# AHA - AUGMENTED HUMAN ASSISTANCE

GOOD PRACTICE - PROJECT

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# Contents

**Introduction to the Good Practice:**

Project developed to tackle assistance and diminishing of isolation in healthcare. The project is supported by the FCT project AHA CMUPERI/HCI/0046/2013. The total budget of the AHA project of the Portuguese partners is approximately 500k euro, which is mainly distributed to the 4 research institutions involved for the implementation of the scientific and technical program.

**Problem:**

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

**Solution:**

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

**Impact:**

Higher delivery of assistance to elderlies. Diminishing of isolation.

1. Physical (re)training: Building on the existing expertise on Augmented Reality (AR) and serious games, we propose to develop adaptive AR physical training tools that deliver online feedback on performance to prevent sedentary, support active aging and provide personalized tools for function re-training in motor impaired patients.

2. Increasing self-awareness: Monitoring of user state by means of biosensors, computer vision systems and exercise performance data. User state will be assessed in a transparent manner and data will be visualized through friendly user interfaces, and shared with patients, clinicians and/or relatives.

3. Augmented assistance: The above systems will be integrated on a mobile robotic platform with indoor navigation capabilities (in environments such as senior houses and hospitals) that will interact through a virtual coach system to monitor patients, provide reminders on tasks, guide patients through exercises, and assist them in daily routines.

# 1. Relevancy of the Good Practise (GP) project

The “Relevancy of the GP project” section provides quick check and definition of its relevancy in regards to HoCare project objectives.

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| **Good practice of quadruple-helix cooperation in R&I?** | Yes, this GP project includes good practices of quadruple-helix cooperation in R&I |
| **Good practice of delivery of Home Care R&I?** | Yes, this GP project includes good practices of delivery of Home Care R&I. |
| **If not in Home Care R&I, describtion and proof of its potential for transferability to delivery of Home Care R&I** | |
| **Generation of innovation in home care through answering unmet needs identified by formal or informal healthcare providers?** | Yes, this GP project includes good practices of innovation through answering unmet needs. |
| **Generation of innovation in home care through public driven innovation?** | Yes, this GP project includes good practices of public driven innovation. |
| **Generation of innovation in home care via quadruple-helix cooperation for quicker delivery to the market?** | Yes, this GP project includes good practices of innovation via cooperation for quicker delivery to the market. |

# 2. Quick overview of the GP project

The “Quick overview of the GP project” section provides initial overview of the good practice project (GP project) and enables readers to see if this GP project idea is relevant for possible transfer to their organization potential innovation activities.

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| **Name of the GP project** | AHA: Augmented Human Assistance<br>Projects in partnership with several partners conducted by M-ITI - http://www.m-iti.org/<br>Studying the long-term acceptance of personal health informatics tools<br>The “AHA: Augmented Human Assistance” - http://neurorehabilitation.m-iti.org/lab/aha-augmented-human-assistance/ |
| **Region of origin of GP project** | Madeira, Portugal |
| **5 keywords that best describe the** | robotic assistance, augmented reality, serious games, physical |

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| **content of the GP project** | training, biosensors, computer vision system, indoor navigation, virtual couch system |
| **Relevant Programme name through which the GP project has been funded** | It was funded by FCT Portugal http://www.fct.pt/<br>The foundation for science and technology of Portugal |
| **Relevant support programme / intervention area name of the GP project through which it was funded** | |
| **Single or multiple recipients**? | multiple recipients |
| **Type of lead recipient and its role** (SME, LME, research centre, innovation centre, network/association, university/school, municipality, other public body, other (specify) | Innovation centre |
| **Types of participating partners and their roles** (list all participating partner types. E.g.: hospital, social house, senior house, patient association, networks, SMEs, LMEs, research actors, business supporting organizations, public institutions/regulators, other (specify) | Universities, centres of research |

# 3. Transferability

The "Transferability" section provides more detailed review of strengths and weaknesses of this GP project including description of necessary basic conditions for region and leading organization to potentially transfer it. At the end of the section, the key threats in the successful transfer open up possibility to focus on specific relevant issues important for the successful transfer.

## Strengths and weaknesses of the project

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| **What are the GP project strengths? Why it was funded?** | Innovation driven highly advanced systems related with health networks, various partners from universities to research centres, possibility of being funded in various sectors from Marie Curie program, other h2020, national programs and others. Funded by FCT. |
| **What are the key weaknesses of the GP project?** | Not funded in an OP. Short linkage with investors. Not funded among H2020 |

## Basic conditions for successful transfer

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| **Why is this GP project transferable?** – innovation, impact, financial, legal, and timeframe aspects | Its is innovative, impact to address new investments is considerable, defines a path for the future essence of some telemedicine new products and services.<br>Allows to create new condition for further development of technology or |

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| | other projects. |
| **What are the basic conditions the region needs to have to be successful in transferring this good practise?** | Investors and entrepreneurs; good legal conditions and business environment |
| **What are the basic conditions the leading recipient from the region needs to have to be successful in transferring this good practice?** | Connections, belonging to networks, capabilities of IP (intellectual property) to secure the property of future IPs. |

### Key threats in GP project transfer

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| **What are the key potential threats for the GP project transfer?** | Inefficiency in addressing the needs of the region to the investor's investments list.<br>Lack of competitiveness to address investors interests and get investors to intervene in other areas and geographies. |

# 4. Description of the GP project

The "Description of the GP project" section provides more detailed information on the Good Practice project (GP project) and enables readers to get further detailed inspiration and easy ready-to-use information for possible innovation transfer to other project applications. This includes: tackled problem, time length of the GP project, objectives, phases, activities and deliverables of the GP project, its main innovation and target group.

### Description of the tackled problem

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| **What was the problem / challenge tackled by the project?** | The project « Studying the long-term acceptance of personal health informatics tools" tries to comply with the factors that drive users' long-term engagement with wearable activity trackers, and to design new solutions for prolonged engagement.<br>The project AHA – Augmented Human Assistance (CMUP-ERI/HCI/0046/2013) tackles a new generation of ICT based solutions that have the potential to transform healthcare by optimizing resource allocation, reducing costs, improving diagnoses and enabling novel therapies, thus increasing quality of life.<br>The integrated AHA system will be composed by a mobile robotic platform with advances in perception, navigation and control skills; leveraged with an extended set of sensors for human sensing and emotional state estimation; serious gaming abilities through novel augmented reality methods yielding extended feedback modalities for physical exercising and motor rehabilitation; and a virtual coach system with technologies and techniques that assist and encourage users while they perform rehabilitation exercises, and instills better compliance with their prescribed exercise regimen. Such platform will define a new class of assistive devices for healthy, elderly and patient users, allowing new modalities of interaction and engagement not yet available in the state-of-the-art. |
| **What were the reasons for the problem?** | Health care solutions for home care. More support for elderly, and care takers. |

### Time length of the GP project

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| **What was the time length of the GP project in** | Still ongoing |

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| **months?** | |

## Objectives of the GP project

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| **Describe the overall and specific objectives of the GP project** | The contributions of this complementary expertise are organized in 6 major work packages:<br>WP1 - Augmented Reality Training;<br>WP2 - Human State Awareness;<br>WP3 - Virtual Coach. Each of these work packages is responsible for a so called AHA module, which are the core technological components of the AHA static platform.<br>WP4 - Robotic Assistance Platform results from the integration of the static platform with a mobile robotic device.<br>WP5 - End user evaluation is a transversal work package to evaluate the separate components as well as the static and mobile platforms in realistic scenarios.<br>Dissemination and exploitation are addressed in WP6.<br>The objectives are : create the VR coach, conduct training and develop the tecnhology for robotic assistance |

## Phases, activities and deliverables

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| **List all main phases of the GP project including their time length** | Augmented Reality Training; Human State Awareness; Virtual Coach;<br>WP4 - Robotic Assistance Platform results from the integration of the static platform with a mobile robotic device.<br>WP5 - End user evaluation is a transversal work package to evaluate the separate components as well as the static and mobile platforms in realistic scenarios.<br>Dissemination and exploitation are addressed in WP6 |
| **List and describe** all **main activities that were implemented by the GP project** | WP1 - Augmented Reality Training;<br>WP2 - Human State Awareness;<br>WP3 - Virtual Coach. Each of these work packages is responsible for a so called AHA module, which are the core technological components of the AHA static platform.<br>WP4 - Robotic Assistance Platform results from the integration of the static platform with a mobile robotic device.<br>WP5 - End user evaluation is a transversal work package to evaluate the separate components as well as the static and mobile platforms in realistic scenarios.<br>Dissemination and exploitation are addressed in WP6. |
| **List all main deliverables** | The integrated AHA system will be composed by a mobile robotic platform with |

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| **of the GP project** | advances in perception, navigation and control skills; leveraged with an extended set of sensors for human sensing and emotional state estimation; serious gaming abilities through novel augmented reality methods yielding extended feedback modalities for physical exercising and motor rehabilitation; and a virtual coach system with technologies and techniques that assist and encourage users while they perform rehabilitation exercises, and instills better compliance with their prescribed exercise regimen. Such platform will define a new class of assistive devices for healthy, elderly and patient users, allowing new modalities of interaction and engagement not yet available in the state-of-the-art. |

### Main innovation of the GP project

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| **What was the main innovation of the GP project?** | New technology by creacting a new robot, new technology by creating new health telemedicine sensors, Virtugal reality new tecnhnology by creating augmented reality applied with health, others. |

### Target group of the project

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| **Who was the main target group of the GP project?** (SME, LME, research organization, university, public institution, healthcare provider, business supporting organization, other (specify) | Health care provider, end users. |
| **Describe the main target group** | Health care organizations, end users, Hospitals, health centres. |

## 5. Impact

The “Impact” section provides more detailed information on the effect of the GP project implementation and dissemination of major outputs.

### Impact

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| **What was the level of geographical impact of the GP project?** (village, city, county, country, international, other (specify) | Portugal and Internationally. |

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| **What were the final impact indicators including their quantification?** | Currently, the project is in development and testing phase. Its implementation is expected to start this year with the local end user associations in Madeira and Portugal mainland. The first targets are senior gyms and clinical settings.<br>This project is still ongoing, but a first prototype version of the games is already finished. Project started 01 August 2014 and ends 31 July 2018.<br>Mid-project results<br>• Automatic Tools developed for fitness assessment of the elderly populations<br>• 5 games developed for physical training / fitness improvement (see http://neurorehabilitation.m-iti.org/tools/node/5).<br>• The game concepts cover:<br>○ Sports appropriate for elder people (exercise defined sport sciences, by Uma- University) |
| **Describe the changes resulted from the project activities** | There have been studies for technology evaluation with elder people. These have been taking place in M-ITI's lab, and through iterations, allowed to mature the tools in order to be ergonomic, achieve usability, and added value to the people. |

### Dissemination of outputs

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| **Describe dissemination activities of the project outputs carried out during the GP project** | The "AHA: Augmented Human Assistance" - http://neurorehabilitation.m-iti.org/lab/aha-augmented-human-assistance/<br>PhysioLab: http://neurorehabilitation.m-iti.org/tools/physiolab<br>Biocybernetic Loop Engine: http://neurorehabilitation.m-iti.org/tools/blengine<br>Youtube channel: https://www.youtube.com/neurorehablab<br>Facebook: https://www.facebook.com/NeuroRehabLab<br>Blog: http://sergibermudez.blogspot.pt/<br><br>**More information at:**<br>- Project basic information: http://neurorehabilitation.m-iti.org/lab/aha-augmented-human-assistance/<br>- NeuroRehabLab Youtube channel: https://www.youtube.com/neurorehablab<br>- NeuroRehabLab Facebook: https://www.facebook.com/NeuroRehabLab<br>- Blog: http://sergibermudez.blogspot.pt/ |

# 6. Risks

The "Risks" section provides more detailed review of potential risks of this GP project implementation including their defined mitigation strategies to eliminate them.

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| **Describe risks involved in implementing this GP project including their mitigation strategies** | Overall project risk management according to best practices. |

# 7. Budget

The "Budget" section provides more detailed review of costs regarding the project implementation as well as operational sustainability after its end. In addition, if relevant, public tenders within the project and additional generated incomes by the project are showed and explained.

## Budget

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| **What was the overall budget of the project in EUR?** | .<br>M-ITI budget 180 220€, overall 500k€ |
| **List relevant budget lines of the project including their % share from total budget** | 100% BY Fundação para a Ciência e a Tecnologia (FCT) in the scope of CMU\|Portugal program. |

## Additional income generated by the project

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| **Did the project create any additional income?** | no, the GP project did not generate additional income |
| **If yes, specify which type of income and what amount in EUR?** | |

## Public tender

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| **Did the project include any public tender?** | no, the project did not include a public tender |
| **If yes, specify what kind of contract** (specific contract, general contract, other) | |
| **If yes, specify in what amount in EUR** | |
| **Describe the public tender subject** | |

## Financial sustainability after GP project end

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| **Was there an operational financial sustainability plan in the project after its end?** | yes, the GP project included an operational financial sustainability plan |
| **If yes, specify where the operational funds after project end came from?** | Note: The project has not ended.<br>A Technology Transfer plan is ongoing with support from the CMU's Center for Technology Transfer and Enterprise Creation, who lead the activities related to Technology Transfer.<br>- IP identification and protection;<br>- inventions in the pipeline to be created;<br>- Roadmap for starting a business. |
| **If yes, specify the amount of operational funds in EUR** | |

# 8. Other information

In this section, specific additional information about the GP project could be revealed.

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| **Please describe any other relevant information about this GP project (if relevant)** | |

# 9. Information gathered by …

The information about this good practise (GP) project has been gathered for the purpose of the HoCare project (Interreg Europe Programme) by the following organization:

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| **Region** | Madeira |
| **Organization name(s)** | MITI - MADEIRA INTERACTIVE TECHNOLOGIES INSTITUTE |
| **Name of the contact person(s)** | Sergi Bermúdez i Badia |
| **Contact email(s)** | sergi.bermudez@m-iti.org |

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