

Proposal title: **ICT Enabling Environments (ICTEE):**

**from assistive devices to an enabling urban environment for the aged**

➤ **Organisation submitting the Proposal:**

**CSIR – Council for Scientific and Industrial Research – Pretoria, South Africa,**

- **The CSIR**, founded in 1946, is the largest community and industry-directed scientific and technological research, development and implementation Organisation in Africa. With more than 3000 staff it currently undertakes 10 per cent of all Research and Development work on the African continent.
  - The CSIR represents a reliable organisational interface to create longstanding IST relationships between the European Union and Africa.
- **Within the CSIR, the AAICT: African Advanced Institute for ICT** (also known as the Meraka Institute) is acting as one of the South African National Research Centres, created by special directive from SA President Tabo Mbeki in 2005. The AAICT is involved in large initiatives of national impact and strategic value, in collaboration with Government Departments, the Academia and the ICT Industry.
- **The Proposer: Dr Ennio V Macagnano**, Project manager, Future Technologies.  
Domain specialist: Technologies for the Disabled and the Aged.
  - **Dr Ennio Macagnano** is one of the concept leaders and coordinators of the SA National Accessibility Portal project. He has been conducting, in recent CSIR past history, eight years of R&D in the area of Design for the Aged and the Disabled, which has culminated in several papers and publications, a prototype Hi-tech Building and several patents related to specific Ergonomic and IT products development. He has also been the concept leader and Co-founder of:- The Ergonomic Society of Southern Africa, ESSA- The CSIR Virtual Reality Centre & The South Africa Nanotechnology Initiative, SANI.

## **ICT Enabling Environments (ICTEE):**

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### **Background :**

In recent times, technology research has been initiated to use/develop Information and Communication Technologies (ICT) to build intelligence into a future 'smart environment' where buildings, public and private transport, urban design and physical infrastructure in general are made more accessible and safe. Such innovation in ICT R&D has the capacity to fast-track the process of better integration, independence, acquisition of social dignity and possibility of contribution to society in particular by the ever increasing aged population.

### **This project Proposes the following:**

- innovative research, in a developmental context, aimed at the creation of a smart environment, both indoor (various building types) and outdoor (up to city level), to be made possible through the use of innovative ICT (hard/software),
- the harnessing and building from current trends in scientific disciplines such as Human Computer Interaction, Ergonomics, Wireless Tracking, Industrial Design, Intelligent Buildings, Wearable Computing, Nanotechnology etc,
- the building of skills, the activation of research streams and the establishment of a network of excellence in alignment with them,
- the assemblage and testing of prototype devices, in collaboration with the Academia and Industry, creating spin-off products development for even wider usage by society, creating also parallel entrepreneurial ICT activities.

### What would such a system do?

- **3D-tracking** of an individual (stationary and mobile), both indoor and outdoor, with remote health diagnostics and emergency intervention (remote 'corrections' to a pace-maker, summoning of help because of failing bodily functions etc.), by satellite, land-based hot-spots etc.
- **Remote management/control** of home devices, indoor climate, security systems etc. Interactive wearable computing/displays capable of enabling remote activation of security systems.
- **Intelligent wireless human video-tracking** with capacity of recognizing a danger situation from 'body language' and/or unusual behavior (fainting, epilepsy fit, heart-attack etc.) and to summon help (at a bus stop, train station, airport etc.).
- **Provision of 'Augmented-Reality' miniaturized devices**, (Hi-Res. mini-screens superimposed on glasses or carried on head or ear), displaying real-time information on surrounding environment (where to turn to find a specific shop, an accessible ramp, in what direction to walk to the clinic or doctor, which bus to take, bus time tables at the bus stop etc..). All this by simply 'looking at' buildings, bus stops, streets, and 'seeing' data superimposed on to it.
- **Provision of real-time information** according to pre-set menus. The aged would only have to synchronize onto a chosen menu (transport, shopping, health care, entertainment..) and the surrounding environment would become 'really' barrier-free. In this context, connected audible messages (through blue-tooth, WI-FI and next generation wireless technologies) could also verbally describe to the user, in real time, what is happening (next bus stop name, name of shop owner, timetables etc.), according to his/her exact 3D position in the city.

### ICT Enabling Environment for the aged: definition

**Imagine** a world where an elderly, progressively disabled person carries with him/her (wearable computing, embedded devices, nano-displays etc.) 'smart devices' connected to an integrated wireless digital network capable of offering total, interactive connectivity, inside his/her home, around the neighborhood and a city level.

### Where would the Enabling integrated and interactive technology be provided?

- **In private homes and public buildings: libraries, municipal offices, places of learning, churches..**
- **On the streets, along pavements and in public open spaces, within an integrated urban structure.**
- **On public transport (rail stations, bus stops, airports etc.).**
- **In public parks, recreational facilities etc.**
- **In places of work.**

### A developmental context

- Although the benefits would have immediate impact in the so called first-world, this project would be of initial immediate relevance also in a developmental context (third world).
- The results would also have great meaning and impact in young emerging economies such as those in Eastern Europe (and formally part of the ex Soviet block), now integrated in a new Europe recently expanded to twenty-five States ,
- We propose a project initially based in South Africa, a Country characterized by a integrated mix of first and third-world, therefore an ideal test bed not only in terms of innovative technological research and technology transfer (having access to outstanding research and academic facilities, staff and young students and researchers), but also ideal for experimentation and analysis of 'softer', but equally important project research components, such as those related specifically to cultural and socio-economic factors.

## Project Activities and Tasks

- Establish a **'technological bench-mark'**: document the international status-quo, major existing and under development technologies and current relevant research (intelligent buildings, automatic video tracking nanotechnology, wearable computing, augmented reality etc.)
- Establish a **'network of excellence'** among scientists currently engaged, internationally in ICT based barrier-free environmental research and solutions development (mostly the built environment). **Create a critical mass of excellence**. Initiate **exchanges of researchers**.
- Create an **experimental 'physical' laboratory** where innovative ideas and solutions can be tested (created in house, imported, integrated and adapted). Various labs, internationally, could also be **connected virtually**, in real-time, for integrated, complementary collaborative work.
- **Select one or more 'real' environment/s** (retirement/disability village or similar) to do action research on selected willing individuals, at house, village, community and neighborhood levels
- Carry out experimentation towards the **establishment of a 'closed/controlled' wireless intelligent network** capable of tracking and interact with subjects 3Dimensionally, also in a busy/complex spatial environment
- Develop a **long term technology strategy** to work towards the visions of the project. The strategy will include roadmap with concrete intermediate objectives and create a methodology towards **effective monitoring and evaluation** of real-time testing. Suggest possible research tracks to solve problems.
- **Hold workshops, conferences** and seminars, both locally and internationally
- Initiate **collaboration with ICT industry**, providing expert support for SA and/or international upcoming commercial/entrepreneurial ventures, in a developmental context.
- Create a methodology aimed at stimulating the **birth** and follow/support the **growth of local/European small business ICT companies** (software, hardware or both).
- Obtain buy-in by the Architectural, Engineering (Civil, Transport etc.) and Town Planning professions. **Initiate the assemblage and testing of product prototyping** in collaboration with Academia and Industry.
- Propose to ICT Industry practical **spin-off product production** of immediate use in society, within current Urban physical structure, design and infrastructure.