INRIA

INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE

Project-Team in-situ

Situated Interaction

Saclay - Île-de-France

Theme : Interaction and Visualization

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Established in 2002, the INSITU project is a collaboration between INRIA Saclay–Île-de-France and the Laboratoire de Recherche en Informatique (Laboratory for Computer Science) of Paris-Sud University and CNRS (Centre National de la Recherche Scientifique), originally established within the framework of the PCRI (Pôle Commun de Recherche en Informatique).

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2. Overall Objectives

2.1. Objectives

As computers permeate every aspect of society, the number and variety of computer users has multiplied dramatically as has the quantity and complexity of the data they manage. Computers are now ubiquitous and increasingly diverse, ranging from mobile phones and PDAs to laptops, desktops and wall-sized displays. Computers and telephony have converged to create a new communication medium, providing mobile access to myriad on-line services. This revolution poses major challenges for the design, implementation and deployment of interactive systems. The current failure to address these challenges has resulted in applications that users can no longer understand or control, lowering productivity and increasing frustration.

The focus of the INSITU project is to create innovative interactive systems that truly meet the needs of their users. For us, context is critical: we need to provide designers with tools and methods that actively take context into account. This requires a deeper understanding of the complementary characteristics of humans and computers as well as an analysis of specific situations of use. Our goal is to develop and facilitate the creation of such situated interfaces, which take optimal advantage of context to provide users with the particular tools they need to address the problems at hand.

The desktop metaphor that has driven personal computing for the past 25 years has reached its limits, with no short-term alternative. Our approach both expands today's graphical user interfaces and explores new possibilities, addressing the following goals:

- Flexibility to support end-user customization and programming as well as adaptation to physical context;
- Integration of physical and electronic worlds through the exploration of mixed reality and tangible interfaces;
- Scalability with respect to the quantity of data being managed, through the development of multi-scale interfaces and information visualization techniques;
- Cooperation and collaboration support in order to study new forms of person-to-person mediated communication;
- Integration of varied interaction styles and techniques into a single coherent environment, using appropriate interaction models and architectures.

2.2. Research Themes

INSITU addresses four major research themes:

Interaction and visualization paradigms focuses on the trade-off between power and simplicity in interactive systems, both in terms of interaction and in managing and visualizing data. Rather than accepting one or the other, our objective is to shift the trade-off curve, creating systems that provide more power while retaining simplicity. We are currently investigating multi-scale (zoomable) interfaces, interactive information visualization, bimanual interaction, multimedia (video and audio) and tangible interfaces. Our goal is to not only explore these paradigms individually but also to investigate how to integrate them into real-world applications.

Mediated communication focuses on how to help people to maintain peripheral awareness of each others' activities at a distance (to "stay in touch"), while maintaining privacy and ensuring that users stay in control of their communication channels. Our objective is to generate a design space for alternative forms of communication, developing and testing new communication applications that illustrate different dimensions of the design space. We are currently developing communication appliances for home settings, including support for the elderly, children, remote couples and families.

Research methods focuses on how multi-disciplinary teams can create effective interactive systems that take context into account. Our objective is to create new research methods that include users throughout the design process, to test these methods in real-world settings and to disseminate these methods to researchers and designers. We are currently investigating participatory design techniques that actively involve users throughout the design process and multidisciplinary design techniques that facilitate communication among researchers from engineering, social science and design disciplines.

Engineering of interactive systems focuses on creating effective tools for building interactive systems. Our objective is to generate libraries, exploratory toolkits and platforms that enable us to quickly implement and work with new concepts, while also enabling researchers within and outside of INSITU to benefit from our research. We are currently investigating tools that facilitate the design and adoption of effective interaction techniques and paradigms and component-based architectures to facilitate dynamic management of interactive systems. Our goal is to develop open source toolkits that enable us and our research colleagues to design and implement advanced interactive systems.

Although we articulate each theme separately, we often intermix them within actual projects. We also work across disciplines, providing us with research breadth, and at the same time, seek to obtain depth in particular projects. We apply our own research methods to the design of new interaction techniques, develop our own tools for developing these techniques and integrate these techniques in the design of innovative interactive systems, which we test in real-world settings. Our long-term goal is to create a new generation of interactive environments that provide a compelling alternative to the current generation of desktop computers.

2.3. Highlights of the year

INSITU had 7 papers accepted at the most prestigious conference in our field, ACM/CHI 2009. Of these, one paper [10] received the Best Paper award (top 1%) and one paper [2] was nominated for this award (top 5%). INSITU also received the Best paper award [32] at IHM 2009 as well as the Best demonstration award [34].

Wendy Mackay was initiated into the ACM CHI Academy. The CHI Academy is an honorary group of individuals who have made substantial contributions to the field of human-computer interaction.

The WILD platform (Section 7.3), with 32 high-resolution screens and a multi-touch table, was inaugurated on 19 June 2009, with over 50 attendees, including top management of the key partners (Région Ile-de-France, Digiteo, INRIA, Université Paris-Sud, CNRS and ANR).

3. Scientific Foundations

3.1. Scientific Foundations

INSITU uses a multi-disciplinary research approach, including computer scientists, psychologists and designers. Working together requires an understanding of each other's methods. Much of computer science relies on formal theory, which, like mathematics, is evaluated with respect to its internal consistency. The social sciences are based more on descriptive theory, attempting to explain observed behaviour, without necessarily being able to predict it. The natural sciences seek predictive theory, using quantitative laws and models to not only explain, but also to anticipate and control naturally occurring phenomena. Finally, design is based on a corpus of accumulated knowledge, which is captured in design practice rather than scientific facts but is nevertheless very effective.

Combining these approaches is a major challenge. We are exploring an integrative approach that we call *generative theory*, which builds upon existing knowledge in order to create new categories of artefacts and explore their characteristics Our goal is to produce prototypes, research methods and software tools that facilitate the design, development and evaluation of interactive systems [41].

4. Application Domains

4.1. Application Domains

INSITU works actively with users from various application domains in order to understand their specific needs. By studying similar problems in different domains, we can generalise our results and develop more general principles. Our current application domains include:

- Biological research, in cooperation with the Institut Pasteur (Paris), INRA (Institut National de la Recherce Agronomique, Evry) and other laboratories of the University Paris-Sud;
- Creative industries (music composition), in cooperation with IRCAM (Institut de Recherche et Coordination Acoustique-Musique, Paris);
- Domestic technologies, in cooperation with France Telecom and ENSCI (Ecole Nationale Supérieure de Création Industrielle, Paris);
- Office settings, in cooperation with Mandriva (Paris);
- Semantic Web data management, in cooperation with MIT (Massachussetts Institute of Technology, U.S.A.) and W3C (World Wide Web Consortium);
- Mobile devices for sound-mediated communication (inter-personal music player), in cooperation with Sony CSL (Computer Science Laboratory, Paris).

We have selected these domains to ensure that we explore and address diverse validation criteria, e.g. enhancing productivity versus increasing communication access, diverse user characteristics, e.g. professionals versus non-professionals, and diverse user environments, e.g., desktops at work versus home versus mobile settings.

5. Software

5.1. The Zoomable Visual Transformation Machine

Participants: Caroline Appert, Olivier Chapuis, Emmanuel Pietriga [correspondant], Romain Primet.

Current Graphical User Interface toolkits such as Java/Swing are powerful, generic and portable, but cannot be used for certain application classes such as structured graphics editors, e.g., graph editors and development environments for visual programming languages. Programmers are required to use lower-level APIs such as Java2D which are more expressive but harder to use. The ZVTM is a Zoomable User Interface (ZUI) toolkit implemented in Java, aimed at promoting the development of the HCI aspects of such applications by making their implementation easier, while favoring the rapid integration of novel interaction techniques.

ZVTM provides application programmers with building blocks for implementing complex multiscale interface components that cannot be handled by traditional WIMP widgets. Featuring off-the-shelf visualization and navigation components that are easy to combine, ZVTM provides a simple yet powerful API and handles low-level operations such as multi-threading, clipping, repaint requests and animation management. The toolkit is based on the metaphor of *universes* that can be observed through smart movable/zoomable cameras. The graphical object model permits management of a large number of complex geometrical shapes. It emphasizes perceptual continuity via an advanced animation module that can animate virtually any on-screen modification. This ranges from camera movements and activation of distortion lenses to modification of the visual variables of graphical objects. Various temporal pacing functions are available to control the execution of these animations. Current development activities around the toolkit now focus on multiscale navigation techniques (focus+context, overview+detail) and high-quality, rich graphics based on advanced 2D rendering techniques.

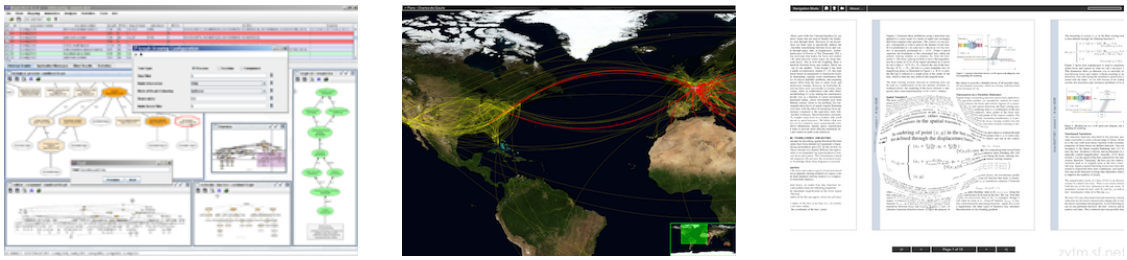

Figure 1. ZVTM used in various applications

Initially developed by Xerox Research Centre Europe and the World Wide Web Consortium (W3C) team at MIT, ZVTM has been available as open-source software under the GNU Lesser General Public License (LGPL) since early 2002. It is used in both academic and industrial projects such as IsaViz (http://www.w3.org/2001/11/IsaViz/), W3C's visual browser/editor for RDF, Blast2GO (Figure 1 - left) (http://www.blast2go.org/), or ZGRViewer (http://zvtm.sourceforge.net/zgrviewer.html) for viewing large graphs generated by AT&T GraphViz[1] (Figure 1 - right). The development of the toolkit is now supported by INRIA. More information can be found at http://zvtm.sourceforge.net and [50].

5.2. The Núcleo toolkit

Participant: Nicolas Roussel.

Derived from VideoSpace [53], Núcleo is a software toolkit designed to help HCI and CSCW researchers to explore new uses of images and image streams within interactive systems. It supports both rapid prototyping and incremental development and has been used to implement most of the video-based systems designed by INSITU, including a web-based mediaspace, the Well, VideoProbe, MirrorSpace (Figure 2) and PêlMêl.

Núcleo provides developers with a set of tools and a C++ class library that makes it easy to integrate image streams within documents and applications. For example, users may display image streams in HTML documents in place of static images. The library makes it easy to create a video link with only a few lines of code, and managing multiple sources and processing video is only slightly more complex. The source code compiles on Linux and Mac OS X and is freely available under the GNU Lesser General Public License (LGPL). For more information, see http://insitu.lri.fr/~roussel/projects/nucleo/

5.3. The Metisse window system

Participants: Olivier Chapuis [correspondant], Nicolas Roussel, Rémi Cardona.

Metisse [3] is a window system that facilitates the design, implementation and evaluation of innovative window management techniques. The system is based on a compositing approach, making a clear distinction between the rendering and the interactive compositing processes. The Metisse server is a modified X server that supports both input and output redirection. The default compositor is a combination of a slightly modified version of FVWM, a standard window manager, with an interactive viewer application called *FvwmCompositor*.

[1] http://www.graphviz.org

Figure 2. Sample Núcleo applications: a web-based mediaspace [55]; the Well [54]; VideoProbe [44] and MirrorSpace [51].

FvwmCompositor uses OpenGL to display windows, which offers a rich graphics model well adapted to the exploration of new window management techniques. Texture mapping, for example, makes it possible to transform the window shapes in real-time (Figure 3, left). Alpha blending makes it easy to create translucent objects and shadows. Scaling, rotation and translation can also be used to position windows in 2D$\frac{1}{2}$ or 3D (Figure 3, middle and right). Input redirection makes it still possible to interact with applications no matter the visual transformations applied to the windows. It also makes it possible to adapt, reconfigure or re-combine existing graphical interfaces [56]. This year we used again Metisse to implement novel desktop interaction techniques [21].

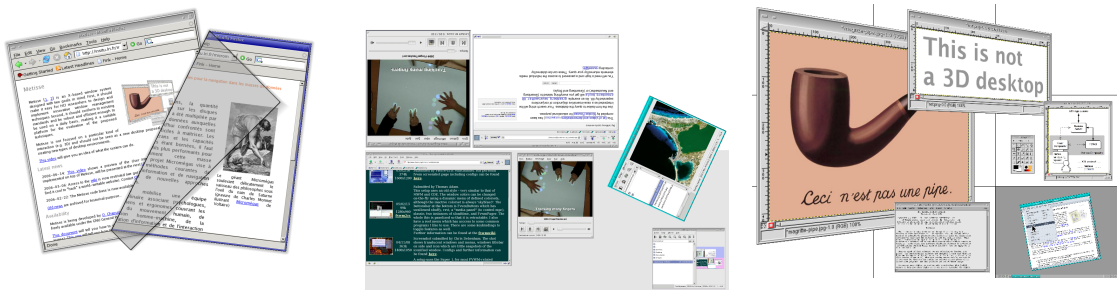

Figure 3. Sample window management techniques implemented with Metisse: extended paper metaphor (left), interactive table configuration that allows to duplicate and rotate windows (middle) and zoomable 3D desktop (right).

Metisse was used by Mekensleep to develop *Pok3D*[2], a multiplayer poker game. This application acts as a new compositor and uses the Metisse server to integrate external applications and 2D GTK+ interfaces into its OpenGL-based 3D scene. Metisse is similarly used by INRIA's ALCOVE project-team to integrate standard X Window applications into their Spin|3D [46] collaborative platform.

Implemented in C and C++, Metisse compiles and runs on Linux and Mac OS X and is freely available under the GNU General Public License (GPL). Distributed as a "Live CD" by Mandriva[3] in early 2007, it is now available as one of the standard desktop configurations in the *Mandriva Linux* distribution. It was publicly demonstrated in 2007 as part of the "Digital odyssey" exhibition[4] organised for INRIA's 40th anniversary.

[2] http://www.pok3d.com/
[3] http://www.mandriva.com/

For more information, see http://insitu.lri.fr/metisse/

5.4. Wmtrace

Participant: Olivier Chapuis [correspondant].

Wmtrace [42] includes two tools that help us study an individual user's window management activity. The first tool runs in the background of an X Window session and continuously logs information about windows and how they are being manipulated. The second uses a VCR-like interface (Figure 4) to replay the resulting logs and analyze the entire session. This tool provides several ways to filter the logs and extract high-level information, including interactive move events and mouse speed. Both tools allow HCI researchers to perform qualitative and quantitative statistical analyses of window management activity.

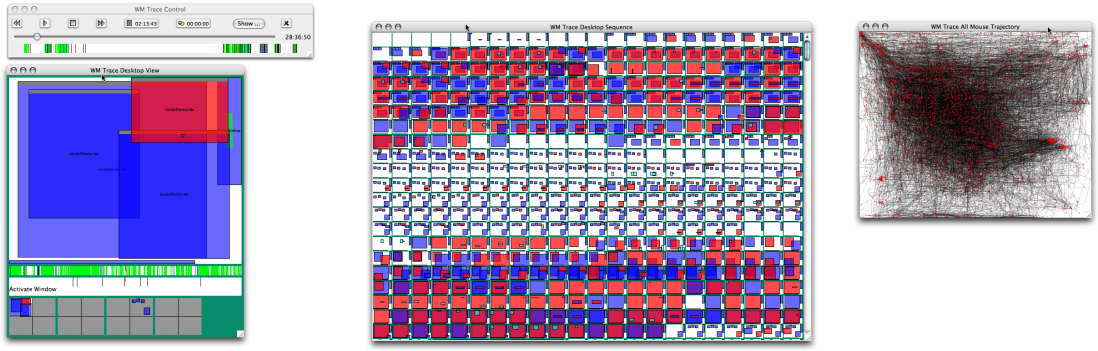

Figure 4. VCR-like interface, session overview and sample plots of mouse trajectories (black) and mouse clicks (red)

Wmtrace is freely available under the GNU General Public License (GPL) and the CeCILL licence. The log recorder compiles and runs on any X Window system (e.g. Linux or FreeBSD). The log viewer, written in Java, is more or less platform independent. Both software can be downloaded from http://insitu.lri.fr/~chapuis/software/wmtrace/.

5.5. The SwingStates Toolkit

Participants: Caroline Appert [correspondant], Michel Beaudouin-Lafon.

SwingStates [1] is a library that adds state machines and a graphical canvas to the Java Swing user interface toolkit. It was motivated by the lack of widely disseminated toolkits that support advanced interaction techniques and the observation that HCI research toolkits are little used outside the lab. By extending the popular Java Swing toolkit rather than starting from scratch, the goal is to facilitate the dissemination and adoption of SwingStates by practitioners.

SwingStates uses *state machines* to specify interaction. It provides programmers with a natural syntax to specify state machines and reduces the potential for an explosion of the number of states by allowing multiple state machines to work together or separately. SwingStates can be used to add new interaction techniques to existing Swing widgets, e.g. to select buttons and checkboxes by crossing rather than clicking. It can also be used with the SwingStates canvas (see below) and to control high-level dialogues.

[4] http://www.inria.fr/40ans/forum/expo.en.php

SwingStates also provides a powerful *canvas widget*. The canvas can contain any Java2D shape, including geometric shapes, images, text strings and even Swing widgets. Shapes can be manipulated individually or collectively, through *tags*. An intensive use of polymorphism allows to apply almost any command to a tag: the command is then applied to all objects with this tag. Tags are also used in conjunction with state machines, to specify transitions that occur only on objects with a given tag. For example, pie menus can be implemented by creating a canvas in the overlay layer of any Swing application (Figure 5).

Figure 5. A numeric text field whose value can be set by a joystick-like interaction (left) and a semi-transparent menu to change the background color of Swing widgets (right)

SwingStates tightly integrates state machines, the Java language and the Swing toolkit to provide programmers with a natural and powerful extension to their natural programming environment. SwingStates is available at http://swingstates.sf.net under the GNU Lesser General Public License (LGPL).

5.6. The FlowStates Toolkit

Participants: Caroline Appert [correspondant], Michel Beaudouin-Lafon, Stéphane Huot.

FlowStates [32], is a new toolkit to program advanced interaction techniques which require non standard input (e.g., two different mice that act independently, a joystick, a tablet, etc.). It is built on top of two existing toolkits: SwingStates [1] and ICon [45].

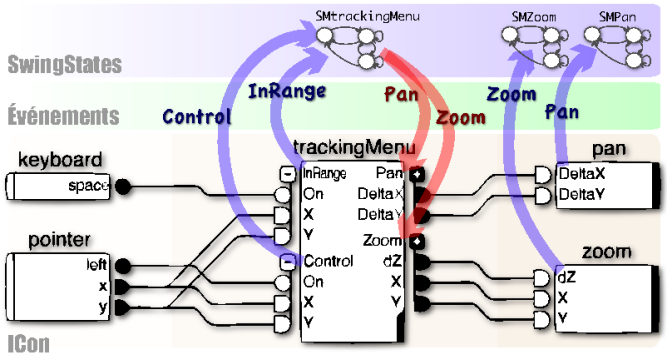

Figure 6. State machines and data flow in FlowStates

With FlowStates the developer can program interaction logic using state machines like SwingStates does but does not restrict the set of possible input channels to Java AWT standard input (a single couple <mouse, keyboard>). The state machines just have to define the virtual input events that are required to trigger their transitions so that FlowStates turns these machines into ICon devices which can be plugged to any physical input channels (Figure 6). An ICon device is a data flow building block that has input and output slots in order to be connected to other devices in the simple graphical environment provided by ICon. State machines can also send out events which appear as output slots in the data flow model.

With FlowStates we showed how two models for programming interaction (state machines and data flow) can be fully integrated to offer a huge power of expression. The explicit decision to not set strict limits between the roles of each model makes this hybrid approach highly flexible, the developer setting himself the limit between the two according to his needs and habits.

FlowStates is available at http://www.lri.fr/~appert/FlowStates/.

5.7. TouchStone

Participants: Caroline Appert [correspondant], Michel Beaudouin-Lafon, Wendy Mackay.

TouchStone [5] is a platform for designing, running and analyzing the results of controlled experiments (Figure 7). While it focuses on experiments comparing interaction techniques, it can be used in a wide variety of contexts.

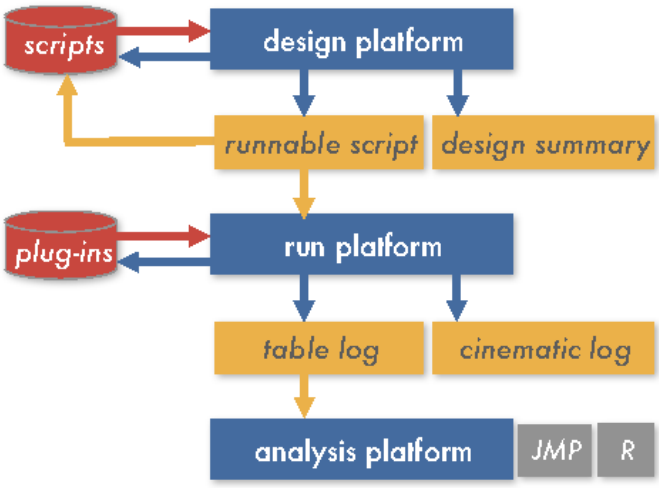

Figure 7. The architecture of the Touchstone platform

With the *Touchstone design platform*, a user specifies the factors and the measures of the experiment, the blocking and counterbalancing of trials, and assess the time it will take to run the experiment. Multiple designs can be explored in parallel to assess the various trade-offs. The output of the design platform is an XML file that can be used as input for the run platform.

The *Touchstone run platform* provides a framework to implement and run an experiment and to collect experimental data. It uses a flexible plug-in architecture to manage a variety of input devices and interaction techniques. The runs of the experiment are controlled by an XML script that can be produced by the design platform.

The analysis platform currently consists of data analysis tools such as JMP, R or Excel. Log data produced by the run platform can be directly loaded into any of these tools. In a future version, analysis sketches will be derived from the experimental design to assist with the analysis.

Touchstone has been used heavily at INSITU over the past two years for the many experiments that we design and run.

5.8. JFresnel

Participant: Emmanuel Pietriga [correspondant].

Fresnel [49] is a presentation vocabulary for Semantic Web data designed to be application- and representation-paradigm independent (see section 5.8). JFresnel is a Java library that implements the Fresnel specification for various RDF APIs, such as Jena and Sesame. JFresnel is a work-in-progress with contributions from HP Laboratories Palo Alto and MIT, freely available under the GNU Lesser General Public License (LGPL). JFresnel is used in the RNTL Platform WebContent (see section 7.1) and partly developed with funding from this contract.

More information about JFresnel can be found at http://jfresnel.gforge.inria.fr

6. New Results

6.1. Interaction Techniques

Participants: Caroline Appert, Olivier Bau, Michel Beaudouin-Lafon [correspondant], Olivier Chapuis, Guillaume Faure, Stéphane Huot, Mathieu Nancel, Emmanuel Pietriga, Nicolas Roussel.

We have continued to explore a wide range of interaction and visualization techniques. We studied a novel pointing technique (Dynaspot) and explored the effect of animated and popup targets on pointing performance. We developed novel window management and menu techniques, and created a new taxonomy of menu techniques based on a morphological approach. Finally we developed efficient techniques to navigate large graphs, and expanded our Sigma Lenses framework for focus+context visualization techniques.

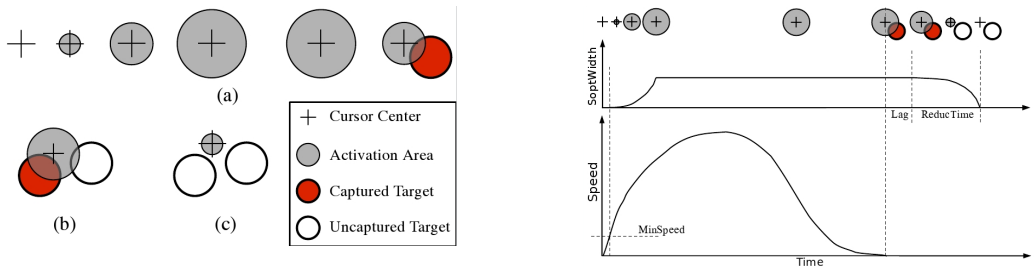

Figure 8. DynaSpot: Speed-Dependent Area Cursor

DynaSpot [2] is a new target acquisition technique based on the area cursor (Figure 8). DynaSpot couples the cursor's activation area with its speed, so that the cursor behaves like a point cursor at low speed or when standing still. This technique minimizes visual distraction and allows pointing anywhere in empty space without requiring an explicit mode switch, thus enabling users to perform common interactions such as region selections seamlessly. The results of our evaluation show that the performance of DynaSpot can be modeled by Fitts' law, and that DynaSpot significantly outperforms the point cursor and achieves, in most conditions, the same level of performance as one of the most promising techniques to date, the Bubble cursor [47]. The paper was nominated for a CHI'09 Best Paper award (top 5% out of 1400 submissions).

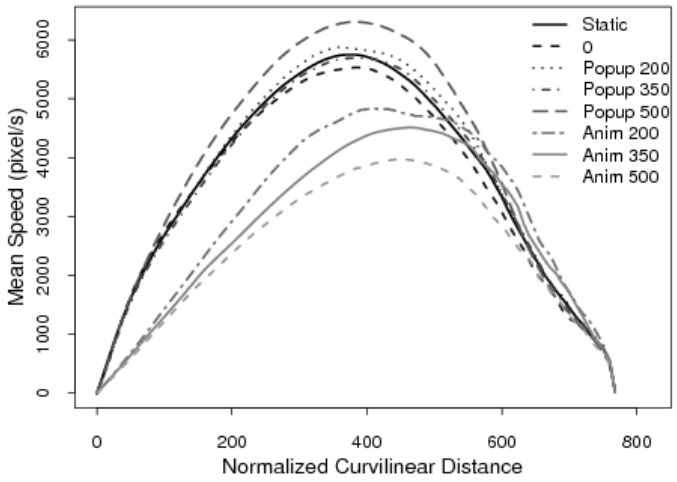

Figure 9. Mean speed as a function of the distance (D = 768) for each DELAY by the pop-up and animation conditions (grey curves with a lower velocity peak are the animation curves)

Continuing our exploration of pointing techniques, we conducted an initial study of **pointing on pop-up and animated targets** [22]. Pop-up targets, such as the items of popup menus, and animated targets, such as the moving windows in Mac OS X Exposé, are common in current desktop environments. We investigated the effect of the DELAY factor, i.e. the delay before the target pops up (for pop-up targets) or the duration of the animation (for animated targets) and find little difference between the two techniques in terms of pointing performance (time and error). A kinematic analysis however revealed qualitative differences in the nature of the pointing movement (see Figure 9). We also found that movement time increases with DELAY. As expected, the degradation is smaller when the target is farther away because the user can start moving the cursor before the target is visible or reaches its destination. Finally we proposed an extension to Fitts' Law that better predicts movement time for these tasks.

We continued our work on **window management techniques**. Copy and move operations across windows have long been supported by interactive desktops, but the growing number of on-screen objects makes these techniques less efficient. Building on our previous work [3], [43], we have developed four new techniques [21] that improve the state of the art: a selection, copy and drag history manager; two techniques to expose the user's desk (see Figure 10) and leaf through stacks of overlapping windows; and a technique that integrates the previous two with conventional drag-and-drop.

We studied new menu techniques to increase the capacity of marking menus, and presented a design space based on a **morphological analysis of menu techniques** [35]. The goal of this design space is to facilitate the analysis of existing menu techniques and the exploration of novel menu designs, in particular to increase menu capacity without sacrificing performance. This design space relies on a taxonomy of the input dimensions used in menu techniques in order to allow a precise analysis of how a selection is performed in a menu and to reveal input dimensions or combinations of them that were not explored. We demonstrated this generative aspect by introducing four new menu designs based on poorly explored combinations of input dimensions: pressure, distance, stylus azimuth and finger touches combined to hand rotation. For two of these designs, the **PushMenu** that uses stylus pressure and **Dartboard** that uses strokes lengths (Figure 11), we conducted controlled experiments that show that they perform on a par with other menus from the literature.

In collaboration with the AVIZ group, we worked on **topology-aware Navigation in Large Networks** [29]. We explored the idea of exploiting the connectivity information provided by networks to help navigate large

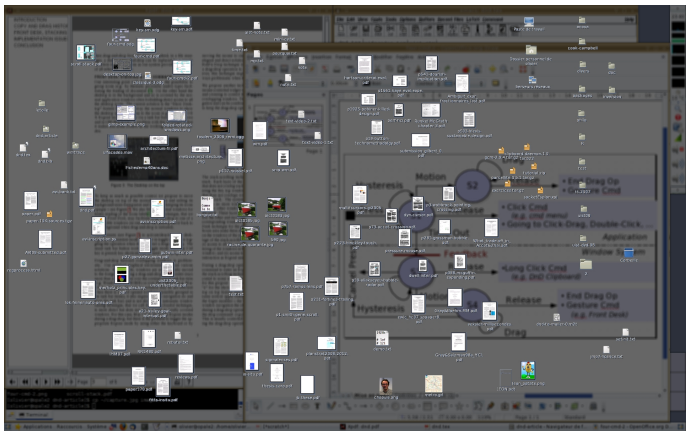

Figure 10. DeskPop: temporarily bringing the desk to the front while keeping application windows visible.

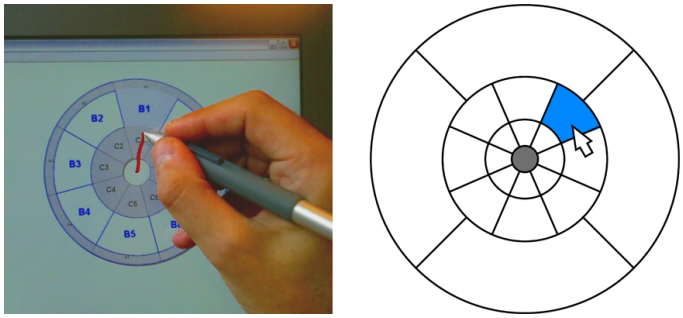

Figure 11. PushMenu and Dartboard: new menu techniques inspired by our morphological analysis of menus

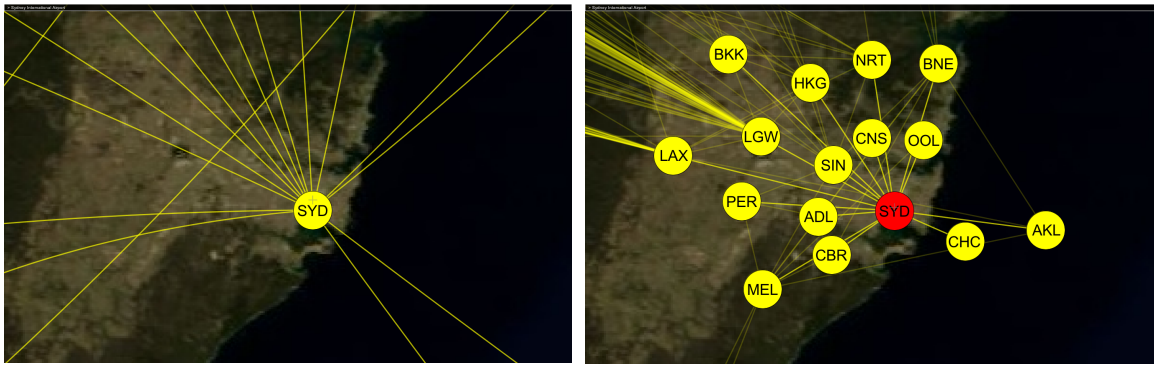

Figure 12. Topology-aware Navigation in Large Networks: the Bring & Go technique

spaces found in applications used every days by millions of people, such as road map navigators, flight route visualization systems, and network visualization systems. We introduced two new techniques, called **Bring & Go**, and **Link Sliding**. Bring & Go (Figure 12) brings adjacent nodes nearby when pointing to a node. Link Sliding provides guided panning when continuously dragging along a visible link. We compared the performance of these techniques with traditional navigation methods in both an adjacency exploration task and a node revisiting task. This comparison illustrated the various advantages of content-aware network navigation techniques. In particular, we found a significant speed advantage for the Bring & Go technique over other methods.

Figure 13. Sigma Lenses: Focus-Context Transitions Combining Space, Time and Translucence

Finally we continued working on the **Sigma Lenses** framework [6] [14], a focus+context visualization framework for large information spaces that uses spatial distortion as well as time and translucence to achieve better transitions among different levels of detail. In our most recent publication [14], we described a representation-independent solution to the implementation of Sigma Lenses that can be easily implemented in different graphics frameworks, ranging from 3D graphics to rich multi-scale 2D graphics combining text, bitmaps and vector graphics (Figure 13). This solution makes it possible to define new focus+context interaction techniques based on lenses whose transition is defined by a combination of dynamic displacement and compositing functions. We also presented the results of a new series of user evaluations that show that a particular Sigma Lens, namely the speed-coupled blending lens, significantly outperforms all others.

6.2. Tangible and Reflective Interfaces

Participants: Olivier Bau, Wendy Mackay [correspondant], Catherine Letondal, Nicolas Masson, Aurélien Tabard, Theophanis Tsandilas, Julie Wagner.

Our work on tangible and reflective interfaces has continued to focused on the use of paper as interface and its role in capturing time-based data that can be used for reflection. We have also started to explore haptic interaction with the BubbleWrap prototype.

Our paper on Musink [10], which received a CHI'09 Best Paper award (out of 1400 submissions), focused on the creative use of paper in the music composition process, particularly the interaction between paper and end-user programming. When expressing musical ideas, composers draw in a precise way, not just sketch. Working in close collaboration with composers, we designed Musink to provide them with a smooth transition between paper drawings and OpenMusic, a flexible music composition tool. Musink's built-in recognizers handle common needs, such as scoping and annotation. Users can also define new gestures and associate them with their own or pre-defined software functions. Musink (Figure 14) supports semi-structured, delayed interpretation and serves as a customizable gesture browser, giving composers significant freedom to create their own, individualized composition languages and to experiment with music, on-paper and on-line.

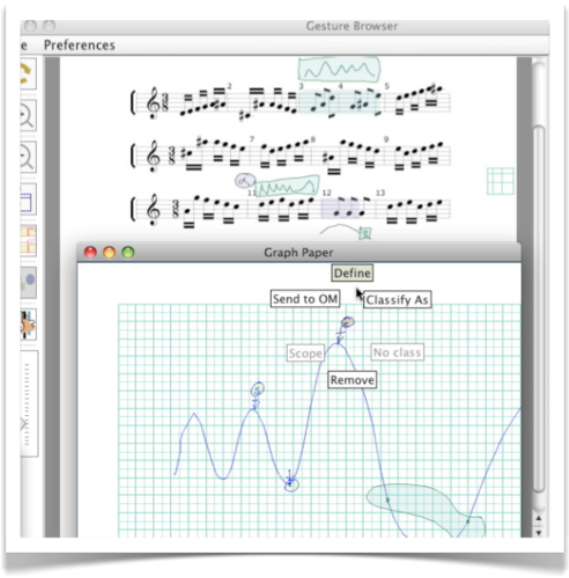

Figure 14. MusInk: the composer annotates the score with a wavy line and then uses MusInk's marking menu to specify how it will be interpreted by OpenMusic

We also presented a short paper and demonstration on augmented writing [34], which received the Best Demonstration award at IHM'09. It described our work on augmented writing and the ReBlog hybrid notebook. ReBlog combines the LiveScribe pen to capture handwritten traces in a paper notebook and link them directly to entries in an on-line blog, with links to diverse functionality. This allows research biologists to not only record, but also reflect upon their scientific data, as they write on paper or on the computer. We programmed a series of small penlets that expand the biologist's abilities to interact with their data as they write. This system is currently in field test with several active users at INSERM and INRA.

Aurélien Tabard successfully defended his thesis, entitled "Supporting Lightweight Reflection on Familiar Information" which included the participatory design and field studies of the earlier Prism hybrid notebook and explored how to provide technology that supports not only capture, but also reflection, by scientists.

Figure 15. BubbleWrap simulates hardness by expanding and contracting fabric cells using electromagnetic force

Finally we developed BubbleWrap [18], which uses actuators that are able to provide different types of haptic sensations and that can be wrapped around a wide range of surfaces and objects. Our first prototype (Figure 15) consists of a matrix of electromagnetic actuators, enclosed in fabric, with individually controllable cells that expand and contract. It provides both active haptic feedback, using vibration, as well passive haptic feedback, using shape and firmness. An initial experiment demonstrated that users could reliably discriminate among the three firmness levels displayed on our prototype.

6.3. Mediated Communication

Participants: Sofiane Gueddana, Danielle Lottridge, Wendy Mackay [correspondant], Nicolas Masson, Nicolas Roussel [correspondant], João Soares de Oliveira Neto.

Our work on mediated communication has focused on two topics. First, we have introduced and are exploring the concept of multiscale communication [48], [52], i.e. supporting multiple degrees of engagement and smooth transitions among them. Sofiane Gueddana successfully defended his thesis on this topic [11]. Second, we are continuing our work on mediated communication in domestic settings with additional studies of families, the elderly and remote couples. Nicolas Masson successfully defended his thesis in this area [12].

Following up on our work on *multiscale communication* [48], [52], we considered the particular case of peripheral displays for interpersonal communication [23].

We conducted two studies to continue exploring our concept of multiscale communication. The first one is a longitudinal study of the Pêle-Mêle system [33] that showed the importance of providing gradual attention management mechanisms to support transitions between background and foreground communications. Our results suggest that control over information salience can help users of communication systems adjust both their local distraction and remote attractiveness. The second study is a preliminary investigation of cross-media applications mixing digital and non-digital media [30]. We conducted a workshop with end users to study the particular case of combining printed material and internet resources for the purpose of delivering complementary information to users. This led to some recommendations to improve the user experience in cross-media applications.

We also conducted an experiment related to the use of peripheral displays for interpersonal communication [23]. The purpose of peripheral displays is to support the continuous awareness of information by users while they perform other activities. Monitoring such displays while performing a central task nevertheless has a cognitive cost. We studied the effect of the pace of peripheral communication on the subjects' allocation of attention in a dual-task situation: a central task consisting of correcting text against the clock, and a peripheral task where participants had to assess the presence of a remote person in a series of snapshots. The results suggest that the pace of peripheral communication does influences attention allocation in dual-task situations. Controlling this pace could help users of communication systems adjust their local distraction as well as the attention they draw from remote users.

Figure 16. The WeMe system uses ferrofluid bubbles to display local and remoteactivity

We continued our work on mediated communication in a domestic setting. We developed the WeMe system [28] to help remote families stay in touch, providing peripheral awareness of each other combined with the possibility of more direct interaction. WeMe's ferrofluid bubbles (Figure 16) move in response to ambient sounds, both local and distant. As many as three family members can generate patterns intentionally, by moving their hands around the surface. WeMe acts as a stand-alone sculpture, a passive indicator of remote activity and a source of shared interaction.

We also developed mediated communication tools to help the elderly age in place, using an approach we call PeerCare [15]. Unlike strategies based on external monitoring the activities of the elderly, we focused on supporting them directly by enhancing their inter-personal communication. We report the results of a user study with 14 independent elderly women and discuss the existing role that communication plays in maintaining their independence and wellbeing. We highlighted the importance of peer support relationships and how awareness of each other's rhythms and routines helps them to stay in touch. We also described the deployment of a technology probe, called markerClock, which a pair of elderly friends used to improve their awareness of each other's rhythms and routines. Such communication appliances enhance the awareness of rhythms and routines among elderly peers and can improve their quality of life and provide safer and more satisfying aging in place.

Finally we conducted a study of 13 remote couples to identify what they lack from existing communication technologies, including what they wanted to share (presence, mood, environment, daily events and activities), how they wanted to share (simple, lightweight, playful, pleasant interaction), and when they wanted to share ("empty moments" such as waiting, walking, taking a break, waking up, eating, and going to sleep). Our paper at CHI'09 [26] reported these findings and argued that "empty moments" provide a compelling new opportunity for design. We created MissU as a technology probe to study empty moments in situ. Similar to a private radio station, MissU shares music and background sounds. Field studies produced results relevant to social science, technology and design: couples with established routines were comforted; characteristics such as ambiguity and "movable" technology (situated in the home yet portable) provide support.

6.4. Research Methods

Participants: Caroline Appert, Michel Beaudouin-Lafon, Olivier Chapuis, Catherine Letondal, Danielle Lottridge, Wendy Mackay [correspondant], Emmanuel Pietriga.

Members of the INSITU team have been actively engaged in participatory design activities with users, especially in the context of the ReActivity and WILD research projects. The ReActivity project is interested in how people interact with temporal data. Together with Max Van Kleek from MIT, we ran a workshop at CHI'09 on "Interacting with Temporal Data" [27], which generated both research papers and a set of five developed video prototypes. We continued their longitudinal field studies of biologists at INSERM and the Institute Pasteur, investigating how biologists use our hybrid notebook [34], called ReBlog and exploring novel forms of paper-computer interaction with them. In addition, we organized a workshop for biologists at the Institute Pasteur, to explore novel interfaces that combine augmented paper technology with on-line interaction.

Members of the WILD group ran several workshops with lab partners, including a video prototyping session with members of the NeuroSpin lab. In addition to exploring the specific needs of users, these and other internal INSITU workshops have generated ideas for live prototyping techniques that take full advantage of the interactive capabilities of the WILD wall, VICON motion capture system, multi-touch table and various small mobile devices such as iPhones and wireless mice.

We also presented Generative Walkthroughs [25], which support the redesign phase of an iterative design process, helping designers generate new design alternatives informed by social science principles. Designers first analyze their own scenarios or storyboards with respect to concrete examples drawn from five socio-technical principles: situated action, rhythms & routines, co-adaptive systems, peripheral awareness and distributed cognition. They then walk through the scenario and brainstorm new design alternatives that reflect the design principle in question. This combination of structured walkthroughs with focused brainstorming

helps designers, particularly those with little social science background, to generate concrete, actionable ideas that reflect key findings from the social science literature. We taught Generative Walkthroughs in ten courses with over 220 students and found that technically-trained students not only learned these socio-technical principles, but were able to apply them in innovative ways in a variety of design settings.

6.5. User interface toolkits

Participants: Caroline Appert, Michel Beaudouin-Lafon, Olivier Chapuis, Stéphane Huot, Wendy Mackay, Emmanuel Pietriga [correspondant], Nicolas Roussel.

We maintain a significant number of tools (see the Software section) and have released new versions of most of them. This section expands on our work on new tools and models. We developed two new toolkits –or rather extensions to existing toolkits– to facilitate the development of advanced interactive applications. We also experimented with a new architectural model for instrumental interaction that revisits the classic MVC model.

FlowStates [32] is a new toolkit to program advanced interaction techniques that require non-standard input (see Software section). It is built on top of two existing toolkits: SwingStates [1], based on state machines, and ICon [45], based on data flow. The resulting integration between a state-based model and a data flow model significantly increases the range of innovative interaction techniques that we can quickly prototype. FlowStates has been used in our WILD project (see the Contracts section) and won the best-paper award at the IHM'09 conference.

Our empirical studies on using stroke shortcuts [17], i.e. drawing a shape with a pointing device such as a mouse to invoke a command, showed that this type of shortcut is as effective as, or even more effective than, keyboard shortcuts. However, implementing stroke shortcuts in real applications is more challenging than implementing keyboard shortcuts because commonly used graphical toolkits do not support stroke input. **Stroke Shortcuts Toolkit** (SST) is a library for adding stroke shortcuts to Java Swing applications with just a few lines of code (SST is available at http://code.google.com/p/strokesshortcuts/). It includes a gesture recognition engine, a graphical environment to easily map a stroke to a command, and visual cues for allowing end users to discover available stroke shortcuts.

VIGO (Views, Instruments, Governors, and Objects) [24] is an architectural model for realizing multi-surface user interfaces. VIGO is based on a vision of an alternative to the currently predominant interaction paradigm based on monolithic applications. VIGO extends our earlier work on instrumental interaction [40] by addressing distributed multi-surface user interfaces. Objects are displayed through Views and contain only a state. Governors control the consistency of objects, while Instruments can modify objects, possibly bypassing their governors. This results in extreme flexibility, such as generic instruments that can manipulate objects in ways that were not anticipated by their designer. This approach was validated by a functional prototype that implemented Rekimoto's classic Pick-and-Drop interaction in a variety of contexts.

7. Contracts and Grants with Industry

7.1. WebContent: the Semantic Web Platform

Participant: Emmanuel Pietriga [correspondant].

Research project funded by national network on software technology (RNTL), 36 months (2006-2009). Partners: INRIA/Gemo, EADS, CEA, INRA, Thalès, LRI/IASI, LIP6, INRIA/Mostrare, and more.

The WebContent project is creating a software platform to accommodate the tools necessary to efficiently exploit and extend the future of the Internet : the Semantic Web. Its objective is to produce a flexible and generic platform for content management and to integrate Semantic Web technologies in order to show their effectiveness on real applications with strong economic or societal stakes. INSITU works on the design and implementation of the platform's Web-based, advanced visualization components, including networks, timelines and charts using JFresnel (section 5.8), ZVTM and ZUIST (section 5.1).

7.2. iStar

Participants: Michel Beaudouin-Lafon [correspondant], Olivier Chapuis, James Eagan, Stéphane Huot, Wendy Mackay, Clemens Nylandsted Klokmose, Tony Gjerlufsen.

Research project funded by ANR, 36 months (2008-2011). Partners: IntuiLab, ENAC, INSITU, Anyware Technologies.

The goal of the iStar project is to create a new generation of programming tools for interaction systems, that support interoperability across components developed and deployed on different platforms and in different languages.The project is creating an "interaction kernel" that will be used to develop a number of demonstrators. INSITU is in charge of creating two such demonstrators, one implementing instrumental interaction and the other implementing multi-surface interaction. The underlying programming model is based on a reactive model of communicating processes organized as a tree of components. Other applications addressed by the project include post-WIMP interfaces and Web 2.0 applications.

7.3. WILD

Participants: Michel Beaudouin-Lafon, Olivier Chapuis, Emilien Ghomi, Stéphane Huot, Wendy Mackay, Mathieu Nancel, Emmanuel Pietriga [correspondant].

Research project funded by Digiteo, 36 months (2008-2011). Partners: INSITU, INRIA/AVIZ, LIMSI.

The goal of the WILD project is to explore collaborative interaction with large data sets in the context of scientific discovery. We have put together what is to date the world's largest very-high-resolution interactive wall: 32 thirty-inch LCD screens covering an area of 5m50 x 1m80, 20480 x 7680 pixels, i.e. 131 million pixels, run by a 16-computer visualization cluster. The platform also features an interactive table, various interaction devices such as PDAs (iPhone or iPod) and a high performance motion tracking system (10-camera VICON system).

Eight research laboratories on or near the Orsay campus are collaborating with us to design novel interactive and collaborative visualization techniques for very large data sets. These laboratories cover a wide range of sciences: Astrophysics, Particle Physics, Chemistry, Biochemistry, Biology, Mechanics, Neuroimagery, and Applied Mathematics.

The hardware platform was inaugurated on June 19, 2009 and was featured for public demonstrations at both the Année Mondiale de l'Astronomie and the Fête de la Science. We are developing dedicated software to display and interact with complex data and to support collaboration. We are also running participatory design workshops with the associate laboratories to better understand and address their specific needs.

7.4. REACTIVITY

Participants: Michel Beaudouin-Lafon, Stéphane Huot, Catherine Letondal, Wendy Mackay [correspondant], Nicolas Masson, Mathieu Nancel, Emmanuel Pietriga, Fanis Tsandilas, Aurélien Tabard, Shengqiong Yuan.

Research project funded by INRIA-Microsoft, 36 months (2008-2011). Partners: INSITU, INRIA/AVIZ, Microsoft Research VIBE.

The goal of this project is to help researchers capture, visualize and interact with their own and their colleagues activities, over time. We are interested in increasing researchers awareness of their activities, so as to improve not only productivity, but also their creativity and understanding. We use a participatory design approach with biologists and bioinformaticians at the Institut Pasteur, INRA, INSERM and at the University of Paris-Sud. We are developing a hybrid laboratory notebook, called Prism, which combines paper and electronic notebooks with other streams of activity. We are also exploring advanced forms of interaction with very large quantities of heterogeneous data, in conjunction with the WILD project (above).

7.5. HOLYRISK

Participants: Caroline Appert, Michel Beaudouin-Lafon, Emmanuel Pietriga [correspondant].

Research project funded by ANR, 48 months (2009-2013). Partners: INSITU, INRA Metarisk (Social sciences/Computer sciences), AgroParisTech (Machine Learning), JIFSAN (University of Maryland/FDA).

Scientific knowledge has become one of the most important prerequisites for making regulatory decisions. For instance, food risk policies are based on the framework of risk analysis which has been an effort to apply universal and formal methods of science to risk assessment and to place societal response to hazards on a scientific footing. This project is proposing a US/EU comparative empirical study that investigates the ways uncertainties are perceived, handled and expressed by experts throughout the food risk analysis process. The project is interdisciplinary, involving scientists from sociology, economics, risk analysis and computer science. It relies on the building of a database to store risk assessment and management documents. The database will provide computer scientists with a unique testing environment where researchers and risk professionals will help calibrate the system. Sociologists will address the substantive questions framing the research using mixed method analysis. Computer scientist will participate in developing 1. the database based on structure and semi-structured information , 2. a coding aid based on machine learning, 3. an interactive visual interface that allows efficient multi-scale navigation in a large corpus of annotated documents, and 4. a case-based reasoning system aiding risk managers.

7.6. MLSN: Multi-Level Social Networks

Participants: Caroline Appert, Michel Beaudouin-Lafon, Olivier Chapuis, Wendy Mackay, Emmanuel Pietriga [correspondant].

Research project funded by ANR, 36 months (2009-2012). Partners: IN SITU, ADIS (Université Paris-Sud), IRISSO (Université Paris-Dauphine), Basic Lead.

This project aims at designing an innovative demonstrator that can be implemented on social networking platforms to do real-time visualization of multiplex social interactions. This demonstrator is a generic decision support tool which can potentially be applied in many industrial contexts. MLSN is based on recent findings in academic research on graph drawing techniques and on network analysis. From these points of view, MLSN contributes to three topics: - Social networks theory - New clustering techniques to qualify the centrality of networks' members and to analyze their similarities. - visualization of the manner people interact to exchange resources in a multi-level context MLSN associates researchers in human- computer interaction, sociology of networks and economics of the Internet (ADIS), and an industrial partner.

8. Other Grants and Activities

8.1. International actions

- *SIRIUS joint lab with Stanford University and University of California, San Diego*.

  The SIRIUS joint lab between INSITU, the HCI Group at Stanford University and the Distributed Cognition and HCI Lab at University of California, San Diego was established under INRIA's *Equipe Associée* program. Wendy Mackay and Michel Beaudouin-Lafon traveled to Stanford twice, to visit Professor Scott Klemmer, give talks and work with Stanford graduate students. They also met with Prof. Klemmer and these students in the context of three other conferences (ACM CHI, ACM UIST and Creativity and Cognition). Wendy Mackay and Michel Beaudouin-Lafon traveled to UC San Diego to visit their large-scale display (HiPerWall) and to visit Prof. Jim Hollan. Prof. Hollan participated as a jury member for Aurélien Tabard's thesis defense. Wendy Mackay and Michel Beaudouin-Lafon have been invited to spend a sabbatical year, beginning in September 2010, at Stanford University, with visits to UC San Diego.

- *MUSE joint lab with University of Toronto*.

  As a final outcome of INSITU's previous *Equipe Associée*, MUSE with the University of Toronto, Wendy Mackay and Danielle Lottridge presented a paper at Creativity and Cognition '09 [25] and

Wendy Mackay, Nicolas Masson and Danielle Lottridge presented a paper at CHI'09 [26]. Danielle Lottridge will be finishing her thesis at the University of Toronto and is applying for a post-doctoral position at Stanford, to coincide with Wendy Mackay's sabbatical year.

- *ALMA: Atacama Large Millimeter/submilimiter Array*. Emmanuel Pietriga and collaborators from CNAM traveled to the chilean Andes on the construction site of the ALMA radio astronomy observatory (European Southern Observatory, National Astronomical Observatory of Japan, National Radio Astronomy Observatory/NSF) to work on the enhancement of the graphical user interfaces of the observatory's control center.

  http://www.almaobservatory.org/

  Members of INSITU involved: Emmanuel Pietriga.

9. Dissemination

9.1. Keynote addresses and Invited Lectures

- Caroline Appert: "Programmer l'interaction avancée", Invited talk, Journée du LRI, Orsay, June, 2009.
- Caroline Appert: "Systèmes interactifs et interfaces à entrée 2D directe", Invited talk, Séminaire SIESTE, École Nationale Supérieure, Lyon, November, 2009.
- Michel Beaudouin-Lafon: "Interaction beyond computation", Invited talk, MIT CSAIL, Cambridge, April, 2009 – University of York, York, June, 2009 – Stanford HCI Group, Stanford, August, 2009 – Université de Montpellier, Montpellier, September, 2009.
- Michel Beaudouin-Lafon: "Évaluations de la Recherche", Invited talk about bibliometrics at the Centre d'Alembert Symposium, Université Paris-Sud, Orsay, May, 2009.
- Olivier Chapuis: "Images subliminales pour interagir ?", Invited talk, Unithé ou Café ?, Saclay, December, 2009.
- Wendy Mackay: "Interaction située", Invited talk, Advancity, Saclay, January, 2009.
- Wendy Mackay: "L'intelligence ambiente", Keynote, Forum Systèmes & Logiciels pour les NTIC dans le transport, Noisy le grand, March, 2009.
- Wendy Mackay: "L'interaction située", Lecture, Digiteo/ENSCII, Fontenay, March, 2009.
- Wendy Mackay: "InterLiving: Ubiquitous Communication Appliances", Keynote, BB-Ubicomp, London, May, 2009.
- Wendy Mackay: "PeerCare: Social Networks for Senior Citizens", Keynote, Home Care Systems Summer School, Edinburgh, June, 2009.
- Wendy Mackay: "Systèmes d'interaction", Invited talk, Advancity, Paris, September, 2009.
- Wendy Mackay: "La conception et L'évaluation des Interfaces Homme-Machine", Lecture, Ecole Normale Superieur Cachan Seminar, Cachan, September, 2009.
- Wendy Mackay: "La conception participative", Invited talk, Crédit Agricole, Paris, September, 2009.
- Wendy Mackay: "Les usages des systèmes d'information et leur co-évolution; Co-Adaptive Systems", Invited talk, Fondation CIGREF, Paris, September, 2009.
- Wendy Mackay: "L'intelligence ambiente", Invited talk, EPITA – Table Ronde : Technologies, usage et société, Paris, December, 2009.
- Wendy Mackay: "Ambient Communication in Peer-to-Peer Social Networks", Invited talk, Rencontres INRIA Industrie, Lille, September, 2009.

- Emmanuel Pietriga: “HCI research at In Situ”, Invited talk, European Southern Observatory, Santiago de Chile, December, 2009.
- Emmanuel Pietriga: “Visualisation interactive de données massives sur mur d’écran très haute résolution”, Invited talk, Thales Research & Technology, Palaiseau, November, 2009.
- Emmanuel Pietriga: “WILD : une plate-forme pour la visualisation interactive de grandes masses de données scientifiques”, Invited talk, Apple Research and Technology Support, Paris, November, 2009.
- Nicolas Roussel: “Simplifying and enhancing daily life with new human-computer interactions and new forms of communication”, Invited talk, Departamento de Engenharia de Computação e Sistemas Digitais, Escola Politécnica da Universidade de São Paulo, August 2009.
- Nicolas Roussel: “Nouvelles formes de communication”. Invited talk, PPF *Interactions Multimodales* des Universités de Grenoble, Octobre 2009.

9.2. Journal editorial board

- Transactions on Computer-Human Interaction (TOCHI), ACM: Michel Beaudouin-Lafon, Wendy Mackay (Associate Editors)
- International Journal of Human-Computer Study (IJHCS), Elsevier: Michel Beaudouin-Lafon (Editorial Advisory Board)
- Journal of Computer Supported Cooperative Work (JCSCW), Springer: Michel Beaudouin-Lafon (Associate Editor)
- Communications of the ACM, Web Redesign: Wendy Mackay (Editorial Board)
- Journal d’Interaction Personne-Système (AFIHM): Nicolas Roussel (Co-Editor in Chief), Michel Beaudouin-Lafon (Editorial Board)

9.3. Journal reviewing

- ACM Transactions on Computer-Human Interaction (TOCHI): Michel Beaudouin-Lafon, Olivier Chapuis, Wendy Mackay
- Software: Practice and Experience (SP&E): Michel Beaudouin-Lafon
- Journal of Computer Supported Cooperative Work (JCSCW): Michel Beaudouin-Lafon
- ACM Computing Surveys: Michel Beaudouin-Lafon
- IEEE Transactions on Visualization and Computer Graphics (TVCG): Caroline Appert
- IEEE Software: Catherine Letondal, Emmanuel Pietriga
- Technique et Science Informatiques (TSI): Wendy Mackay
- Nucleic Acids Research: Catherine Letondal
- International Journal of Human-Computer Studies (IJHCS): Olivier Chapuis
- Journal of the Brazilian Computer Society: Nicolas Roussel

9.4. Conference organization

- ACM CHI 2009 - 27th ACM Conference on Human Factors in Computing Systems: Wendy Mackay (Subcommittee Chair), Michel Beaudouin-Lafon (Program Committee member), Catherine Letondal (Program Committee member)
- ACM CHI 2009 Workshop on Interacting with Temporal Data: Wendy Mackay (Co-Chair), Aurélien Tabard (Co-Chair)

- ACM UIST 2009 - 22nd ACM Symposium on User Interface Software and Technology: Caroline Appert (Program Committee member), Wendy Mackay (Doctoral Consortium Jury Member)
- IEEE VL/HCC 2009 - IEEE Symposium on Visual Languages and Human-Centric Computing 2009: Emmanuel Pietriga (Program Committee member)
- INTERACT 2009 - 12th IFIP TC13 Conference in Human-Computer Interaction 2009: Olivier Chapuis, Stéphane Huot, Emmanuel Pietriga (Program Committee members)
- ACM ICEIS'09 - ACM SIGCHI Symposium on Engineering Interactive Computing Systems 2009: Michel Beaudouin-Lafon (Program Committee member)
- VINCI'09 - Visual Information Communications International 2009: Emmanuel Pietriga (Program Committee member)
- IS EUD 2009 - Second International Symposium on End User Development: Catherine Letondal (Program Committee member)
- IHM 2009 - Conférence Francophone d'Interaction Homme-Machine: Michel Beaudouin-Lafon (Program Committee member, Doctoral Consortium Co-Chair)
- UBIMOB'09 - 5èmes journées Francophones Mobilité et Ubiquité: Nicolas Roussel (Program Co-Chair), Stéphane Huot (Program Committee member)

9.5. Conference reviewing

- ACM CHI 2009: Caroline Appert, Olivier Chapuis, Stéphane Huot, Mathieu Nancel, Emmanuel Pietriga, Nicolas Roussel, Theophanis Tsandilas
- ACM UIST 2009: Olivier Bau, Michel Beaudouin-Lafon, Olivier Chapuis, Stéphane Huot, Catherine Letondal, Wendy Mackay, Emmanuel Pietriga, Nicolas Roussel
- INTERACT 2009: Catherine Letondal, Guillaume Faure, Nicolas Roussel
- IEEE Vis 2009: Emmanuel Pietriga
- IEEE InfoVis 2009: Emmanuel Pietriga
- IEEE PacificVis 2009: Emmanuel Pietriga
- ACM SIGCHI EICS 2009: Olivier Chapuis
- ACM SIGGRAPH Asia 2009: Olivier Bau
- IHM 2009: Olivier Chapuis, Stéphane Huot, Emmanuel Pietriga, Nicolas Roussel, Guillaume Faure

9.6. Scientific associations

- ACM: Michel Beaudouin-Lafon member of the ACM Publications Board (2002-2009) and member of the ACM Europe Council (since 2009)
- AFIHM (French speaking HCI asssociation): Michel Beaudouin-Lafon member of the Scientific Board (CPPMS), Nicolas Roussel member of the Executive Committee since sept. 2009
- "Fête de la science" 2009 at LRI, coordinator: Caroline Appert

9.7. Evaluation committees and invited expertise

- European Research Council (ERC), Advanced Grants evaluation panel PE6-A (computer science), member: Michel Beaudouin-Lafon
- SEE-ERA.NET PLUS Joint Call for European Research Projects, evaluator: Emmanuel Pietriga
- Gilles Kahn thesis prize 2009, jury member: Caroline Appert

- Univ. Paris-Sud hiring committee, Commission Consultative des Spécialistes de l'Université 27ème section (computer science), member: Michel Beaudouin-Lafon
- Univ. Paris-Sud hiring committee, Comité de Sélection 27ème section (computer science), member: Stéphane Huot
- INRIA Lille hiring committee, member: Wendy Mackay
- INRIA Sophia Antipolis hiring committee, member: Wendy Mackay
- IRCAM (Paris) Scientific Committee, member since 2004 and chair in 2009: Michel Beaudouin-Lafon
- TELECOM ParisTech Research Committee, member: Michel Beaudouin-Lafon
- Area committee for Information and Communication Science and Technology, National Research Agency (Comité Sectoriel STIC de l'ANR), member: Michel Beaudouin-Lafon
- Digiteo Steering Committee (Comité de Pilotage du RTRA Digiteo), member: Michel Beaudouin-Lafon
- Scientific Committee of the ISD Program (Information Systems Dynamics), Fondation CIGREG (Club Informatique des Grandes Entreprises Françaises), member: Michel Beaudouin-Lafon
- "Commission Petit", working group nominated by the CNRS executive director and chaired by Antoine Petit to propose scenarios for the organization of Science and Technology of Information within CNRS, member: Michel Beaudouin-Lafon
- AERES Visiting Committee for INRIA Bordeaux – Sud-Ouest, Bordeaux, member: Michel Beaudouin-Lafon
- Assessment Committee for the project MINT proposal, INRIA, member: Wendy Mackay
- Assessment Committee, INRIA, elected representative: Wendy Mackay
- Assessment Committee "BQR Financier", Univ. Paris-Sud, jury member: Wendy Mackay
- Assessment Committee "BQR Emploi", Univ. Paris-Sud, jury member: Wendy Mackay
- Assessment Committee "ANR Preciput", Univ. Paris-Sud, jury member: Wendy Mackay
- Working group "Évaluation des activités de chercheurs", INRIA, member: Wendy Mackay
- Working group "Plan campus", member: Wendy Mackay
- Working group "Mobilité", INRIA, organizer: Wendy Mackay
- European Science Foundation Exploratory Workshop, proposal EW08-135, expert reviewer: W. Mackay
- EPSRC Large Grants, Avoidance, recovery and coordinating activities (ARC): Minimising slips and developing resilient behaviour in individuals and small teams, expert reviewer: Wendy Mackay
- Comité ad-hoc : évaluations d'HDR, LRI, Univ. Paris-Sud, member: Wendy Mackay
- Head of Laboratoire de Recherche en Informatique (LRI): Michel Beaudouin-Lafon
- Vice-President for Research, Computer Science Dpt., Univ. Paris-Sud: Wendy Mackay
- Agoranov business incubator, Paris: Nicolas Roussel

9.8. PhD defenses

- Emmanuel Dubois (Univ. Paul Sabatier, Toulouse): Michel Beaudouin-Lafon, reviewer (Habilitation)
- Gilles Bailly (Univ. Joseph Fourier, Grenoble & TELECOM ParisTech, Paris): Michel Beaudouin-Lafon, reviewer
- Arnaud Blouin (ESEO, Angers): Emmanuel Pietriga, jury member

- Celine Coutrix (Univ. Joseph Fourier, Grenoble): Wendy Mackay, reviewer
- Sofiane Gueddana (Univ. Paris-Sud, Orsay): Michel Beaudouin-Lafon and Nicolas Roussel, advisors
- Bruno Mantel (Univ. Montpellier, Montpellier): Michel Beaudouin-Lafon, reviewer
- Nicolas Masson (Univ. Paris-Sud & INRIA, Orsay): Michel Beaudoin-Lafon and Wendy Mackay, advisors
- Scott Sherwood (Univ. of Glasgow, Glasgow): Wendy Mackay, reviewer
- Aurélien Tabard (Univ. Paris-Sud, Orsay): Wendy Mackay, advisor

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[12] N. MASSON. *Espace de conception et système d'interopérabilité, une aide à la création et à la combinaison des Communication Appliances*, Université Paris-Sud, Orsay, France, Septembre 2009, Thèse de Doctorat.

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