

# CAALYX Complete Ambient Assisted Living eXperiment

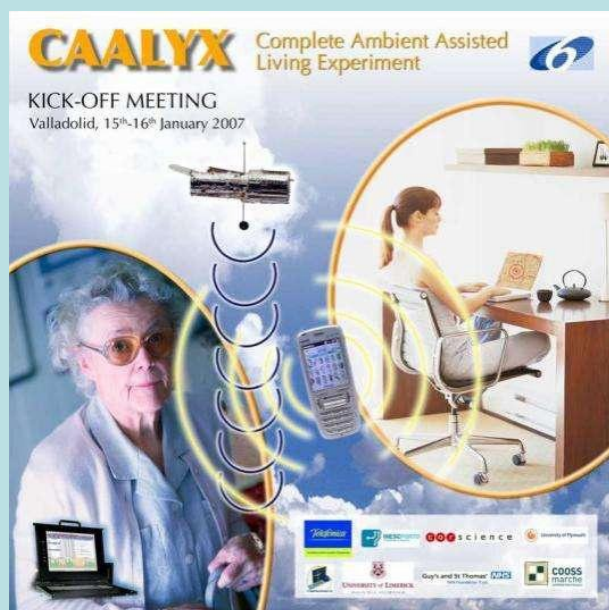
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1<sup>st</sup> January 2007-31<sup>st</sup> December 2008



CAALYX is a two-year project funded by the European Commission under the Sixth Framework Programme. It has 8 participants across Europe, including the University of Plymouth.

CAALYX's main objective is to develop a wearable light device/garment able to measure specific vital signs of the **healthy** older person, to detect falls and to communicate automatically in real time with his/her caregiver in case of an emergency, wherever the older person happens to be, at home or outside.



The service is designed to increase the older people's autonomy and self confidence. This is particularly important in a society which faces an unprecedented demographic change, where the ratio of the older people to the entire population is continually growing and the numbers of healthcare professionals shrinking.

## Specifically, CAALYX's objectives are:

1. To identify which vital signs and patterns are more relevant in determining probable critical states of an older person's health.
2. To allow for the secure monitoring of individuals organised into groups managed by a caretaker who will decide whether to promote raised events to the emergency service (112).
3. To create social tele-assistance (home) services that can be easily operated by users.



**We will use the following case study to discuss CAALYX in more details:**

- Peter is 65 and lives alone in a sheltered accommodation managed by social services. Peter has always lived alone and values his independence.
- He has two sons (Terry and John) who live nearby and visit him occasionally.
- Peter's friend, Barry, lives next door and has taken the responsibility for looking after him.
- Peter suffers from memory loss but uses a system of notes and reminders to keep track of his activities, and apart from this is healthy.



- Peter's day starts at 7:30 when he uses the bathroom and gets ready for the day.
- He fits his vital signs sensors, fall sensor and mobile phone when getting dressed.
- His TV automatically comes on at 8:00 with a prompt for him to take his medication. Peter sends a reply back (through his TV) once he has taken his medication.



- He goes for a walk at 10:00. If Peter falls during his walk, his fall sensor contacts his medical centre and opens a voice channel allowing medical staff to talk to him, if this is possible.

- The fall sensor is equipped with a **Geographic Positioning System** (GPS) device that can precisely pinpoint his location and relay it to the medical centre.



- The centre also sends a text message to Barry alerting him about the location of Peter. Barry believes he can get to Peter quicker as he lives next door and knows Peter's routine.

- Falls are registered by the system and a weekly log is sent to Peter's General Practitioner who monitors his progress and evaluates his medication.

- If Peter falls or if his vital sign sensors are triggered **while at home**, a similar alert procedure is adopted except that the system knows he is in his home so that geographic positioning is not required.



•Terry monitors his dad's progress via his TV. Terry's children contact Peter on weekly basis. They play a game on their TV (where is my suitcase) together and use a **video conferencing** to help each other finding the missing items. The game is fun and designed to improve memory and cognitive functions in both adults and children.

•On Friday nights, Peter plays bingo (from his TV) with his other friends while they chat about what they have done during the week. This is conducted through an audio/video system, which connects several sheltered accommodations together.



Vital Signs in the 1<sup>st</sup> iteration of CAALYX (2007) include:

- ECG
- Pulse
- Blood Pressure
- Movement
- Fall Detection
- (By GPS: Speed, Position)

For the 2<sup>nd</sup> iteration of CAALYX (2008), in addition to those vital signs above, we will also have more signs and **possibilities**, which can also be used to cover non-healthy older people *in follow-on projects*. These additional signs include:

- SpO2 (arterial oxygen saturation)
- Plethysmography (e.g., for lungs, for limbs)
- Blood Pressure Trend
- Respiratory rate
- Temperature
- Cough
- Weight (toilet seat sensor)
- Skin/mucosa humidity
- Physical activity (more detailed monitoring)

**All are non-intrusive sensors!**



- CAALYX's processing of vital signs won't be simply threshold-based, but will also incorporate **intelligent clinical bio-signal correlation and pattern detection tailored to the individual older person.**

- Another key feature of CAALYX is the **voice communication channel** with the elderly, as some important but subtle and/or subjective symptoms like shortness of breath (not the same as respiratory rate) cannot be reliably detected by relying on the vital signs' sensors alone.

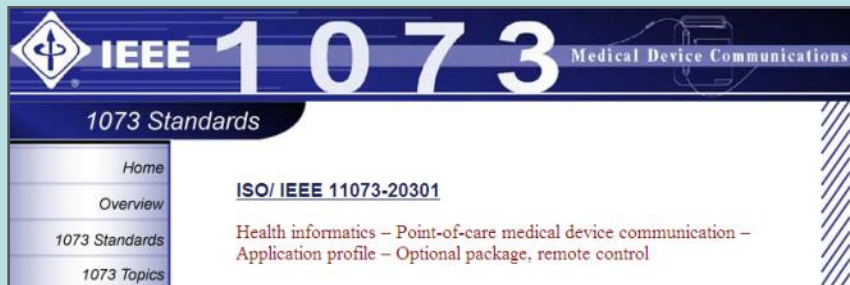
- These symptoms must be communicated instead to the call centre. Further elaboration of the symptoms can be obtained by the call centre staff (for instance by using a brief questionnaire), so that appropriate actions may be undertaken subsequently.



In the CAALYX project, the University of Plymouth is in charge in the following aspects of the project:



- Informing CAALYX's **technical standardization** work, contacting relevant standards bodies and exploring with them the possibilities of proposing any necessary modifications/extensions to improve existing standards, and also identifying patenting opportunities for CAALYX and working on them as soon as possible (with the other technical partners).



***Possibility of contributing to IEEE 11073...***

- Elaboration of a strategy for the **dissemination** of the project and the **exploitation** of the results achieved, including describing approach, timing and estimated effort for future commercial use of CAALYX results, and liaising with appropriate organizations and the consortia of related projects.

The University of Plymouth has so far undertaken the following dissemination activities:

1. Online activities aimed at raising awareness about CAALYX and facilitating communication with involved parties:

- Project presentation/ introduction; and
- Project Web portal.

Home CAALYX Presentation News / Public Documents Publications Links Contact Us search...

CAALYX

SIXTH FRAMEWORK PROGRAMME

Health  
Complete Ambient Assisted Living Experiment

European Commission  
Information Society and Media

NEWSFLASH  
CAALYX Second Consortium Meeting  
When: 16-18 April 2007  
Where: Porto, Portugal  
Hosted by: Instituto de Engenharia de Sistemas e Computadores do Porto (INESC Porto)

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• A New Generation of Location-based Services in Healthcare

Home

**Welcome to CAALYX!**  
Written by M.N.K. Boulos  
Wednesday, 14 March 2007  
CAALYX (Complete Ambient Assisted Living Experiment, 1st Jan 2007-31st Dec 2008) is a two-year project funded by the European Commission (EC) under the Sixth Framework Programme (FP6). (Total EC contribution to CAALYX is €1,850,000.00 Euros.) It has a total of eight participants (see figures below – Telefonica is Coordinator), based in Spain, Portugal, Germany, Italy, UK and Ireland.

Telefonica INESCPORTO COP science University of Plymouth

UNIVERSITY OF LIMERICK HOSPITAL COMARCAL SAINT ANTONI ABAT COOSS marche

Participant name	Country
Telefónica Investigación y Desarrollo	Spain

CAALYX Web Portal –  
<http://caalyx.eu/>  
Public section with  
project presentation

## 2. Collaborative read-write Web space: Internal knowledge management and dissemination within the CAALYX Consortium / between CAALYX partners.

The screenshot shows a web browser window displaying the CAALYX Members-only Area forum. The browser's address bar shows the URL <http://caalyx.eu/>. The forum page features a navigation menu with links for FAQ, Search, Memberlist, Usergroups, Statistics, Profile, and Log out. A table lists various forum categories and their activity:

Forum	Topics	Posts	Last Post
<b>General Project Area</b>			
<b>Discussions</b> General CAALYX-related discussions and polls Moderators: <a href="#">Maqed NK Boulos</a> , <a href="#">Artur Rocha</a> , <a href="#">Manuel Escriche</a>	7	51	Mon Jun 04, 2007 1:30 pm <a href="#">Robert Feld</a>
<b>Reports</b> Place to upload monthly reports Moderators: <a href="#">Maqed NK Boulos</a> , <a href="#">Artur Rocha</a> , <a href="#">Manuel Escriche</a>	5	32	Mon Jun 04, 2007 9:14 am <a href="#">Maqed NK Boulos</a>
<b>Glossary</b> To propose, discuss and fix definitions on concepts and terms used. It should help tune our different backgrounds, knowledge and assumptions. Moderators: <a href="#">Maqed NK Boulos</a> , <a href="#">Artur Rocha</a> , <a href="#">Manuel Escriche</a>	3	6	Mon Jun 04, 2007 1:49 pm <a href="#">Manuel Escriche</a>
<b>Deliverables</b> Place to upload project deliverables already sent to the European Commission Moderators: <a href="#">Maqed NK Boulos</a> , <a href="#">Artur Rocha</a> , <a href="#">Manuel Escriche</a>	1	1	Fri May 25, 2007 4:11 pm <a href="#">Manuel Escriche</a>
<b>Project Meetings</b> Meeting agendas, presentations and related documents Moderators: <a href="#">Maqed NK Boulos</a> , <a href="#">Artur Rocha</a> , <a href="#">Manuel Escriche</a>	5	17	Fri May 25, 2007 10:09 am <a href="#">Manuel Escriche</a>
<b>Guidelines and Templates</b> Place to upload guidelines and templates Moderators: <a href="#">Maqed NK Boulos</a> , <a href="#">Artur Rocha</a> , <a href="#">Manuel Escriche</a>	11	11	Mon Mar 26, 2007 8:17 am <a href="#">Manuel Escriche</a>
<b>Miscellaneous Documents</b> Place to upload miscellaneous documents Moderators: <a href="#">Maqed NK Boulos</a> , <a href="#">Artur Rocha</a> , <a href="#">Manuel Escriche</a>	1	1	Mon Jan 22, 2007 4:00 pm <a href="#">Maqed NK Boulos</a>
<b>Resolutions</b> Decisions taken by Caalyx' Consortium Moderator: <a href="#">Manuel Escriche</a>	14	25	Wed May 09, 2007 10:48 am <a href="#">Manuel Escriche</a>
<b>Work Package Area</b>			
<b>WP1 - Project Management</b> Area devoted to Project Management Moderator: <a href="#">Manuel Escriche</a>	7	41	Thu May 24, 2007 4:47 pm <a href="#">Manuel Escriche</a>
<b>WP2 - Dissemination &amp; Exploitation</b>			Tue May 22, 2007 3:01 am

A pink callout box is overlaid on the right side of the forum table, containing the text: "CAALYX Web Portal - <http://caalyx.eu/> - Members-only section with restricted access to documents and discussions (password-protected and not open to the public)".

3. Press releases/articles in trade/specialised magazines, which are targeted to directors and managers in (health) industry.

The screenshot shows the website 'the ENGINEER online'. The header features the site's logo and a yellow box with the text 'Your Profile'. Below the header is a login section with a 'NewUser' button, input fields for 'Username' and 'Password', and a 'Submit' button. A navigation menu on the left lists various categories: Home, News (with sub-items Business News and Technology News), Jobs, Careers News, Features, Classic Articles, Opinion, Directory, Products & Notices, Awards, Design Engineering, Production Engineering, Environment, Energy, and sectors (Aerospace, Automotive). The main content area displays a 'Technology News' article titled 'A sense of security', published on 30 January 2007 at 03:30 PM, sourced from 'The Engineer'. The article text describes an intelligent sensing system for elderly people and mentions the CAALYX project, a €1.85m (€1.2m) EU-funded initiative led by Telefonica and Plymouth University.

#### 4. Publications in scholarly journals and conferences, which are targeted to academic community.

[Int J Health Geogr](#). 2007 Mar 12;6:9.

[Related Articles, Links](#)



##### **CAALYX: a new generation of location-based services in healthcare.**

[Boulos MN](#), [Rocha A](#), [Martins A](#), [Vicente ME](#), [Bolz A](#), [Feld R](#), [Tchoudovski I](#), [Braecklein M](#), [Nelson J](#), [Laighin GO](#), [Sdogati C](#), [Cesaroni F](#), [Antomarini M](#), [Jobes A](#), [Kinirons M](#).

Recent advances in mobile positioning systems and telecommunications are providing the technology needed for the development of location-aware tele-care applications. This paper introduces CAALYX--Complete Ambient Assisted Living Experiment, an EU-funded project that aims at increasing older people's autonomy and self-confidence by developing a wearable light device capable of measuring specific vital signs of the elderly, detecting falls and location, and communicating automatically in real-time with his/her care provider in case of an emergency, wherever the older person happens to be, at home or outside.

##### Publication Types:

- [Editorial](#)
- [Research Support, Non-U.S. Gov't](#)
- [Review](#)

PMID: 17352802 [PubMed - indexed for MEDLINE]

#### 5. Contacting/meetings with elderly and carers' communities.

6. Investigating and networking with potential partners: industrial/commercial partners, and health and social care service providers/elder care organizations (governmental and non-governmental, public/private and for profit).

7. Contacting/meetings with other EU/international projects with related agenda or projects of interest to CAALYX, e.g., MobiHealth <http://www.mobihealth.org/>.

CAALYX's **standardization philosophy** and **open, plug-and-play architecture** are expected to **significantly boost the exploitability and marketability** of the project's product outputs and their future expandability and reconfiguration. By conforming to the right standard, CAALYX will be able to shape its marketing strategy in a way that enables them to cover more market share.

The market in return can also dictate changes to be made to the current CAALYX design/standardization (this is part of what we will be investigating at Plymouth). By designing a system ready for future expandability and reconfiguration, CAALYX will be able to react to the changes in the market and maintain its competitive advantage.



Besides its leading role in Work Package 2 (WP2), the University of Plymouth also has key roles in the Management of the whole project (e.g., Dr Boulos is CAALYX's **Exploitation Manager**) and in two other Work Packages:

**WP3: Scenario Description,** and

**WP4: Requirement Specification.**

In these WPs, the University of Plymouth helps in identifying CAALYX user requirements and translating these requirements into technical system requirements.

Examples of those user requirements include:

- Cost/Return on investment (ROI)/Reimbursement
- Integration with existing systems/Standardization

These will translate into for example:

- Evaluation of sensors, technologies and designs
- Investigating suitable technical options for vital sign detection

# QUESTIONS AND DISCUSSION