

# PROJECT FINAL REPORT

## PUBLISHABLE SUMMARY REPORT

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**Project title: “Easy Positioning of in-BED patients with reduced mobility”**

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**FP7 – SME – 2007 - 1**

# Eposbed

## “Easy Positioning of in-BED patients with reduced mobility”

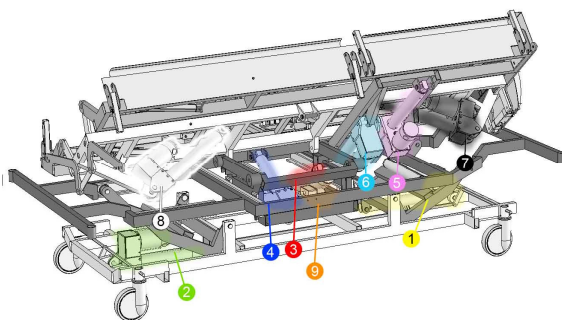
### 1. Background

The number of patients with mobility restrictions is growing across Europe, as the population ages. 16% of Europe's population is over the age of 65, and this figure is expected to reach 25% by the year 2040, i.e. over 150 million persons. Aging is also affecting nurses and caregivers. As the average age of the hospital personnel increases, so does the demand for assistive mobility systems that allow nurses to work effectively more years.

The in-bed positioning of patients with limited mobility is of major importance in order to prevent the worsening of their health condition and improve their comfort. The lack of autonomy to undertake basic movements and postural changes causes anguish and discomfort in these patients and directly affects their quality of living.

Nowadays, nurses need to change manually the position of patients every 2 to 4 hours. Manual handling is not only a discomfort for patients but is also reported to cause an outstanding amount of work-related back injuries; with 85% of nurses suffering back injury at some point in their career. These injuries account for 15 billion working days lost each year; bringing annual costs to approximately 6 billion Euros for European hospitals.

In summary, there is a need in the market for an assistive technology aimed at improving the living conditions of patients with reduced mobility. This new technology must reduce or eliminate the current dependency of patients when they desire to change their posture in the bed. The technology must also contribute to improve the work conditions of caregivers by reducing the need of periodic manual positioning of patients.



### 2. The Eposbed Product

The Eposbed product consists of a specialty bed with automatic positioning, driven by an intelligent software. Eposbed allow patients with limited mobility to change their position in bed without the need of assistance from hospital personnel. In Eposbed the

patient is able to command the movements of the bed with slight body movements. No need to use a remote controller or human assistance.

An intelligent software permanently monitors the pressure map of a mat sensor embedded into the mattress of the bed. The software detects and anticipates in real time the intention to move of the patient and acts in consequence. Bed movements are smooth, interactive and reliable since the system is performing continuous control from the feedback signals of the patient. In order to move in one direction, the patient just needs to move slightly and naturally in this direction. To stop an initiated movement, it is sufficient to do a similar pressure in the opposite direction. In consequence, the interface with the bed actuators is straightforward and well suited for persons with reduced mobility. In addition, the Eposbed system offers a complete remote controller to be used by caregivers.

Eposbed software has been validated in pre-clinical trials with different types of persons; including: man and women, different weights and different heights. The results from these tests have been very successful since, almost without any exception, all people interviewed recognized Eposbed is a natural and attractive way to interface with the bed.

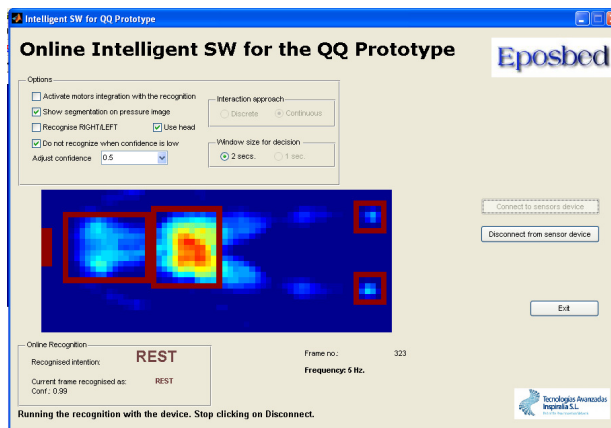
As part of the Eposbed system, we have developed an innovative bed frame; able to do most required movements in a hospital environment. The bed, designed using CAD and cutting-edge simulation techniques, is composed of a hospital bed frame moved by intelligent servo-actuators. Either using the intelligent software or the remote controller, the bed is able to do the following movements:

- **Lateral movement.** Lateral movement allows the patient to rotate left and right along the main axis of the bed. Lateral movement may be requested by patients desiring to change their position or may be scheduled by caregivers on a periodic basis (i.e. at night). Lateral movement is also useful when cleaning a patient. Due to safety reasons, the maximum rotation angle is restricted to 60°. The system automatically folds the lateral panels when in a step angle to avoid falling of the patient. Lateral movement is an innovation in hospital beds, since very few products offer this kind of movement and none of them has available intelligent movement detectors; such as Eposbed does.
- **Fowler movement.** This movement allows to control together a sitting position with a leg and foot movement. A locking hinge allows the lower section to lift. This is probably the movement more demanded by patients since it allows them to incorporate at different positions.
- **Tredelenburg.** This movement is basically designed to improve blood circulation in patients. Again the movement can be demanded by patients or caregivers indistinctly.

An important element of the Eposbed system is the pressure mat sensor. The mat, composed of no less than 1.000 individual sensors, is embedded into the bed mattress. It is passive (i.e. has no electronics), flexible, washable and very robust. A patient laid on the bed exerts a pressure on each sensor. The information from the pressure mat is

transformed into a pressure image. The intelligent software analyses in real time the pressure pattern and decide the most convenient intention to move. The software then commands the servo actuators and moves the bed to the desired position.

The software is based on image processing algorithms and Neural Networks, a well-known Artificial Intelligence technique, being able to interpret pressure changes in the vast majority of the patients.



### 3. Market Aim

Eposbed is expected to have an important impact in the field of assistive technologies for patients with reduce mobility. The main markets foreseen are public and private hospitals, residences and also private homes. The main factor driving success in the different markets is price. For that reason we foresee Eposbed will be offered as different products, addressing different market niches.

In that sense we envisage the commercialization of the complete product, comprising the bed frame and the intelligent movement detector, or as individual products. For example, the medical bed with lateral positioning can be market independently using a remote controller (i.e. no intelligent movement detection). Also, the intelligent movement detection can be offered as an open product able to command cheaper commercial beds from external suppliers. Finally, the capabilities of the bed frame can be adapted also to different applications; i.e. by offering lower number of actuators for low cost applications.

We expect private hospitals will be at the high end of the market, while residences and private homes will be located at the lower end. A patent has been requested to protect the results of the project. Also the brand name “Eposbed” has been registered.

### 4. Consortium members

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- Proteo SpA
- Dynamic Motion S.A.
- Techem BP S.A.
- Qinetiq Ltd.
- Inspiralia Tecnologías Avanzadas.
- Fundación Rioja Salud FRS
- Vivisol Srl

## 5. Project website

This publishable summary report and other public information about Eposbed project can be found at: <http://eposbed.pera.com>. Several videos about the behavior of the EPOSBED recognition system can be found on the website: <http://eposbed.pera.com/results>