RGS

RGS is a novel and highly innovative Virtual Reality (VR) tool for the rehabilitation of deficits that occur after brain lesions. Currently RGS has been successfully applied to the rehabilitation of the upper extremities after stroke. The RGS is based on the neurobiological considerations that plasticity of the brain remains throughout life and therefore can be utilized to achieve functional reorganization of the brain areas affected by stroke. This can be realized by means of activation of secondary motor areas such as the so called mirror neurons system. According to the World Health Organization, there are over 15 million patients who suffer a stroke every year in the world. RGS is suitable for those patients who suffer a stroke and have moderate to severe impairments in their upper extremities. This reduces the number of potential patients that can be treated by using RGS to 40% of those who suffer an ictus, i.e. the potential market for RGS is of 6 million patients. The users we envisioned for RGS as a product are as follows:

- Primary user: stroke patients in the clinic and at home with deficits of the upper extremities
- Secondary user: healthcare providers; i.e. clinicians, therapists.
- Tertiary user: medical institutions (hospitals, day centers, primary care) and health insurances

The Rehabilitation Gaming System (RGS) will allow an elderly person who suffered a stroke (the primary End User), to take advantage of a novel ICT based product to manage their chronic condition. It will alleviate their chronic long term condition by providing individualized rehabilitation therapy at home in the shape of an interactive virtual reality system. RGS is based on the integration of a wide range of highly innovative ICT technologies, such as Virtual Reality, learning and adaptive systems, image and scene analysis, wireless technologies, multimodal interfaces, simulation tools, sensors, telehealth and information systems and, wearable physiological data sensors. Despite this major integration effort combined with solid science and medical research it is nearly invisible for the End User, unobtrusive and low power consuming (home PC based). RGS provides personalized cognitive and functional rehabilitation. It assesses the patient's status and progress using predictive models to provide prognosis and generates individualized rehabilitation protocols. The system retains qualitative and quantitative information of the performance of the subject/player during the tasks, hence allowing for a detailed assessment of the deficits of the patient player and their recovery dynamics. The RGS system has been validated in clinical trials with more than two hundred patients focusing on the rehabilitation of the upper extremities. Results with acute and chronic patients published in neurological journals show that RGS accelerates functional recovery of acute stroke patients and it is at least as effective in the recovery of movement speed as can be achieved with intense - and therapist dependent - occupational therapy. Chronic patients show improvements as compared to their baseline performance even after training with RGS has stopped. Given the epidemiology of stroke and its future development, the strain on financial and human resources of the healthcare systems will only increase. The RGS has been designed to be used at home and to send information
to the healthcare provider via internet. In this sense, this tele-health option supports the early patient discharge and reduces the need of human resources allocated to the patient; therefore reducing the costs for the healthcare system. The project dissemination activities have been very intense not only scientifically (with several joint publications on the project results in international high-impact journals) but also with exposure to the media and with the award of some Spanish innovation awards. Having clinically validated RGS and proven its efficiency, the next natural stage is future commercialization to ensure wide reach of

patients, for which the next steps are currently being planned. We foresee 1-2 years to market approximately and a possible barrier in the very short term could be that public health systems do not currently rely on their day-to-day on devices like RGS and telemedicine is an incipient activity. RGS is a novel device and part of an emergent market of i-health devices which aim to revolutionize the health care @home.