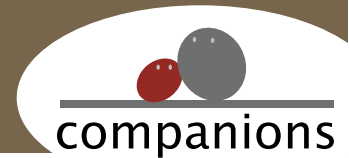


# COMPANIONS:

<http://www.companions-project.org/>

Intelligent, Persistent, Personalised Multimodal Interfaces to the Internet



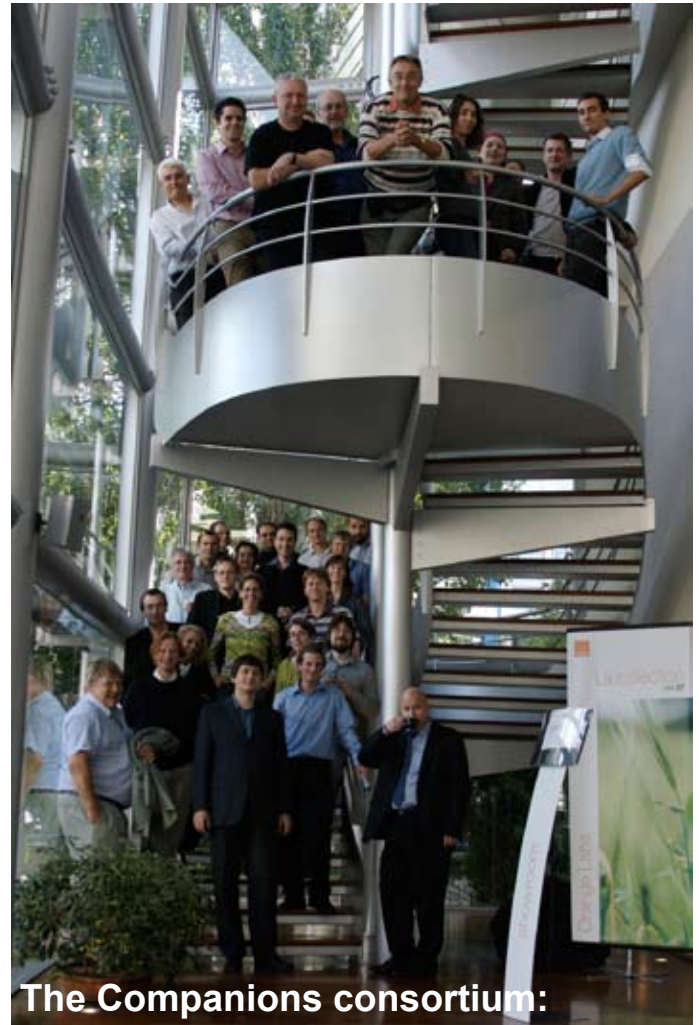
COMPANIONS is a 12.88m Euro interdisciplinary research project which focuses on combining advanced technologies to create personal, persistent 'agents' or 'Companions'. This will be an agent or 'presence' that communicates and develops a relationship with its user primarily by using and understanding speech.

## What are Companions?

COMPANIONS is a new paradigm for the way people deal with the Internet, as computational agents that are personalized and persistent, sensitive to the needs of, and relationship with, the single owner. The embodiment of a Companion is relatively unimportant: it could be a screen head, a mobile phone, or some simple object, easy to carry about, like a handbag, **The key thing is talk:** the Companion, whatever its size or shape, will be a conversational entity, interacting with its owner over long periods. It is an ECA (Embodied Conversational Agent) but with an emphasis on the conversation rather than the graphical forms. That is what the project's first trial demonstrators are aiming at, however simplified they turn out to be.

The Companion vision is that a Companion becomes, in a precise sense, **part of the user's memory on the web**, essentially their memory of themselves and their life events. The originality here is the use of conversation as a tool of reminiscence for users who will already have much of their life's data in digital form, such as images, texts and videos. The Companion is there to give that data a narrative form, a life story, for the benefit of the user and their successors. In the Senior Companion of course the aim is also to divert, entertain, instruct and help.

A crucial component in the Companion vision is the relationship of the Companion, not only to its owner, but to the Companions of other users; as well as the relationship of users to each other mediated by their Companions. Users will be likely to have revealed details of themselves, their financial intentions, their health etc. to their Companion they may not want shared or gossiped about. Companions will need to show trust by understanding different levels and types of information entrusted to them and what can be done with it: how far, when making a date with another user via his or her Companion, it can reveal relevant and useful things ("I think my owner likes yours!"). Companions must therefore know how they are affecting the moods and emotions of their users and how far they are doing what they were intended to do, and not more; they must be able to assess both their owner's state and their own capacities.



**The Companions consortium:**

University of Sheffield, University of Oxford, University of Teesside, Charles University, Swedish Institute of Computer Science, Napier University, As An Angel, Loquendo, University of Tampere, University of West Bohemia, University of Washington, Telefonica Group, France Telecom, Teliasonera, University at Albany

## Scientific Governing Council

Members: Professor Ricardo Baeza-Yates (Yahoo! Research, Barcelona, Spain); Professor James Allen (University of Rochester, USA); Professor Dr Harry C. Bunt (University of Tilburg, Netherlands); Dr Gregory Grefenstette (CEA, France); Dr Rafi Haladjian (Violet, France); Dr David Levy (Intelligent Systems, UK).

## Funding

European Commission Sixth Framework Programme Information Society Technologies Integrated Project IST-34434



## The Health and Fitness Companion

This Companion supports a healthy lifestyle by maintaining records of a user's health-related information (eating, physical exercises) over a long time ...

In the first prototype we have focused on dialogues where the user gives the Companion background information, such as current exercise and eating habits. Based on this, the Companion will provide the user information on healthier eating habits (including how to cook healthier food), and how these relate to various fitness activities. Typically, the user and the Companion make an overall plan for the whole day, and there can be more detailed conversations during the day. The first prototype is capable of having a dialogue with the user covering all daily meals. The following dialogue excerpt gives an example of the current system:

**Markku:** <Touches the Companion with the RFID-tag>

**Companion:** Hi Markku! How are you doing today?

**Markku:** I'm fine, thank you.

**Companion:** How about taking a look at your eating habits?

**Markku:** Sure, why not.

**Companion:** Would you say yesterday was an average day?

**Markku:** Yes, I guess so.

**Companion:** What time did you wake up?

**Markku:** At seven o'clock

**Companion:** Do you usually wake up around seven in the morning?

**Markku:** No, usually around 8 in the morning.

**Companion:** What did you eat and drink between getting up and going to work?

**Markku:** Some coffee and juice

**Companion:** Did you eat something between getting up and going to work?

**Markku:** Yes, I had toast

**Companion:** Did you have milk or sugar in your coffee?

**Markku:** Yes, both milk and sugar

The current implementation uses a unique combination of spoken dialogue system technology and physical Nabaztag/tag rabbits (see figure). In future prototypes, cooking and physical exercises will be incorporated, including a mobile Companion that provides feedback and advice during physical activities, such as jogging exercises.

## Talking to the first Companion:



## The Demonstrators

The Companions Demonstrators will show off the capabilities of the technology, and a number of components or modules that future research and products can build on to create a variety of Companions ...

### Introducing the PhotoPal WoZ Platform

In order to explore how people talk about their digital photos, the details of events, of places, of memories, the Companions project have developed a series of Wizard of Oz (WoZ) platforms ...

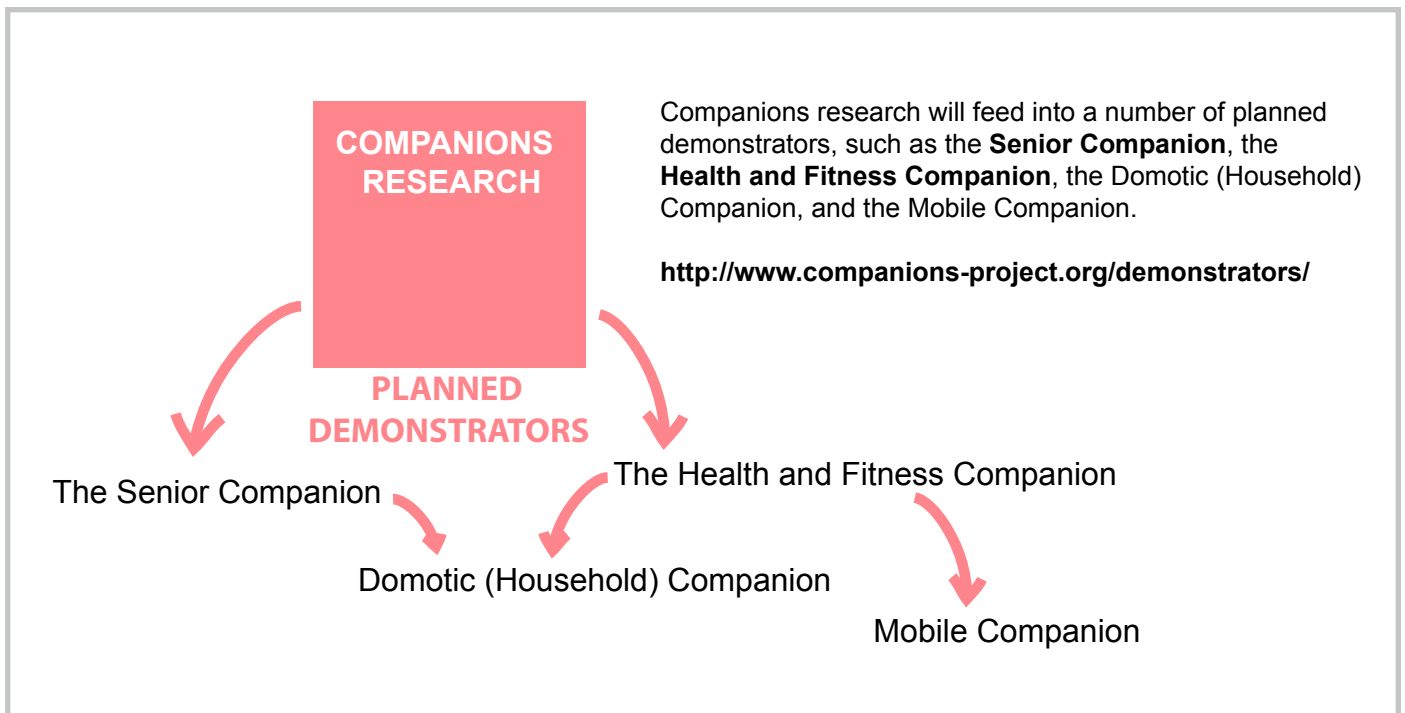
The notion of the WoZ approach is that to explore advanced technologies that are beyond the reach of the researcher (through barriers of cost, technical feasibility etc) we can replace the technology with a human 'wizard'. This wizard then allows the unknowing participant to experience, describe and interact with the technological functionality with which the researcher is interested.



The Companions WoZ examples allow a participant to discuss their photos with an on screen avatar, their PhotoPal. The set up enables people to engage in an experience which is not yet technically possible, namely to talk openly and naturally about their photos to what they believe to be an intelligent computer system. The value of this approach is twofold.

On an interaction design level it is possible to investigate how best to develop elements such as interface, avatar design, aesthetics and general functionality. Secondly, the sessions provide a hugely rich source of data for a variety of dialogue corpora, thus aiding the speech work which will make such an interaction a reality.

<http://www.companions-project.org/demonstrators/>



## Companions events

Companions has an important role in training a new generation of researchers in these interdisciplinary fields, and in raising awareness about persistent agents and the role they can play in society and people's lives ...

**Register your interest:  
Fourth Bellagio International Workshop on  
Human-Computer Conversation**

This workshop brings together academic researchers and industrialists concerned with all aspects of human-computer conversation and the associated research issues of emotion, relationships, companionship, embodiment, ECAs, memory, evaluation etc. that persistent, personalised computational agents will need solutions for if they are to exist, as they will, in the reasonably near future.

Earlier workshops in this series were highly successful at getting industry groups (as well as university and independent researchers) to display their interests and prototypes.

Since 2000, there has been a great upsurge in research funding, and another aim of the meeting will be to bring together members of currently active research consortia in the EU and US, such as CALLAS, CALO, COSY, AMIDA, INDIGO, SOPRANO and others.

Calls for papers, lists of invited speakers and the program committee, will be sent out nearer the time.

The First and Third workshops are available at: at <http://www.dcs.shef.ac.uk/research/ilash/Meetings/Bellagio/> Bellagio and the Villa Serbelloni are among the finest spots in the world for thought and reflection ...

Location: Grand Hotel Villa Serbelloni, Bellagio, Italy  
Date: 6-7 October, 2008  
Register your interest: [events@oii.ox.ac.uk](mailto:events@oii.ox.ac.uk)

### Scientists Discuss Artificial Companions

The Oxford Internet Institute, a Companions project partner, hosted a workshop meeting of scientists from Europe and the USA to discuss the future of "Artificial Companions in Society" in Oxford on October 26th, 2007. Research into such characters is fast expanding and the general perception is one of a future in which people will become emotionally attached to these companions and will rely on them in various ways, such as storing and accessing their personal memories on the Internet.

The workshop was preceded by a lecture by Sherry Turkle, Abby Rockefeller Mauze Professor of the Social Studies of Science at MIT and Technology Director, MIT Initiative on Technology and Self. Her lecture, entitled 'Cyberintimacies/Cybersolitudes', asked questions such as "What kinds of relationships are appropriate to have with machines?"

Papers presented at the workshop, on speakers' perspectives on the present and future of this emerging science, included titles such as: "Conversationalists, maybe – But Confidants?" (by Margaret Boden); "Falling in Love with a Companion" (David Levy); "Are Artificial Companions Better Than Real Ones?" (Joanie Gillispie); "A Victorian Companion?" (Yorick Wilks) and "Robots Should be Slaves" (Joanna Bryson) (the Position papers are available on the Companions website).

The event was organized by Professor Yorick Wilks, Director of the EU-funded Companions project, on behalf of the e-Horizons Institute, a unit of the James Martin School of the 21st Century; the workshop was also supported by Microsoft Research.

<http://www.companions-project.org/events/>

## Feature: Nabaztag as a first Companion

The Nabaztag rabbit is being used as the first Companion avatar in two initial demonstrators in the project. In the **Health and Fitness Companion** being integrated at the University of Tampere, Nabaztag is the free-standing rabbit available commercially from Violet in Paris, adapted with an API so as to receive speech input as well as output. In the **Senior Companion**, being integrated at the University of Sheffield, Nabaztag is appearing as a talking 2D screen rabbit, discussing the content of personal photos. Nabaztag is the brain-child of Rafi Halidjan (the name is the Armenian for rabbit). It is a plastic rabbit that can move its ears, flash colours and speak. Its input is entirely wifi, driven from a remote website. The standard use is to convey messages and emotions, all input at a website, to a remote friend or lover: it can **flash blue** with ears down and say or sing 'I miss you', or indeed anything else you type in. Rafi Halidjan is on the Companions Governing Council and we hope for a closer relationship in the future as Nabaztag has much of the attractive, distinctive and expressive quality one wants in a physical embodiment of the Companion idea: especially as the Tampere version can now listen as well as talk!

See: <http://www.companions-project.org/demonstrators/>

## Loquendo

The automatic speech recognizer (ASR) and the text-to-speech (TTS) system integrated in the present Companions demonstrators have been provided by Loquendo. While themes related to improving acoustic quality, naturalness, and expressivity of speech generation are subjects of research done by Loquendo in Companions, the ASR integrated in the demonstrators is the Loquendo commercial product. Loquendo ASR can support speech applications that need accurate recognition of broad vocabularies, up to 1,000,000 forms of words. The speech recognition engine is based on algorithms that integrate neural networks and continuous density hidden Markov models. The TTS pronunciation lexicon ensures that specialized vocabularies, abbreviations, acronyms, and even regional pronunciation differences, can sound as the speech application developer intends them to. The acoustic characteristics of the voices (speech, speaking rate, and volume) can be fine tuned and controlled at the application level.

## Telefonica

One of the today's buzzwords among telco companies and a technology that can significantly enable some of the future Companions features is IMS (IP Multimedia Subsystem). This acts as the glue that will bring today's mobile, fixed and IP telephony into a convergent, unified entity. IMS will offer significant advantages on concepts such as multidevice situations, usability, session transferring, identity tracking, personalization, security and others, all of which will undoubtedly be crucial in the future Companions prototypes. The same Telefonica I+D team working on Companions has recently collaborated in the development of scenarios and implementation for one of these projects, involving many of the above concepts. Our mixed presence and identity tracking demonstrator performs transference of sessions between different devices such as PCs, smartphones and touch panels, enabling users to perform complex tasks such as reading their incoming mail and SMS/MMS, accessing the internet and granting access to their homes. We hope to bring some of this technology in later stages of the project to make the Companion not only able to recognise each user's presence, but to follow her or him along using different devices.

## Our Industrial Partners

### As An Angel

As An Angel is a European SME, founded in 2001, based in Paris, specialized in human-computer dialogue and agent-based multimodal interfaces. It has produced a dozen conversational agents, prototypes and demonstrators for advertising agencies, banks, and other advertisers. As An Angel is about to launch an online automated generator of personified avatars, named AngelStudio. This generator allows the user to develop his or her virtual double in just a few minutes. This personified and learning avatar will be able to achieve the following delegated actions such as representing the user on his/her personal site or blog, meeting sites and forums, online communities or virtual worlds and simulation games. The first application of AngelStudio technology is the game SimDate, currently in its final stage of development and due to launch online in January 2008. In this simulation of a seduction dialogue, the players purpose is to seduce a character (derived from a real person) through an instant messaging-like dialogue with a webcam.

### Teliasonera

The major undertaking of TeliaSonera has been the development of a dialogue management method suitable for automatic troubleshooting and other problem-solving applications. The method has a theorem-proving flavour, in that it recursively decomposes tasks into sequences of subtasks and atomic actions. An explicit objective when designing the method has been that it should be tailored for use by other people than the designers themselves. A pilot implementation in the domain of over-the-phone broadband support has been developed and has been used for internal data collection in order to validate the basic ideas and fine-tune the design. We are particularly interested in trying to apply unsupervised machine learning methods, such as reinforcement learning, to enable this kind of system to learn to improve its behaviour by itself.