both care homes to determine the mental issues and their influence on the possibility of the resident to have his daily routines. It helps identify the etiology of symptoms that are responsible for changes in patient behavior, that lead to family stress, but that are



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otherwise not indicative of cognitive dysfunction. A structured mental status examination is also important and necessary in distinguishing cognitive changes caused by dementia, delirium, and depression. To evaluate elderly people medical condition specialist have to:

- collect all patient medical history (diseases, eating, smoking or alcohol habits, etc).
- collect and evaluate patient medical physiological parameters (blood pressure and pulse; weight; body fat, muscle and bone mass; and etc.)

Working personnel have medical and psychological background to examine the residents according to the steps in mental status assessment guidelines and the commonly used assessment instruments. If affect the residents possibility to perform physical testing with many equipment. Personnel use cognitive assessment as a common guideline for the following reasons: (i) screening for cognitive impairment; (ii) differential diagnosis of cause; (iii) rating of severity of disorder, or monitoring disease progression. These three factors form the basis of the structure of this review of mental stability. These examinations vary in time, from 5 minutes to a couple of hours at least. The developed ICT services provide an opportunity for the personnel to monitor the physical stability of the residents and establish a common view of the mental actions (when he is observed in real time or after as log info):

- Strange movements in home premises;
- Blood pressure drops;
- Physical degradation of limbs;
- Loss of sensitivity (touch, smell or others);
- And etc;

A wide range of tools has been developed during the years to aid the clinician in this process of mental and physical condition determination. But the new ICT opportunities provide a more clear and real time information of the residents condition.

The newly proposed mental assessment structure is as follows. During an assessment, the following points are considered and are used to gain statistical data for future examination and decision support during prescriptions of drugs, physical routines, group sessions, visual experiences and multi-sensory room and etc. (where relevant):

- your mental health symptoms and experiences.
- your feelings, thoughts and actions.
- your physical health and wellbeing.
- your housing and financial circumstances.
- your employment and training needs.
- your social and family relationships.
- your culture and ethnic background.
- your gender and sexuality.
- your use of drugs or alcohol.



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- past experiences, especially of similar problems.
- issues relevant to your or others' safety.
- whether there is anyone who depends on you, such as a child or elderly relative.
- your strengths and skills and what helps you best.
- your hopes and aspirations for the future.

**The goals of the new routines** using the e-services and ICT is to develop new method for physical/mental evaluation of the resident and to enable personnel to develop new skills in:

1. Accurately assessing the functional, cognitive, and affective status of older patients, and

2. Effectively communicating with older adults. This is a learning experience, not a formal evaluation. Residents are able give immediate feedback on the performance of the personnel, the performance of the ICT, with specific tips for improvement from ICT e-services from the personnel side.

Specifically, personnel is now be able to:

- Ask a brief series of questions to identify impairments in Basic Activities of Daily Living and Instrumental Activities of Daily Living (including medication use) and to estimate the muscle, bone characteristics of the resident as an initial assessment by using the new assessment equipment.
- Not only ask about the presence or absence of falls but also have statistical data from sensors and other purchased equipment that determine the number of health issues related to falls.
- Screen patients for gait impairment and fall risk using the Timed Up and Go Test or perform such routines autonomously via e-services, correlating incoming real time data from sensors in residents beds and clothes, wrist bands and other equipment (like motion detectors on several layers of the room).
- Screen patients for cognitive impairment by administering and interpreting the MiniCog Examination.
- Screen patients for major depressive illness using a two-question screener.
- Use appropriate interviewing techniques to facilitate communication with older patients.
- Demonstrate respect for older patients.

Solution to encourage elderly people to engage in active physical activity would be to introduce them to a new smart technologies. Develop individual physical activity, physiological state monitoring smart system, including:

- motion sensing devices;
- heart rate monitors;



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- blood pressure monitors;
- smart scales, etc.

Monitoring smart system (including: motion sensing devices, heart rate monitors, blood pressure monitors, smart scales, etc.) programs for elderly care services much easier and make elderly social exclusion problem less problematic. The one aim of this project is to develop methodology guide for specialists. Who could then create individual physical activity programs for elderly care services, according to this methodology advices about smart devices:

- which ones to use?
- why this one?
- when to use?
- how to use?

### *STEP II – Initial individual physical activity plan.*

Many of the recommendations of physical activity for elderly people emphasize in medium intensity activity and aerobic, flexibility and resistance training. For example:

- Regular exercises: exercises with gym machines or exercises in water;
- Walking, dancing, various games, etc.
- Housekeeping, garden maintenance, etc.

To manage successfully track all this physical activity information on daily basis, specialists can use smart watches.

- These devices are comfortable to wear and use everyday.
- They can track activity, exercise, food, weight, sleep and more real-time information about patient day and night.

Synchronise all statistical data wirelessly and automatically from patient device to doctors computer.

### *STEP III – weekly meetings with a specialist.*

At the weekly meetings specialist could analyze all statistical data collected by patient smart watch, measure other physiological parameters (blood pressure, pulse, weight). Depending on the results, it becomes easier for the specialist to adjust the physical activity plan (to increase/decrease physical activity) to the patient more easily. Also at the weekly/monthly meetings patient could perform a 6 minute Test, questionnaires or other methods to track changes in patient physical activity state and medical condition. This monitoring guide will help professionals to identify and assess health problems easier for elderly people. Create individual physical activity programs in order to improve their quality of life, prolong their independence and increase their integration into society.



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Many care organizations residents want more assistance than they receive. Nursing or care homes are facilities for elderly people who need care, the primary goal of an institution for elderly people should be to maintain interest in life, not just maintaining life. Nursing homes function mostly as institution, they work on a schedule therefore residents have to wait for things. This is a crucial mistake done in the premises of the organizations. Such view of the process organization must be changed in order to accept the innovations with a high accessibility rate. Residents must be sure that the ICT services and other e-services provided to them allow not only sparing some time for the nurses, but also making their daily routine more agile and not so time and place dependent. In most institutions there is a lack of personal space and an increase in the amount of time one spends in public places. Nursing homes tend to take away many of the individual choices that people have in their lives. The result is that residents can have a feeling of loss of control over themselves. To diminish this feeling, Klaipeda University proposed to use more agile approaches for important data retrieval and analysis. General residents tended to resist the innovations due to lack of knowledge and lack of motivation. Both project partners from Lithuania and Latvia convinced the personnel and target groups to try the following equipment:

- Smart Wrist Blood Pressure Monitor;
- Smart watches for real time monitoring of movement, steps and heart rate;
- Smart glucose level meters;
- Segmented body composition analysis equipment.
- And etc.

Target groups accepted the innovations due to understanding the benefits, provided to them during common meeting in Lithuania and Latvia. Target groups tried the equipment on a daily basis as a demo version to try to acquire as much data as possible and to see the weak points of the innovation.

At this time both care homes full-time nursing coverage, nurses perform treatments and dispense medication, and they are also responsible for monitoring the health of the residents using also the older equipment, that has no IT connectivity. It makes observations and statistics much more difficult. This new innovations brought additional benefits like:

- Time shortened for assessment;
- Some procedures were shortened due to ICT capabilities to perform it faster and more precise;