Multimodality in a domestic environment

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Abstract

We describe a sensitive and multimedia house conceived at France telecom R&D Studio creative. In that house we develop communicating objects. We describe here the issues of such developments, and the way we cope with multimodality for multimedia navigation.

Key words: pervasive computing, multimodality.

Methodology of the Creative Studio

The *Creative studio* is part of France Telecom's R&D centre. It was launched in 1997 by Musso[1], to promote innovation in communication services. Its main thrust is to build up usages, services and customer awareness in an innovative process traditionally governed by a technical and scientific structure. The idea is to complement the traditional R&D approach wit new methods borrowed from the human sciences, creativity and artistic creation.

The Creative studio uses two methods: the first is to produce services concepts which are briefly sketched out; the second is to implement services scenarios in a living environment, in order to present these concepts as part of a usage sequence. It is emphasized that the combination of the two is the key to the Creative Studio original approach.

The innovative process involves three phases:

- the production of ideas and their illustrations,
- the validation of ideas, and
- the transfer of selected ideas to operational entities.

The studio calls upon many sources to generate new ideas for services: monitoring future services, market studies, reports on usage habits and practices, strategic sector reports, exchanges and discussions with experts and artists, science-fiction reading and creativity sessions in or outside of France Telecom, including customers.

The selection of concepts is a mandatory step, and not the less difficult. We then select a service concept that we want to validate. To better envision the various parameters, the studio produces numerous illustrations: sketches, videos, animated sequences. In some cases we produce a working simulation (i.e a full development).

The Studio then tests the concepts by consulting customers and experts from different fields as to how they may be adapted and utilized. This approach is complementary to conventional market studies. This working mode is fully in phase with group creativity, in which a divergent phase (production of ideas) is followed by a convergent phase (illustration and selection). It is stressed that through our methodology, the Studio takes the market and usage potential into account before the prototype is decided upon. From an economic standpoint, this is an advantage since the concepts may still change or evolve.

The sensitive house

We are testing services in a simulation of a house, which is around 100 square meters. It is designed to be modular and to allow a rapid reconfiguration, either from the technical side (electronic, routing of video, sound and computer signals) or from the furniture point of view. Thus, we are able to adapt to different ways of life. The aim is to have a familiar environment, in which user can describe their existing practice, and also develop new ones. We use the house in several different ways, which can be contradictory sometimes:

- A *domestic house* to test automated element of comfort.
- A *secure house* in which we can test the security of persons and goods.
- An *adaptative house* in which we develop new ideas and concept about the living space and its components (ambient intelligence, pervasive computing).
- A *sensitive and multimedia house* which is more oriented on leisure, permanently connected to the world. It relies on the perspective of broadband access, and on the ability for the user to interact naturally and easily with services. It is this latter house that is the subject of this article.
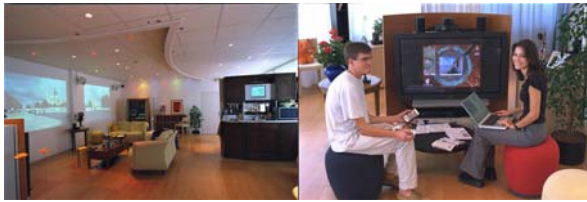
Figure 1. The sensitive house. Left side, the view shows from left to right a plasma TV display (see right picture), two projection screen s to create data projection, or panorama live videos, and the kitchen space, which integrate a display screen. The right picture displays the large plasma screen, also use for video conferencing.

To interact with the user, we devise information appliances [2] in the shape of objects. An information appliance is an intelligent object that performs one function (for instance give the weather forecast with a single push on an unique button). The different appliances in the house cooperate in order to provide the desired result. In the sensitive house, you will find a variety of sensors and object that allows direct control over "things" (comfort, medias).

Multimodality in the house

We present here the different interactors we develop in the house.

The "info turtle" comes from creativity sessions. Users expressed the need for a device that provided "the necessary information" very simply. They wanted to have traffic info near the exit door, fridge information in the kitchen. First, a simple button was designed, nicknamed the "mushroom". The mushroom was located in a place and configured to give contextual information relative to that place. For instance, pressing the mushroom of the home door gave via voice synthesis traffic information. It was realized as a mock-up (using "wizard of Oz" technique). We gathered feedback from this mock-up and teamed with the wireless department to produce the "turtle". The turtle is a WiFi device, configured remotely by a PC. It has a one-line LCD display, giving contextual information.

The Zen lamp is also derived from creativity sessions. In that case the user expressed the need to buy an "ambient" in a shop as an object, and to be able to use that ambient at home: changing the light, sound smell and visual of the home. The Studio came up with the Zen Lamp. This device is an incense lamp. When the use put candlelight inside, the heat is detected by a sensor, which triggers by radio the *ambient portal* of the sensitive house. The Zen lamp has the effect of closing the blinds, dimming the lights, and displays on the walls a panoramic video of a Zen garden, with associated sound ambient.
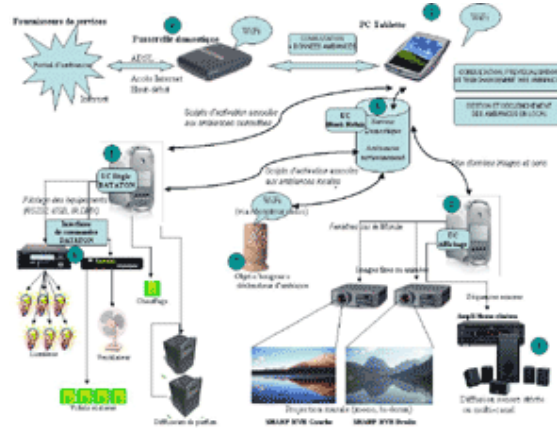
Figure 2. The ambient portal of the sensitive house. The portal is controlled either locally, either via the web or radio. The portal control video projector, sound, light smells, and specialized devices in the house. All communicating objects in the house connect to the portal.

figure 4. The Zen Lamp. The radio emitter is located is the bottom part.

Figure 3. : the portal in action. The lights are dimmed and a Zen ambient is projected

The interactive bicycle is the result of a collaboration with an artist. The Creative studio worked with Rob

White, a London-based multimedia artist. Rob White has developed IBIS [3], a digital bicycle interface that allows the user to navigate through an Edwardian travelogue. The journey represented is a bicycle tour through southwestern France and northern Spain. Conceived as an interactive art installation, a bicycle was incorporated as the user input device, not in order to create a simulator, but rather to integrate an appropriate input device that echoed the content of the travelogue, thus creating an augmented storytelling experience. As well as being able to navigate through text and images the user is uniquely able to interact with *video* footage using the functions of the bicycle. The interaction is simple: pedaling causes the user to go forwards (in the video and in the text). We do not use VRML, as Jeffrey Shaw [4], but sepia filtered videos, which give an antique look to the experience, instead of a futuristic one. The user can use a genuine bike put on a stand, equip it with four sensors and start using it. The original concept for the Ibis application was the development of a user-friendly interface that reconstructed a linear narrative into a non-linear *interactive* experience. Consideration was given to four key areas.

• The design of an immersive input device other than the traditional keyboard and mouse.
• The acquisition and interpretation of the data from the device.
• The translation through software of this data into an intuitive navigation system.
• Making the underlying technology of the installation as unobtrusive as possible.

Bicycles have already been used for media interaction, but it was either 3D [5][6] or linear media with no interaction [7]. The originality of our development holds in the fact that we handle video, animated pictures and text media.

The collaboration with the studio has led to the conception of a new bike and integration of the bike in existing 3D applications [8]. With the bike, we are able to design simple ways of navigating and interacting with 2D graphics, 3D graphics, sound, text and video. Biking advance you through the media and control the speed in a very natural way, while the brake is used to do a action, and ringing the bell get you to a generic menu.

We developed a sensitive carpet, similar in principle to a Playstation-2 dance pad, though this carpet is much wider: 2 meters by 3 meter, with an accuracy of 15 cm. With the carpet, the user can navigate in a 3D world. We also have a video tracking system: a camera mounted on the ceiling is able to identify a point of light.

All these navigation system were developed separately and do not interoperate. Suppose we have two users, Jane and John. If John visits Jane, can he bring with him his own gamepad? What if Jane does not want to bike, but want to sit on the floor and still interact? What if Jon wants to move freely inside the house?

To solve these scenarii, we propose that all input devices are permutable, just like a PC gamer could use a Joystick, a game pad or a keyboard. We choose to use the VRPN abstraction layer. VRPN met all of our requirements. *"The Virtual-Reality Peripheral Network (VRPN) is a set of classes within a library and a set of servers that are designed to implement a network-transparent interface between application programs and the set of physical devices (tracker, etc"*[9]. This opens new combinations: navigation in a CD-ROM with a bike or a carpet, 3D world navigation via a carpet.

Using this layer, we are now able to use indifferently on 3D navigation and in an interactive solar system tutorial the following input devices: a mouse, a Phantom (3D mouse with force feedback), any game pad or joystick, the bike, the camera-tracking system and the sensitive carpet. This opens up to the notion of "preferred device" for each user. Each person could carry with him a control device (like a remote), such as a touch screen, a mobile phone or a pocket game pad, and use it in its current task. Similarly, he could choose to use instead available larger device: bike, camera tracking … Put in a few word, everybody could carry with him a device that acts as personal Human computer interface, or acts as a switcher for in situ interface.

As of October 2004, we are now running end-user test, to validate separately all these devices as interfaces, and to validate the ability of switching between devices.

Intuitive control

However, all these systems are used for explicit control / movement into 2D or 3D world, or to control a video playback. We want to develop systems that allow intuitive control. The aim of such systems is to be able to address issues such as:

- How Jane can set the ambient of the house without having to use a control interface that explicitly addresses all lights and blinds?
- How John can browse a huge CD collection (either local or network based), looking for a music that suits its mood?

One answer is to detect the user *mood* and to (re)act accordingly. The reaction could be to propose an ambient for the house (combination of light sound, pictures). The same way, we could find a record in a huge library of CD that is adequate for John's mood.

We have a partnership with the Japanese multimedia artist Naoko Tosa to integrate her interactive piece of work "The ZENetic computer" [5] inside the sensible house. ZENetic Computer is an interactive experience that evokes "self-awakening, a particular cognitive response to processing reality via subliminal

consciousness. It uses stories portrayed in sumi-e (ink painting), haiku and kimono, which display features of eastern philosophy, and Zen in particular. Visitors create their own sumi-e and stories on a large rice paper screen, while learning about Zen, Japanese art, and themselves.

The ZENetic computer uses the ink painting and interactions to induce an emotional state for the visitor, and then tries to bring the visitor, through a sequence of interactions to a higher awakening. We believe that such devices can be used in the future to interact with services. Imagine a scenario in which you come back home. You do not want to interact with a PC computer to specify an ambient (music, videos etc.). You could just sit and place different special objects on a surface, or do a drawing, just like the one we often do during a boring phone call. The house can then analyze the pattern of object, or the drawing to induce your mental state, and go through patterns learnt to find the ambient that fits your mood, without having to go through introspection. The work on these interfaces is in his first stage.

Figure 2 : the Zenetic computer in the sensitive house. The plasma screen is used for main display, while a large rock garden (in front of the author) integrates a sensitive screen for interaction. The yellow box in the back emits smells. Videos are projected on the wall behind. A very dark ambient is used.

Conclusion

We described the Creative Studio, and its methodology, which is to produce new services concepts; and to implement services scenarios in a living environment, in order to present these concept as part of a usage sequence The field of domestic interfaces and interaction is quite wide and we work simultaneously in the following directions:

- communicating objects that perform one function, and work in cooperation with the house: the turtle, the Zen Lamp;
- interactors that can be substituted, for handling various media: mouse, gamepad, bike, carpet etc;
- more intuitive interfaces that allows users to interact with their environment in a non-explicit way, by detecting the mood of users.

References

1. "The France Telecom R&D Creative Studio – An original Approach to innovation in services", Laurent Ponthou and Pierre Musso, Journal of the IBTE, Vol. 1, Part 4, October–December 2000.
2. "The Invisible computer", Donald A. Norman, MIT Press, 19992.
3. IBIS interactive travelogue, Rob White, 2000, http://www.veloquence.com
4 "Legible city",Jeffrey Shaw, Art Exhibition, Siggraph 89, Boston, Massachussetts, United 4. VR bike, a kit for coupling a bike to a PC – www.tectrix.com - (discontinued in 2003)
5. Carraro G., Cortes M., Edmark, J. T., Robert Ensor J, "The Peloton Bicycling Simulator", Proceedings of the third symposium on Virtual reality modeling language February 1998
6. Cateye company, "The Cateye Game Bike", http://www.cateye.com/gamebike
7. SimTeam, "Entretien avec un pionnier : Morton Heilig 1989" http://www.simteam.com/VR/heilitv.htm
8. "Using a Bicycle Interface for Interaction and Games", Henry Thomas, Rob White,. 10th International Conference on Human - Computer Interaction, June 22-26, 2003
9. VRPN, University of northern California http://www.cs.unc.edu/Research/vrpn/