



Information and Communication Technologies

The University research unit CoBTeK-IA

Missions for the CoBTeK (Cognition – Behavior Technology) unit

CoBTeK unit missions are using Information and communication techniques and most particularly imaging and video processing analytic techniques

- To develop new strategies in order to prevent help and assist elderly people
 - To improve diagnostic and treatment for behavioral and cognitive symptoms in Alzheimer disease and related disorders
 - To improve autonomy in the elderly
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Institute Claude Pompidou – a unique place

The main objective of the Institute Claude Pompidou is the promotion of interactions between care, education, research and cultural activities in the heart of the city of Nice. This scientific project should allow an optimal interrelationship between research, new technologies and human sciences by placing the patient and his caregivers at the center of interest. This is possible by integrating in the same building the Resources and Memory Research Centre, the research unit CoBTeK, a nursing home, family associations and accommodation units¹.

The Institute Claude Pompidou's principal objective is to represent a model on different levels: care, research and education at all stages of Alzheimer's disease. The Institute, located in the heart of the city of Nice, offers combined at the same place, all possible information and support for Alzheimer's disease and related disorders.

¹ Partners of the ICP: 19 places at the day care center (Alzheimer 06 Family Association)

A residence for autonomy and the integration of people suffering from Alzheimer's Disease 72 beds in Nursing Home (Mutualité Française)

The Research Memory center of the Nice University Hospital, CoBTeK research unit and the association innovation Alzheimer

Research at the Institute Claude Pompidou

The new technologies of Information and Communication Technologies (ICT) are partly employed as assessment instruments as well as instruments to verify and follow up on treatment plans. Thus, ICT have a major role in dependency prevention and the adaptation of urban environments to the needs of the elderly and the preservation of their autonomy.

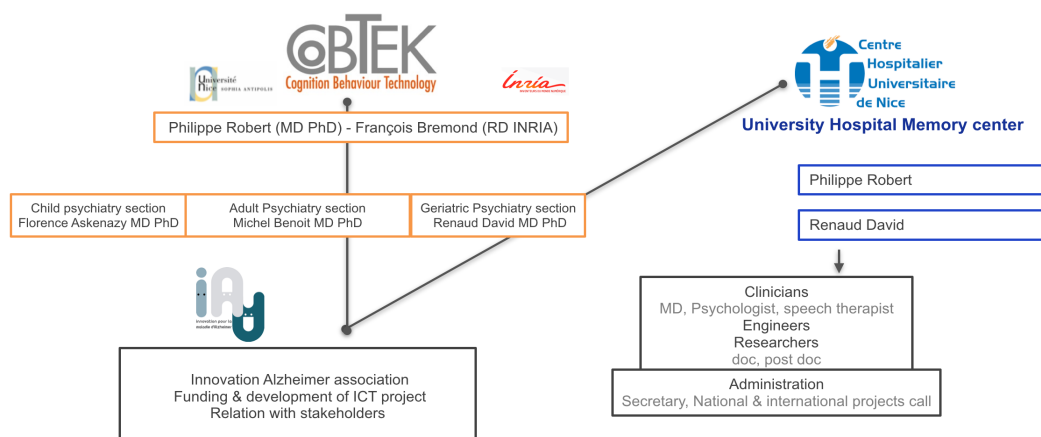
In order to be a leading actor in research, the Institute Claude Pompidou will house a dedicated team composed of guiding experts in the field: the CoBTek unit for **Cognition-Behavior-Technology**. This unit is attached to the University of Nice Sophia Antipolis. The association Innovation Alzheimer (IA) supports CoBTek.

The implementation of an interrelationship between Information and Communication technologies required the establishment of a strong partnership between clinical and fundamental research.

As the former research at the hospital, the objective is to bring “fundamental research to the patient’s bedside”, the objective of CoBTek is to guide this fundamental research as an “algorithm” at the living places of the elderly.

The CoBTek team includes experts from both fields: INRIA (National Institute of Research in Computer and automatic Sciences) for the fundamental research and the CMRR (Resources and Memory Research Centre) for the clinical research, in a place that is accessible to everyone: The Institute Claude Pompidou.

CoBTek have also other scientific partners (**IM2A** – Paris Pitié Salpêtrière, **IPMC**- Sophia Antipolis, Stanford University- USA) and with the help of IA supporting partners (Fondation JL Noisiez, Lions Club and private donors)



CoBTek - IA goals

Key words: Ageing, Alzheimer Disease, Behavioral disturbances – autonomy – perception & analysis techniques for behavior

Normal aging, as well as the spectrum of neurodegenerative conditions such as Alzheimer disease with its accompanying behavioral disturbances, can significantly impact personal autonomy and quality of life. This has major implications for our society as a whole. In this context, the utilization of and help from new technologies are being developed. It is therefore extremely important to develop high-level research into these new technologies, as well as information technology, and to experiment with how they can be adapted to and enhance the lives of the elderly.

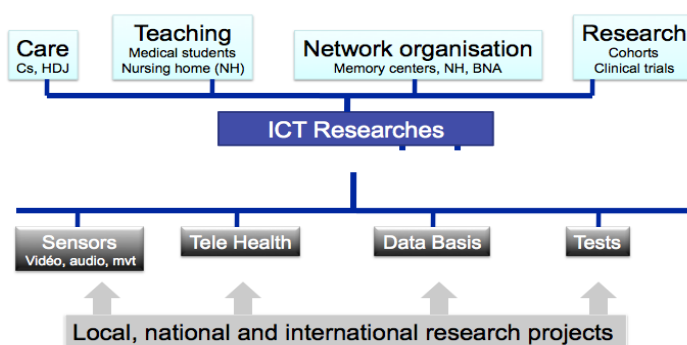
In the Alpes-Maritimes, there is already a well-established and dynamic collaboration for Alzheimer disease research between the biological research team (IPMC) and the clinical team (CMRR), namely, the *“bench-to-bedside”* link.

Another important research collaboration/ has been established in the domain of ICT - information and communication technology between technology expert (INRIA The French National Institute for Research in Computers Science & Control) and clinician. Such an interaction is distinct from the biological-clinical link (*“bench-to-beside”*) and corresponds instead to an entirely different theme, namely, *“ICT or computer-to-clinic”*.

The establishment of collaboration between information/communication technology (INRIA) and the Alzheimer disease clinical setting (CMRR) requires integration into the overall context of the technological platforms within the university and hospital structure.

The partnership of Engineers (INRIA) and clinician (Memory Center) lead to the development in 2012 of a research unit within the University of Nice Sophia Antipolis. This research group named, CoBTek (for **C**ognition **B**ehavior **T**echnology), is situated within this context and one of its objectives is to foster interdisciplinary teaching within these new research areas.

The association IA (Innovation & Alzheimer) is included in the economic model of CoBTek is devoted to the diffusion of innovation to stakeholders supports the CoBTek unit: <http://www.innovation-alzheimer.fr/>



CoBTeK - IA place at the Institute Claude Pompidou

Within the Institute Claude Pompidou the research area (site of the CMRR, COBTEK and IA) are regrouped under the name of Centre Edmond & Lily Safra:

- Localization: 1st floor
- Surface used for premises of the CMRR: 429.59 m² SU
- Surface used for internal circulation of the CMRR: 67.55 m² SU
- Total number of rooms: 18
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Photos of the CMRR – CoBTeK – IA location are available at the following link:

<http://www.innovation-alzheimer.fr/les-locaux-du-cmrr-et-de-lequipe-cobtek-au-sein-de-linstitut-claude-pompidou/>

CoBTeK - IA Research topics

ICT can be used both for assessment and for stimulation

Activity and event recognition: the use and semantic interpretation of dynamic scenes obtained in real-time by video/sound sensors provide objective and automatic assessment of cognition, behavior and activities of daily living²

Experimentation, validation and implementation in collaboration with the STARS and INRIA research teams



Today COBTeK already participate to several European and French projects in this field:

FP7: Dem@Care: <http://www.demcare.eu/>

FP7 VERVE: <http://www.innovation-alzheimer.fr/projets-en/verve-en/>

FP7 IN MINDD: <http://www.inmindd.eu/>

H20 20 SENS-Cog: Ears, Eyes and Mind: The 'SENSE-Cog Project' to improve mental well-being for elderly Europeans with sensory impairment.

AZ@GAME Alzheimer and Associated pathologies Game for Autonomy Maintenance Evaluation Investissements **d'Avenir** Développement de l'Economie Numérique AAP e-santé n°1: Santé et autonomie sur le lieu de vie grâce au numérique : <http://www.innovation-alzheimer.fr/azgame-en/>

ANR SafeE (Safe and Easy Environment for Alzheimer's disease)

ANR – 13 – TECS – 0002 - 01 <http://www.innovation-alzheimer.fr/safee-en/>

Aidants & Eve CNSA (Caisse Nationale de Solidarité pour l'Autonomie) -appel à projets « Aide aux aidants 2015

ICT, Human and social activities

IA and COBTeK are also involved in psychosocial interventions using or not ICT:

Prevention: In collaboration with the association IA the CMRR develop for the City of Nice since 2012 Memory training group for the Nice citizen (more than 200 seniors participated each year).

Social interactions and non-pharmacological approach:

In collaboration with the association IA the CMRR develop for the City of Nice since 2011 the CALMAN program aiming to organize museum and artistic visit for patients and families (between 10 to 12 visit per year) <http://www.innovation-alzheimer.fr/calman-eng-2/>

MeMo website: since the beginning of 2015 a website as also been launched in order to offer free cognitive training for patients suffering from memory and other cognitive problems <http://www.memory-motivation.org/fr/jouer-2/?lang=fr>

- ² Experimentation, validation and implementation in collaboration with the STARS INRIA team. Example of automatic recognition in the Dem@Care project: <http://www.innovation-alzheimer.fr/projets-en/demcare-en/>

CoBteK - IA Ecological room

The activity of the university team COBTEK focuses on the use of new technologies to facilitate evaluation and assistance of patients suffering from Alzheimer's disease and related disorders.

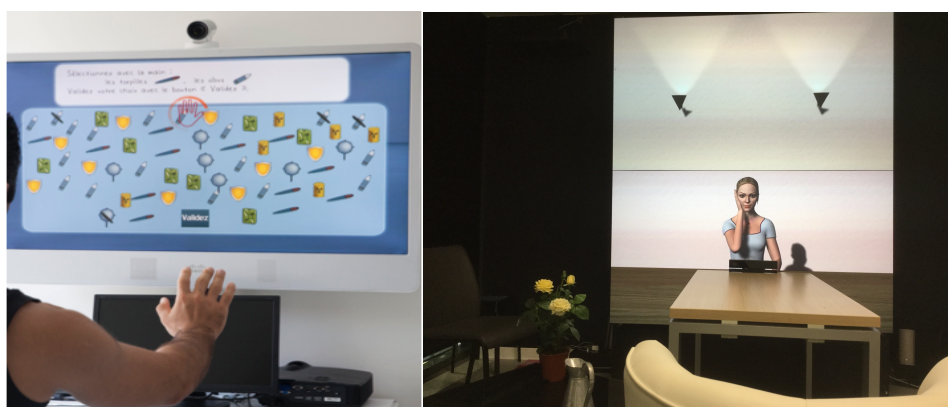
As part of the university team's installation at the site of the Institute Claude Pompidou a set of sensors on the entire floor as well as a room dedicated to ecological assessment and virtual simulation has been developed. It is located in a designated area for researchers and allows multiplying in an even more innovative manner the patient assessment & care. This room has been equipped in part by LIONS club donations.

This room is designed to allow the assessment of consulting subjects (prevention, diagnosis and treatment). This assessment is done directly through the execution of activities of daily living.

In this room, stimulation activities using "Serious Games" or virtual reality can be programmed and practiced. The equipment of this room consists of easily retractable furniture allowing a modular use of the space and a Barco screen for the use of "Serious Game³" in virtual reality (2D/3D) mode.



Other screen use kinet control systems⁴



³ Recommendations for the use of serious game available here: To view the online publication, please click here: http://www.frontiersin.org/Journal/Abstract.aspx?s=18&name=aging_neuroscience&ART_DOI=10.3389/fnagi.2014.00054&utm_source=Email_to_authors&utm_medium=Email&utm_content=T1_11.5e1_author&utm_campaign=Email_publication&journalName=Frontiers_in_Aging_Neuroscience&id=78241

⁴ cf for example Xtorp video abstract and praxia : <http://www.innovation-alzheimer.fr/azgame-en/>