

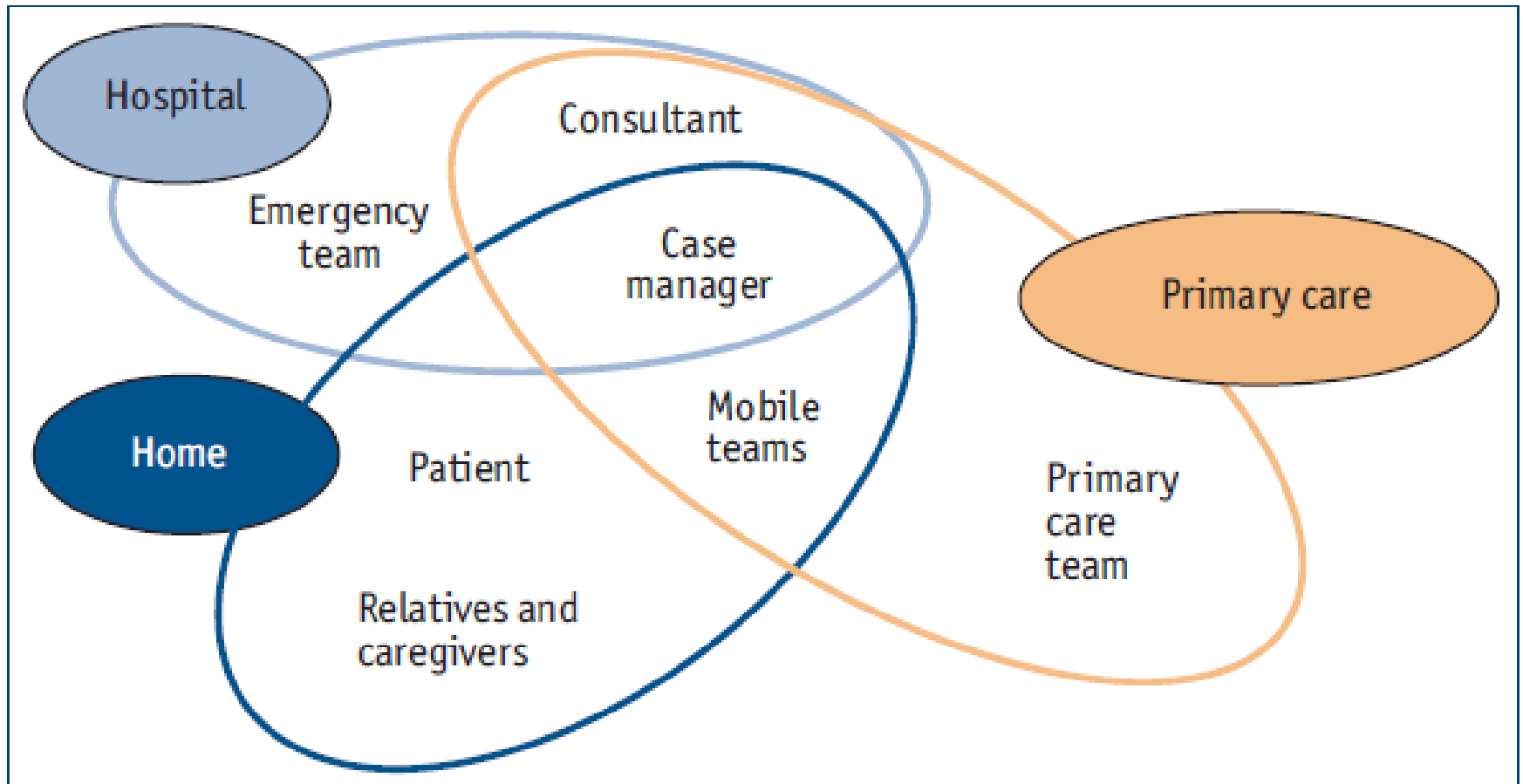
IS-ACTIVE

Rehabilitation Department
Elias University Hospital

Medicine Today

- Paradigm shift in healthcare.
- Technology advances.

Home oriented healthcare



Evolving trends of healthcare to support integrated care services, linking stakeholders at all levels. Shared-care arrangements among levels of care are required to apply patient-oriented clinical guidelines

Ambient Assisted Living (AAL)

- Health monitoring and therapy support at home.
- Living longer independently.
- Reducing risks and energy expenditure.
- Improving quality of life.

AAL challenges

- Sensible systems that can evolve to meet the requirements of individuals as their needs and circumstances change.
- Adaptive, open, small, cheap, scalable systems.
- Permanent monitoring in chronic conditions.
- Friendly user interfaces.

IS-ACTIVE

Inertial Sensing System for Advanced Chronic Condition Monitoring and Risk Prevention

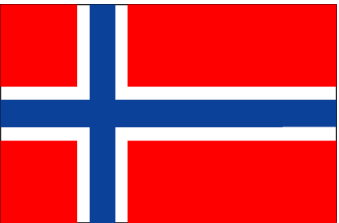
IS-ACTIVE

- The purpose of **IS-ACTIVE** is to devise a person-centric healthcare solution for patients with chronic conditions.
- The project emphasizes the role of the home as care environment, by providing real-time support to patients.
- Designed to monitor and improve the physical condition of chronic patients, using sensing systems, wireless technology, a feedback device and persuasive technology.

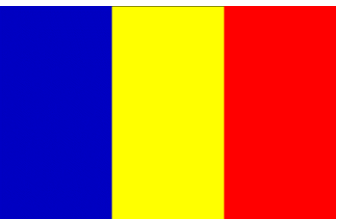
IS-ACTIVE Partners



- University of Twente – The Netherlands (UT)
- Roessingh Research and Development – The Netherlands (RRD)
- Inertia Technology – The Netherlands (INE)



- The Norwegian Centre for Telemedicine – Norway (NST)
- Northern Research Institute – Norway (NOR)



- Elias University Hospital – Romania (ELS)
- PROSYS – Romania (PRS)

IS-ACTIVE - objectives

- Technical objectives.
- Economic objectives.
- Social objectives.

IS-ACTIVE Technical Objectives:

- To develop the sensing and communicating hardware platform.
- To study the algorithms and develop the software for data capture, feature extraction, wireless networking, collaborative inference and reasoning.
- To design an attractive interface and innovative feedback mechanisms.

IS-ACTIVE Economic Objectives:

- To produce fully functional prototypes (hardware and software).
- To validate the developed technology through field trials involving patients with COPD (44 million potential users in Europe).
- To exploit the developed technology in related affections.

IS-ACTIVE Social Objectives:

- To increase quality of life, ensuring a better physical condition.
- To increase patient's motivation and self-managing skills.
- To reduce anxiety, depression, social isolation, by increasing participation in social and community activities (also through virtual group based training sessions).

IS-ACTIVE

- **IS-ACTIVE** aims at producing tangible results in the form of fully-functional prototypes with a relatively short estimated time to market (1-2 years).
- The project addresses all the development phases of such a prototype wireless sensing platform, from hardware platforms and software packages to algorithms and user interfacing.

IS-ACTIVE = Team work

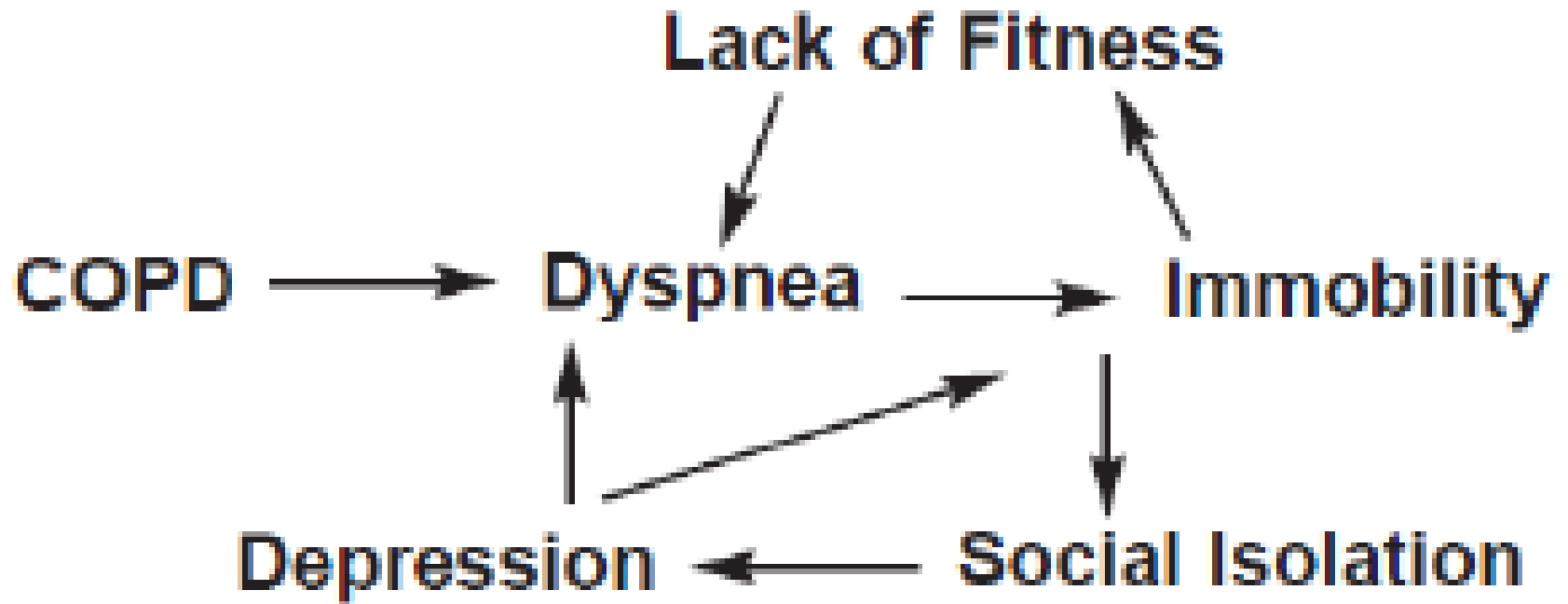
- April 2009 – June 2012
- **7 Work packages (WP):**
 - *Determined time WP*: system architecture, testing phases.
 - *All time WP*: management and dissemination.
- **Team meetings: 2/year.**
 - *midterm review* in November 2010.
 - AAL Forum Vienna, September 30th 2009.
 - AAL Forum Lecce, 26-28th September 2011.
- **Deliverables** for each WP.
- <http://www.is-active.eu>

IS-ACTIVE for COPD Patients

Global initiative for chronic Obstructive Lung Disease (GOLD)
definition of COPD:

“COPD is a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases”.

COPD



To break this vicious circle COPD patients have to remain physically active.

ELIAS Partner Contribution

- **Requirements analysis.**
- **System's design:** necessity of continuous input of patient physiological parameters for risk prevention.
- Safety marker for COPD is **SpO2** – use the **pulse oxymeter!**
 - **Normal oxygen saturation= >95%;**
 - **Moderate Hypoxemia= 90-95%;**
 - **Severe Hypoxemia=<90%.**
- **Protocol design** for initial experiments, field trials.
- **Lab Trial and Field Trial** fulfillment.
- **Dissemination of results.**

IS-ACTIVE system



Pulse oxymeter

Node of movement sensors

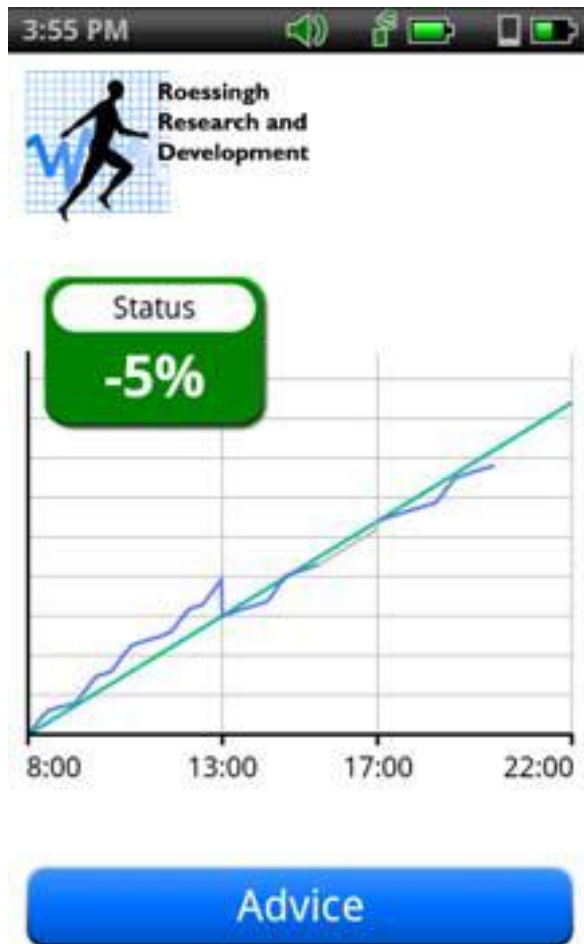
PDA

IS-ACTIVE

Main concerns in COPD patients:

- Shortness of breath
- Fatigue
- Risk avoidance

PDA Feedback



Graphic of physical activity level

11:31 AM

Advice






Your deviation is -14%.
You took more rest.

Take a walk
around the block

OK

Suggestion

PDA Questions

11:32 AM     

Shortness of breath

Have you been short of breath?

Normal

A bit more than normal

Clearly more than normal

OK

11:32 AM     

Fatigue

Indicate the degree of fatigue at this moment.

No fatigue Maximal fatigue

0 1 2 3 4 5 6 7 8 9 10

OK

IS-ACTIVE experiments

- Initial experiments. Lab Phase Trial.
- Field Trial Phase.

IS-ACTIVE Initial experiments

- **10 inpatients.**
- **Patient inclusion criteria:**
 - COPD GOLD 2, 3, 4. >50years old. City/Countryside.
 - Current or former smoker.
 - No exacerbations during the last month.
 - No other medical conditions to obstruct ADL.
- **Protocol:**
 - Informed consent.
 - Explanations.
 - Tasks and free physical activity.
 - Acceptancy and usability Questionnaires.
 - 1h during. No pulse oxymeter.

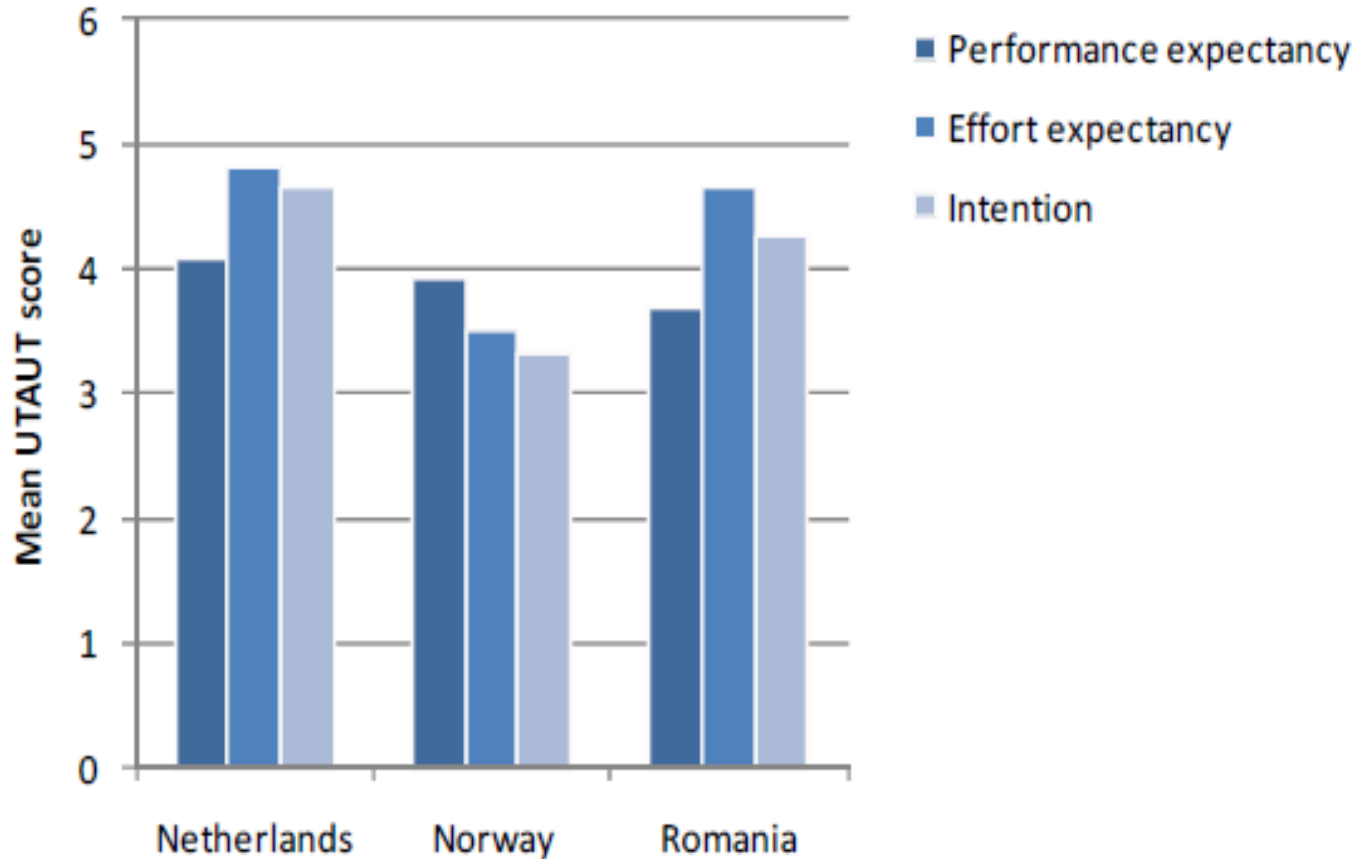
IS-ACTIVE Initial experiments Results

Acceptancy – good.

Usability - very good.

New requirements:

- Good price.
- Audio messages.
- Information about heart rate.
- Useful for “danger” prevention.



Mean UTAUT scores, subdivided in the three countries

IS-ACTIVE Field Trials:

- *Norway*: social group.
- *Netherlands*: individual group.
- *Romania*: **mobile safety group.**

IS-ACTIVE Field Trial

- In progress.
- 10 patients.
- **Protocol:**
 - Same inclusion criteria
 - 1 month each,
 - at home, during ADL, work, leisure, etc.
- **Use the pulse oxymeter!**
- Trial on healthy persons!
 - Quite easy to wear
- **Feedback:** ok.
- **ELIAS Partner** : different weather conditions winter/spring.

IS-ACTIVE
Field Trial
Phase
Patient
using the
System



Things to ponder:

- Usability.
- Acceptance.
- Perceived advantages and disadvantages.
- Legal and ethical concerns.
- ***Patient outcome and health status:***
 - Exacerbation rate (emergency department visits and hospitalizations.)
 - Quality of life.
 - Exercise capacity.
- Limitations.
- Future perspectives.



AAL FORUM 2011

26-28th SEPTEMBER 2011
LECCE, ITALY

Ambient Assisted Living J.P. Project Award finalist

IS ACTIVE

Pietro SICILIANO
AAL Forum 2011
Forum Programme Chair

A handwritten signature in black ink, appearing to read 'Pietro Siciliano', written over the printed name.

Lena GUSTAFSSON
AAL Association
President

A handwritten signature in black ink, appearing to read 'Lena Gustafsson', written over the printed name.

Diploma received
by IS-ACTIVE Project
at AAL Forum 2011,
26-28th September,
Lecce, Italy.



IS-ACTIVE project meeting - Roessingh Research and Development, Enschede (March 2011)

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Advanced Chronic Condition Monitoring and
Risk Prevention**

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