Laboratoire de Recherche en Informatique

2005-2008 report

in situ

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January 2009

Acknowledgments: Nicolas Taffin for the original design, Nicolas Roussel, Olivier Lebelfel, Wendy Mackay.
12/ InSitu

Situated Interaction
équipe
Interaction
Située

Responsable: Wendy Mackay

La mise en réseau d'ordinateurs de toutes tailles, du téléphone portable au mur d'image, permet l'accès d'un population de plus en plus grande à de nouveaux services interactifs dans le cadre professionnel et privé. Cette révolution pose des défis majeurs pour la conception, l'implémentation et le déploiement de systèmes interactifs : la "méthaphore du bureau" créée il y a 25 ans a atteint ces limites et il est temps de développer une nouvelle génération d'environnements interactifs.

L'équipe InSitu, commune avec l'INRIA, explore de nouvelles formes d'interaction homme-machine. L'équipe développe la notion d'interaction située, pour prendre en compte explicitement le rôle critique du contexte dans la conception de systèmes interactifs. Le but est de permettre aux utilisateurs de mieux comprendre et contrôler l'environnement informatique. Les recherches d'InSitu sont organisées en quatre thèmes complémentaires :

Paradigmes d'interaction et de visualisation : optimiser le compromis entre puissance et simplicité pour améliorer la performance des utilisateurs, notamment par l'étude des interfaces multi-échelles (zoomables), de la visualisation interactive et des interfaces tangibles.

Communication médiatisée : explorer des applications multimedia permettant aux utilisateurs de rester en contact à distance tout en respectant leur vie privée, en testant des prototypages en environnement réel.

Méthodes de conception : développer et tester des techniques participatives qui impliquent les utilisateurs tout au long du cycle de conception, à travers une approche pluridisciplinaire combinant ingénierie, sciences humaines et design.

Ingénierie des systèmes interactifs : développer des outils avancés de construction de systèmes interactifs pour permettre aux chercheurs d'InSitu ou d'ailleurs d'imaginer, de concevoir et de développer des systèmes interactifs nouveaux.
Situated Interaction

Head: Wendy Mackay

Networked computers permeate every aspect of society and range from tiny mobile devices to huge displays. An ever-increasing number of users access myriad on-line services while novel hardware provides new opportunities for work and entertainment. This revolution poses major challenges for the design, implementation and deployment of interactive systems: The "desktop metaphor" that drove personal computing for the past 25 years has reached its limits and the time has come for a new generation of user-centered interactive environments.

The InSitu group, joint with INRIA, explores advanced forms of Human-Computer Interaction. The group places particular emphasis on situated interaction, acknowledging the critical role of context in the design of interactive systems. The goal is to empower users, enhancing their understanding and control of computer environments. InSitu’s research is organized into four inter-related themes:

**Interaction and visualization paradigms** optimize the trade-off between power and simplicity to enhance the user’s performance and understanding. This work includes multi-scale (zoomable) interfaces, interactive information visualization and tangible interfaces.

**Mediated communication** explores innovative multimedia applications that help users maintain peripheral awareness at a distance, while maintaining privacy and control. This work includes longitudinal field tests of working prototypes with users in real-world settings.

**Research methods** develop and test novel participatory design techniques that include users throughout the design process. This work integrates engineering, social science and design methods to create a multi-disciplinary approach to interaction design.

**Engineering of interactive systems** develops advanced tools for building libraries, exploratory toolkits and platforms. This work enables researchers, both within and outside of InSitu, to imagine, design and implement advanced interactive systems.
## Research Group Members

### Permanent faculty (1 October 2008)

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<th>Name</th>
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<tr>
<td>APPERT*</td>
<td>Caroline</td>
<td>MCF</td>
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<td>BEAUDOUIN-LAFON*</td>
<td>Michel</td>
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<td>CHAPUIS*</td>
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<td>HUOT*</td>
<td>Stéphane</td>
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<td>MACKAY*</td>
<td>Wendy</td>
<td>DR1</td>
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<td>PIETRIGA*</td>
<td>Emmanuel</td>
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<td>ROUSSEL*</td>
<td>Nicolas</td>
<td>MCF</td>
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* Member of LRI-INRIA joint group InSitu, head: Wendy Mackay

### Doctoral students (1 October 2008)

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### Temporary personnel (2005-2008)

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<td>Rémi</td>
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<td>09.2007</td>
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<td>FOREST</td>
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<td>TSANDILAS</td>
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<td>Post-doc</td>
<td>INRIA</td>
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### Visitors for 3 months or more (2005-2008)

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<tr>
<td>GIROUARD</td>
<td>Audrey</td>
<td>Ph.D. student</td>
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<tr>
<td>JACOB</td>
<td>Robert</td>
<td>PI</td>
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<td>LOTTIDIDGE</td>
<td>Danielle</td>
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<td>NYLANDSTED</td>
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<td>Ph.D. student</td>
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<td>KLOKMOSE</td>
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* See the glossary for the acronyms.

## Group evolution

InSitu was created in 2002 as a joint project between INRIA and LRI, with four permanent faculty and two doctoral students. By the end of 2004, the group had grown to six faculty members and ten doctoral students. During the past four
years, InSitu has continued to grow. In 2007, InSitu spun off the AVIZ project, headed by Jean-Daniel Fekete, after he was promoted to Directeur de Recherche level 2 at INRIA. Stéphane Huot was then hired as a Maître de Conférences in 2007 and Caroline Appert was hired as a Maître de Conférences in 2008.

Caroline Appert, Renault Blanch, Jean-Baptiste Labrune, Emmanuel Nars successfully defended their doctoral dissertations and Yann Riche and Jerôme Lard plan to defend their dissertations in September and October 2008. Renault Blanch was hired as a Maître de Conférences at the University of Grenoble, Jean-Baptiste Labrune was hired as a Research Associate at the MIT Media Lab and Emmanuel Nars is working for a startup. InSitu has maintained an average of ten-twelve graduate students every year and has attracted visiting graduate students from MIT, University of Toronto, Tufts and Wuhan University. We have an INRIA joint lab with University of Toronto and have welcomed visitors on sabbatical from University of Toronto, Canada, Tufts University, USA and the University of Canterbury, NZ, as well as shorter-term visits from faculty from the University of Lancaster and the Royal College of Art, UK and from MIT and Stanford University, USA.

12/ InSitu

**Highlights**

InSitu has become an internationally recognized research group in the field of Human-Computer Interaction. InSitu stands for *Interaction S ituée or Situated Interaction*, which reflects our emphasis on interaction in the context of use. Our publications appear in the most prestigious conferences in our field, including ACM/SIGCHI, ACM/UIST, ACM/CSCW and IEEE/InfoVis. In 2007, InSitu had six long papers accepted at CHI’2007, the most prestigious conference in our field and a record for France. This record was just broken for 2009: seven long papers were just accepted for CHI’2009. Team members have served on American, European and French prize and evaluation committees, including the Franklyn Institute’s Bower Award, CHI Best Paper award, ASTI thesis award, EPSRC Fellowship grant, EC’s ICT calls for FP7, ANR, RNTL, and the ERC Advanced grants. Michel Beaudouin-Lafon serves on the ACM publications board and is an ACM member-at-large.

InSitu Faculty members serve on the program committees of all the top conferences (CHI, CSCW, UIST, InfoVis, AVI, VL/HCC, ECAI, Multimedia) and journal editorial boards (ACM/TOCHI and LHCS). Michel Beaudouin-Lafon and Wendy Mackay co-chaired of ECSCW in 2005. Michel Beaudouin-Lafon is program chair of UIST 2008 and Wendy Mackay is an Area Program Chair for CHI 2009. Members of InSitu ran the UIST 2.0 20th Anniversary event ([http://www.acm.org/ust/UIST2.0](http://www.acm.org/ust/UIST2.0)). Senior InSitu faculty have given keynote addresses at various international conferences and have been interviewed by French radio as well as French and international research and general interest magazines. In 2007, Wendy Mackay was featured as the September interview of the month for *La Recherche*.

InSitu has been awarded research grants from the European Union, France and industry. Major projects included *Indigo*, which explored distributed architectures for interactive systems, *MicroMegas*, which developed tools for managing masses of familiar data, *WebContent*, a software platform designed to accommodate the tools necessary to efficiently exploit and extend the Semantic Web and *Convivio*, an EU Network of Excellence on human-centered computing which
funded the *Interaction Museum*. New projects include ANR *iStar* which is exploring the next generation of tools for programming interactive systems, the *ReActivity* project, funded by the joint INRIA-Microsoft lab which is working on the capture, visualization and analysis of temporal data, for and by scientists and the *ICI-TV* project, funded by an OMTE from Digiteo, which draws upon our work on communication appliances for distributed families to provide communication services for the elderly, in collaboration with a CEA-based start-up, *Praesto*.

InSitu has disseminated a number of new open-source software applications, including *Touchstone* for designing and running controlled laboratory experiments, *SwingStates* which uses state-machines to program advanced interaction techniques, *WMTrace* which captures user activity in a window manager, *JFresnel* which offers a presentation vocabulary for semantic web data, and *Metisse* a window system that supports state-of-the-art interaction techniques and is now available as one of the standard desktop configurations in the *Mandriva Linux* distribution. Earlier tools such as *IsaViz*, *ZVM* and *Núcleo* continue to be used by researchers inside and outside of InSitu.

We are proud of the individual distinctions awarded to members of InSitu. Michel Beaudouin-Lafon and Wendy Mackay were both admitted to the ACM CHI Academy. Michel Beaudouin-Lafon was promoted to Professor, *classe exceptionnelle* at the University of Paris-Sud. Wendy Mackay was promoted to *Directeur de Recherche* level 1 at INRIA. Emmanuel Pietriga was promoted to *Chargé de Recherche* level 1 at INRIA and Jean-Daniel Fekete and Nicolas Roussell obtained their *habilitations*. In 2007, Caroline Appert received a Lavoisier grant for her Postdoc at IBM Research in the United States and in 2008, she received the Gilles Kahn Thesis Prize, supported by the French Academy of Science, for her work on Modeling, Evaluation and Generation of Interaction Techniques.

### Key Publications

The following publications have appeared (or will appear this year) in A+ rated conferences. The SwingStates paper appeared in an A-rated journal.

Research Description

InSitu was evaluated by INRIA in 2006 with respect to our three initial research themes: Interaction techniques, Research Methods, and Engineering Interactive Systems. We then added a fourth theme, Multi-Media Communication, which together serve as the foundation for InSitu’s research.

Interaction and Visualization Paradigms

This theme 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. During the past four years, we investigated multi-scale (zoomable) interfaces, interactive information visualization, multimedia (video and audio) and tangible interfaces. Our goal was to not only explore these paradigms individually, but also to investigate how to integrate them into real-world applications.

Our theoretical work emphasizes generative theory, including CIS (Complexity of Interaction Sequences) which permits predictive evaluations of different interaction techniques [133], Refication, Polymorphism and Reuse which provide principles for creating novel interaction techniques that increase power while maintaining simplicity [66], and dynamic guides which combine feedforward and feedback techniques for revealing the current state of a recognition algorithm to the user, improving both the user’s and the algorithm’s performance [10].

Our empirical work takes a number of forms. We develop new interaction and visualization techniques that we validate with controlled experiments using well-known protocols, in particular based on Fitts’ pointing paradigm. We also create new artifacts and test them in situ with longitudinal studies. The rest of this section describes this work along three themes: multi-scale interaction, information visualization and mixed reality.
Multi-scale interaction

We explore how to take advantage of the scale dimension to improve interaction with large or complex information spaces. Our concept of multi-scale navigation and pointing extends Fitts’ pointing paradigm to multi-scale interaction\(^1\) [95]. In particular, it makes navigation an integral part of pointing: when reaching a target that is not in sight, one must navigate so that the view includes the target before actually pointing to it. This approach opens up a host of possibilities for creating novel interaction techniques and exploring large information spaces.

For example, in the Micromegas project, we explored a multi-scale navigation technique based on a perspective view [24, 18, 25], which takes advantage of the characteristics of human perception. We also developed a multi-scale scrolling technique called OrthoZoom [9] that makes it possible to scroll a very large document, such as the complete plays of Shakespeare, with very high speed and precision. Indeed, we found that OrthoZoom is twice as fast as the fastest known technique, called Speed-Dependent Automatic Zooming (SDAZ). We also formalized multi-scale pointing in order to operationalize the various situations when looking for a target that is not visible [36]. Finally, we applied some of these techniques to the navigation of a discrete multi-scale space, i.e. a tree, with the ControlTree technique [48].

Our work on multi-scale interaction also inspired interaction techniques that improve more traditional pointing tasks. Our semantic pointing and object pointing techniques are among the very few that make pointing on a screen more efficient than pointing in the real world [134]. Pointing on small devices can also take advantage of multi-scale approaches: we developed Pointing lenses [38] to improve precision pointing on small screens by using magnification. Finally we studied the specific pointing situation where targets are on the edges of the screen [8] and proposed several models for pointing semi-infinite targets.

Multi-scale interaction permeates many aspects of InSitu’s research and we are now applying the notion of scale to information visualisation and to mediated communication [43]. We also explored the role that context plays in interaction: PageLinker [46] allows biologists to use local context, e.g., the last copy-paste link between two web sites, as an efficient replacement for a history list. Object Tracker [19] and OctoFocus [10] (figure 12.1) each provide users with feedback and feedforward information to efficiently guide their actions and to improve learning.

\(^1\)Fitts’ law is an empirical law that predicts that the time it takes to acquire a target of size \(W\) at distance \(D\) is linear in the index of difficulty of the task \(\text{ID} = \log(1 + D/W)\). Typical pointing tasks, in real life or on a screen, rarely exceed and \(\text{ID}\) of 10 bits, i.e. a ratio of 1000 between the distance and size of the target.
Information visualization

We have focused on interactive visualization of graphs, data from the semantic web and time-based data.

We explored the use of matrices rather than node-link diagrams to represent large and dense graphs [2, 26, 51]: by reordering lines and columns of the matrix, patterns can appear in a visual representation of the matrix. We developed algorithms for reordering matrices and an interactive system to help users navigate and interact with them. We applied this technique to the visualisation of constraint-based programming in the OADymPPaC project [22], the visualisation of test sets for software engineering and the visualisation of social networks as part of a collaboration with Univ. Sydney, via co-advised Ph.D. This subarea of InSitu was spun off into the INRIA AVIZ group, with whom we continue to collaborate in the context of the ReActivity project.

We continued our work on visualizing data from the Semantic Web [6, 34], in particular the visualization of RDF data [59, 37] and its application to Bioinformatics [17]. This work builds on our ZVTM toolkit [33] which we continue to develop. The exploration of large data sets in general, and large graphs in particular, benefits from various focus+context techniques, such as fish-eye views or radar views. We have created a general framework called SigmaLenses to explore the transition between focus and context, which is often a source of disorientation, and shown that a particular combination of speed and translucence improves navigation.

Finally we have started to work on the capture and visualization of time-based data. In the context of the Micromegas project, we investigated the use of episodic memory to navigate familiar data [57]. We also created the wumtrace tool [50] to capture usage data at the level of the window manager (mouse motion, window activation, etc) and visualize it (figure 12.2). This work is being pursued in the ReActivity project.

Mixed reality interaction

We have continued to study how to combine physical and electronic artefacts in order to obtain the best of both worlds. One focus of this work is on paper-based interaction, which allows users to keep their work practices while taking advantage of on-line access. We built upon our earlier work with biologists at the Institut Pasteur (Paris) and created PRISM [45], a hybrid paper-electronic notebook that links streams of (i) hand-written notes on paper (captured using Anoto
User Interface Façades [44] allow end-users to quickly, flexibly and seamlessly change the user interface of any X-Window application. The system supports cutting, copying and pasting of screen regions, combined with the ability to overlay screen regions on top of other windows. Façades can also be used to change the interaction behavior of applications.

Recomposing a user interface (here, from the GIMP) by drag-and-dropping a component (here, the opacity slider) into a façade window.

Façades allows users to copy interface components from one window to another while maintaining a one-to-one functional relationship between the copy and the original. The user can incrementally construct a façade window by selecting widgets from arbitrary dialogs, e.g., to package frequently used tools into a custom palette. The façade window expands automatically as elements are dragged and dropped into it.

The façade on the right was created from standard GIMP palettes. It can be saved and reloaded the next time the application is launched.

Façades also supports the replacement of standard GUI widgets with customized widgets. For example, some options in a menu may be used frequently, while others are used hardly at all. Instead of choosing from the long list every time, it is much more efficient for the user to select the most frequent items via a small set of radio buttons. Façades lets users create a custom replacement widget that specifies the desired subset of items. The replacement widget can be added to the original window or even replace the original widget.
The original application (left) has a menu with a long list of Canadian provinces. The façade construction dialog (center) lets the user select the most frequent items (middle). The façade now replaces the original menu with a set of radio buttons (right).

A toolglass is a semi-transparent window that is manipulated by the non-dominant hand. The user moves the toolglass over the object of interest and uses the dominant hand to click on the toolglass with the main input device. Façades lets users turn any window into a toolglass. It sends the click to the toolglass window, and sends the press and subsequent drag events to the window under the toolglass. The application thus remains unaware of the toolglass-style interaction, but the user interacts as if the toolglass is an integral part of the interface.

Using a palette façade as a toolglass with the GIMP. The toolglass contains color swatches and some drawing tools. Shapes can be created by clicking the corresponding tool and dragging. To fill a shape, the user simply selects a brush, clicks on a color swatch and paints.

Façades is implemented with Metisse[15] and uses the X-Window accessibility interface. The Metisse architecture supports the dynamic rendering of interface elements in multiple windows and handles input redirection and composition. This allows any application to benefit from Façades without modifying its code.

The flow of input events and images in the Façades system

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technology), (ii) an electronic notebook, and (iii) email, web and other on-line activities. We tested *Prism* for over nine months with a group of Bioinformatics at INRA (Evry).

We also worked with contemporary music composers at IRCAM. After studying how composers use paper and computer tools [53, 65], we created *MusLink*, a system that enables composers to annotate their compositions and delay interpretation, enhancing the creative process.

In connection with our work on multi-media communication, we developed a tangible interface called *FamilyNet* [32] that uses cards with embedded RFID tags, enabling users to create and manage secure groups in an extremely simple way. We also developed *TangiCam* [28] and *Sketchcam* [30] (figure 12.3), which provide innovative ways for allowing children to interact with and control photographs. In each case, the tangible interfaces reified a difficult-to-understand on-line concept, making it easier for users to control on-line devices. Although many research groups now work on tangible interfaces, our work emerges from actual studies of users and their context of use, rather than being driven by the available technology.

### Multi-Media Communication

This theme 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.

After the success of the *InterLiving project*, which developed the concept of *Communication Appliances* [74] to help remote families use peripheral awareness technologies to stay in touch, we developed a variety of new devices. With funding from France Télécom, we developed communication technologies to address the needs of different user groups, including remote couples (*Nightboard* [132], *WeMe* (to be published in 2009), *MissU*) (to be published in 2009), adolescents (*Teledbeads* [29] and A20 [58]) and the elderly (*Marker Clock* [40]).

This work led to the *ICI-TV* project, funded by Digiteo, in which we are collaborating with a start-up to create communication appliances for the elderly. This theme also explored more theoretical issues such as multi-scale communication (*Pêle-Mêle* [23]) and different media, including distributed images, sound and touch.
Research Methods

This theme focuses on how multi-disciplinary teams can create effective interactive systems that take context into account. Our objective was 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 believe strongly in 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.

We recently applied techniques such as the Interactive Thread at the UIST 2.0 20th anniversary celebration and developed Generative Walkthroughs to enable technically trained developers to incorporate insights from the socio-technical research literature into the design of their interactive systems.

The Touchstone project (figure 12.4) created an exploratory platform for helping researchers design, run and analyze controlled laboratory experiments [31]. The design platform allows users to explore the consequences of various design choices and produces a file that can be used by the run platform to actually run the experiment. The resulting data can then be analyzed with traditional tools. The platform is available through a web site (http://touchstone.lri.fr), in order to encourage sharing of experiment designs, code modules and results. A Java version of the design platform is being developed to provide more flexibility than the online version.

The Interaction Museum [121] project explored how to capture key interaction techniques in a form that can be shared and adopted by both researchers and industry.

Engineering Interactive Systems

This theme 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.

In the INDIGO project [3, 49], we developed a distributed architecture composed of object servers that manage the application data and interaction and rendering
servers that manage display and interaction. Such separation of the core application logic from the interaction makes it possible to optimize graphical rendering and interaction according to the current setup and context, and supports sharing and collaboration among devices and users. This work is now pursued in a more radical way in the ANR iStar project, by developing an interaction kernel at the same level of abstraction as the operating system. While it is probably a long way before such tools can be used in industry [137, 5], we believe it is crucial to provide support for interaction at the level of operating systems and programming languages in order to address the challenges of multi-user, multi-device interactive systems [88, 91].

A good example is the use of state machines to specify interaction. While the idea has been explored a long time ago, no user interface toolkit uses them today and instead relies on poor mechanisms such as listeners and callbacks. We used hierarchical state machines in INDIGO and showed the power of this approach [14]. We pursued this work with SwingStates [1, 7, 47], an extension to the Java Swing toolkit that takes advantage of the Java syntax to specify state machines almost as if they were a construct of the language. We have used SwingStates for teaching for several years now, and it is used in various places in France as well.

We also developed the Metisse Window System to facilitate the design, implementation and evaluation of innovative window management techniques [15, 56]. The system is based on a compositing approach that makes a clear distinction between the rendering and interactive compositing processes. The Metisse server is a modified X server that supports both input and output redirection. Metisse has proven to be a productive environment for creating a variety of novel interaction methods, including Façades [44] which enables users to create custom-made palettes of tools from any application and advanced techniques that permit one-click Copy-Paste interaction [16] (figure 12.5). Because of the overwhelming commercial success of the Windows operating system, few research groups are working on new interaction models or environments; we are not aware of work similar to ours. However, we believe this form of research is the key to bridging the gap between the many individual interaction techniques that are invented by researchers and their use in commercial application. While such integrative work is often viewed as applied, we argue that it embodies difficult and fundamental questions about the nature of interaction. Metisse is available as one of the standard desktop configurations in the Mandriva Linux distribution.
Strategic Planning

Original LRI Goals

InSitu was most involved with the Masses of Data challenge and has been actively engaged in several projects that address this topic, including MicroMegas for helping users deal with large quantities of familiar data, which lead to the creation of the Metisse window manager, and more recently the ReActivity project which addresses the problems scientists face in managing large quantities of data. In addition, InSitu has organized the WILD (Wall-Sized Interactive Large Display) project, which will continue this theme by working with scientists to display and interact with large quantities of heterogeneous research data.

Self Assessment

Although InSitu was a full research team at INRIA in 2004, it was a subgroup within the Genie-Logiciel group at LRI. In response to the last evaluation, InSitu was made a full research team within LRI, effective in 2007. This has raised the visibility of the group within LRI and has allowed us to participate more fully in the life of the lab. As part of the group’s effort to contribute to LRI, Wendy Mackay was made a Research Vice President, representing the Computer Science department at the University level.

Relationship to LRI Strategic Plan

The primary focus of InSitu is on the theme “Interacting with the real world”, which is of strategic importance to both LRI and INRIA. Given our research approach, which involves the participation of users throughout the design process, we plan to explore a wide variety of interaction and communication techniques to support users in diverse settings. For example, the ICI-TV project, begun in mid 2008, will provide the elderly with novel ways to “stay in touch” with family and friends. The Sirius project, InSitu’s Associate Lab with Stanford University and the University of California, San Diego, will explore novel techniques for interacting large displays (related to the WILD and iStar projects), new methods for supporting creativity (Design workbench), new forms of interactive paper (related to the ReActivity project and Paperoles a proposed collaboration with IRCAM, the center for contemporary music in Paris, and new methods of expressing and analyzing temporal data (Ethnographer’s Workbench).

A secondary focus for InSitu is the “Scalability” theme, which is fundamental to much of our work on interaction and visualization techniques. In particular, the ReActivity and WILD projects will involve extensive collaborations with research scientists from multiple disciplines. Our challenge will be to develop novel strategies, both in terms of interaction techniques and engineering platforms, that will enable them to visualize and interactively manipulate massive quantities of complex, dynamic and heterogeneous data. This work has natural links with projects in the Biolinfo and IAO groups, which address some of the same users and provide complementary strategies.
Honors

Prizes and Awards

- Michel Beaudouin-Lafon, *Member of the ACM SIGCHI Academy*
- Wendy Mackay, *Member of the ACM SIGCHI Academy*

Keynote Addresses

**International**

- Wendy Mackay, *Augmented Paper Then and Now*, invited keynote at the *CO-PADD workshop*, in conjunction with ACM CSCW 2006.

**France**

- Wendy Mackay, *De l’interaction située à la communication ambiante*. Launch of Digiteo Labs, research park in information science and technology, Oct. 2006.
- Wendy Mackay, *Innover pour gérer la complexité de l’interaction homme-machine*. Invited address to the Minister of Industry, System@tic, Dec. 2006.

Other Honors

Evaluation of Research

Editorial Boards

International

- CACM, Communications of the ACM, ACM: W. Mackay (2008-)
- HCI, Human Computer Interaction, Special Issue on Awareness Systems: W. Mackay (Co-Editor, 2006)

National

- R13, Revue Information, Interaction Intelligence, Capaduès: M. Beaudouin-Lafon (2001-)
- Member of the editorial board for a French encyclopedia of information systems and computer science [90]: M. Beaudouin-Lafon (2006)

Program Committees

Chair


Member (international events)

- SoftVis, ACM Symposium on Software Visualization: E. Pietriga (2008)
• SoftVis, ACM Symposium on Software Visualization: E. Pietriga (2008)
• IUI, ACM International Conference on Intelligent User Interfaces: C. Appert (2009)
• GD, International Symposium on Graph Drawing: J.-D. Fekete (2005)
• SOUPS, Symposium on Usable Privacy and Security: W. Mackay (2006)

**Member (national events)**

• IHC, Simpósio de Fatores Humanos em Sistemas Computacionais de la Sociedade Brasileira de Computação: N. Roussel (2006, 2008)

**Evaluation Committees and Invited Expertise**

**International**

• Franklyn Bower Award committee (USD 250,000.00 prize, oldest U.S. scientific prize): W. Mackay
• European Research Council (ERC), Advanced Grants evaluation panel: M. Beaudouin-Lafon (2008–)
• TAICHI FP6 Project, Wales, U.K. (FET-Open Coordination Action): W. Mackay, reviewer
• European Science Foundation Exploratory Workshop: W. Mackay, expert reviewer
• EPSRC Senior Fellowships, UK: W. Mackay, expert reviewer (2006)
• EPSRC Large Grants, Avoidance, recovery and coordinating activities (ARC), UK: W. Mackay, expert reviewer (2008)
• EPSRC Equator Evaluation (6-year, £10,000,000.00 project), UK: W. Mackay, expert reviewer (2007)
• EPSRC Fellowships: W. Mackay, committee member
• ACM CHI Best Paper award committee: W. Mackay, member of the jury
• Hasler Foundation’s Man-Machine Interaction program: N. Roussel, reviewer (2005)
• French-brazilian CAPES-COFECUB program: N. Roussel, reviewer (2005)

**France**

• Award committee for the Gilles Kahn thesis award (awarded by the SPECIF association and sponsored by Académie des Sciences): Caroline Appert (2008)
• Award committee for the ASTI thesis award, France: W. Mackay (2007)
• Commission d’évaluation, INRIA, elected representative: Wendy Mackay
• Research committee of TELECOM ParisTech: M. Beaudouin-Lafon (2008–)
• Scientific committee of IRCAM (Paris): M. Beaudouin-Lafon (2004-)
• Evaluation committee of LIG laboratoire (Grenoble): M. Beaudouin-Lafon, co-president (2006)
• Ministry of Research, Committee for Prôme d’Encadrement Doctoral et de Recherche: M. Beaudouin-Lafon (2007)
• ANR jeunes chercheurs: N. Roussel, reviewer (2007), W. Mackay, reviewer (2008)
• ANR contents et interactions: N. Roussel, reviewer (2008)
• ANR VERSO Réseaux du Futur et Services, jury member: W. Mackay
• ANR MDD Masses de données: J.-D. Fekete, reviewer (2005 -)
• INRIA project evaluations: Wendy Mackay (2)
• Contrat de Projet Etat-Région Lorraine (CPER), thème Modélisation, Interaction, Simulation: E. Pietriga (2007)

Other Evaluation Activities

• Commission de développement technologique, INRIA Saclay - Ile-de-France: E. Pietriga (2008)
• Hiring committee for the computer science department (Commission de Spécialité et d'Enseignement 27ème section), Université des Sciences et Technologies de Lille (Lille 1): N. Roussel (2007-2008)
• Hiring committee for the computer science department (Commission de Spécialité et d'Enseignement 27ème section), Université Paris-Sud : M. Beaudouin-Lafon (2005-2008)
• International Ph.D. committees jury members: W. Mackay (2), M. Beaudouin-Lafon (1), N. Roussel (1), J.-D. Fekete (1)
• International Ph.D. committees mid-term exams: W. Mackay (3)
• French Habilitation à diriger des recherches committees: M. Beaudouin-Lafon (president: 1, reviewer 4), W. Mackay (reviewer: 1, member: 1)
• French Ph.D. committees: M. Beaudouin-Lafon (president: 1, reviewer: 9, member: 2), W. Mackay (president: 1, member: 4), J.-D. Fekete (reviewer: 1)
• ACM CHI 2007 Doctoral Consortium, San Jose, USA: W. Mackay (Jury member)
• ACM UIST 2007 Doctoral Consortium, Newport, USA: Wendy Mackay (Jury member)
• Interact 2005 Doctoral Consortium, Rome, Italy: W. Mackay (Jury member)
• Stanford University HCI jury: M. Beaudouin-Lafon and W. Mackay
• Reviewing for the following national journals: Revue Information-Interaction-Intelligence (Revue I3), Revue de l’Interaction Homme-Machine (RIHM), Technique et Science Informatique (TSI), Document Numérique
• Reviewing for the following international conferences: ACM CHI, ACM UIST, ACM CSCW, ACM Multimedia, ACM SoftVis, AVI, Critical Computing, CRIWG, ECSCW, GD, IDC, IHC, IFIP EIS, IEEE InfoVis, IEEE Multimedia, IEEE VL-HCC, IEEE 3DUI, IEEE TableTop, Interact, NordicCHI, SOUPS, VIEW
• Reviewing for the following national conferences: IHM, UbiMob
Volunteer Professional Service

Management Positions in Scientific Organisations

- Convivio, FPS Network of Excellence: Wendy Mackay, vice-chair

Organisation of Conferences and Scientific Events

- UIST, ACM Symposium on User Interface Software and Technology, Newport, USA, 2007: W. Mackay & M. Beaudouin-Lafon, 20th Anniversary Special Event Chairs
- CSCW, ACM conference on Computer Supported Cooperative Work, San Diego, USA 2008: N. Roussel, Interactive Posters co-chair
- UIBMOb, Journées Francophone Uniquité et Mobilité, Nice, 2005: W. Mackay, Conference co-chair
- UIST, ACM Symposium on User Interface Software and Technology, Monst-reux, Switzerland, 2006: N. Roussel, Demonstration Co-chair
- VL-HCC, IEEE Symposium on Visual Languages and Human-Centric Computing, Coeur d’Alène, ID, USA, 2007: E. Pietriga, Publicity Chair
- VL-HCC, IEEE Symposium on Visual Languages and Human-Centric Computing, Herrsching, Germany, 2008: E. Pietriga, Publicity Chair
- ReActivity Workshop on Capture, Visualization and Interaction with Temporal Data, Paris, 2008: W. Mackay, Chair
- CHI 2005 Workshop on Awareness Systems, Portland, USA: W. Mackay, Co-Chair

Working Groups

- Interaction Museum: M. Beaudouin-Lafon, W. Mackay, E. Pietriga, co-organizers
- OFTA (Observatoire Français des Techniques Avancées): Wendy Mackay and Nicolas Roussel, members of Groupe Informatique Diffuse
- INRIA Working Group on Mobility: W. Mackay, organizer
- INRIA Working Group on Research Careers: W. Mackay, member

Other Professional Service

- ACM Publications Board: M. Beaudouin-Lafon, member (2002-)
- AFHIM, Association Francophone d’Interaction Homme-Machine: Michel Beaudouin-Lafon, Stéphane Huot, Jean-Daniel Fekete, Executive Committee members
Contracts and grants

Contracts and grants (jan 2005 - dec 2008)

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<td>IStar</td>
<td>Université Paris-Sud 11</td>
<td>02.2008 / 36 mo.</td>
<td>218 k€</td>
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<tr>
<td>ANR</td>
<td>Web-Content</td>
<td>INRIA</td>
<td>06.2006 / 36 mo.</td>
<td>262 k€</td>
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<tr>
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<td>Université Paris-Sud 11</td>
<td>07.2003 / 36 mo.</td>
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<td>06.2008 / 12 mo.</td>
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<tr>
<td>DIGITEO</td>
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<td>Université Paris-Sud 11</td>
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<td>427 k€</td>
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<td>Industry</td>
<td>DISCODOM</td>
<td>INRIA</td>
<td>12.2008 / 36 mo.</td>
<td>221 k€</td>
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<tr>
<td>Industry</td>
<td>ReActivity</td>
<td>INRIA</td>
<td>01.2008 / 36 mo.</td>
<td>400 k€</td>
</tr>
</tbody>
</table>

IStar

Partners: ENAC, IntuiLab, Anyware Technologies

The IStar project will develop a new generation of programming tools for developing interactive applications, supporting interoperability among components developed on different platforms as well as multi-surface / multi-device applications. It will be based on a run-time kernel (virtual machine or server) that will execute programs developed according to a semantic model suited to describe interactive components. The run-time kernel will use platform-dependent rendering modules, such as OpenGL for graphics or embedded resources such as the Flash or SVG plug-ins of a web browser, therefore supporting Web 2.0 applications.

See http://www.i-star.fr

Web-Content

Partners: CEA LIST, Thales Research & Technology, EADS, Soredab, New Phenix, INRA, ADRIA, Exalead, LIP 6, PRISM, INRIA In Situ, INRIA Mostrare, INRIA Gemo, INRIA Exmo, LIMSI-CNRS AMI Group, LIG, GRIMM, PSY.CO

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. The first targeted domain is the watch, a subpart of intelligence dedicated to warn the decider on the occurrence of an event or the evolution of a situation. It joins several Open Source tools to create the core of a Service Oriented Application and it defines the interface of several services that are available through several partners, either freely or through commercial licences. These services then exchange data in a formalized manner.

See http://www.webcontent-project.org
**MICROMEGAS**

*Partners: LMP (Marseille, coordinator), In Situ (LRI & INRIA Futurs Saclay), MErLIn (INRIA Rocquencourt) and Institut Pasteur (Paris)*

The goal of this project was to design and prototype new interactive systems for managing large data sets. It focused on multiscale interactions with familiar data: personal or professional data that users have somehow manipulated (e.g. created, received or downloaded).

**ICI-TV**

*Partners: CEA PRAESTO*

The goal of the ICI-TV project is to help seniors remain independent while living at home by staying in touch with close family, friends and care-givers. ICI-TV will provide a range of communication services on a home television, via a set-top box. Elderly users will use an intuitive, easy-to-use interface to access channels devoted to specific people: accessing that person is a simple matter of changing to the appropriate channel. Users may choose three levels of interaction, from low-level indicators of presence, to exchanges of photos and messages, to live audio-video chat. ICI-TV plans to transfer this technology to a CEA-based startup, called Praesto, by September 2009.

**WILD**

*Partners: INRIA Equipe AVIZ, LIMSI CNRS*

The goal of the WILD project is to create a very high resolution platform for interactive visualization. It will be used both by researchers in human-computer interaction to study interactive visualization of large data sets, and by researchers from other disciplines to explore their complex data. The platform will consist of a unique interactive wall display made of thirty-two 30” LCD screens, i.e. a 5m50 x 1m80 (18’ x 6’) wall displaying 20 490 x 6 400 = 131 million pixels, and a camera-based gesture tracking system supporting interaction with the wall as well as within the surrounding space. The platform will also include one or more interactive tables and other interaction devices will in order to facilitate collaborative work, therefore creating a unique experimental environment for interactive visualization.

**DISCODO**

The goal of this project is to design innovative communication systems for the home environment. In this context, we are particularly interested in supporting smooth transitions between alternative forms of communication involving different media combination.

See [http://institu.lri.fr/discodom/](http://institu.lri.fr/discodom/)
ReActivity

**Partners:** INRIA Équipe AVIZ, MSR-INRIA

The ReActivity project focuses on the fundamental problem of how to capture researchers’ work processes in a form that enables them to observe their past and current activity, to reflect upon it and to improve their own future activity.

Our goals are to identify appropriate levels of data capture and to create sophisticated tools for logging and storing records of user activity, including their interactions with the physical world and across computer platforms. We are also interested in developing efficient algorithms for visualizing the resulting multimedia temporal data and in developing interactive applications that allow scientists to explore, reuse and improve successful strategies. We use participatory design to identify real-world work patterns and needs and we evaluate our work via benchmarks and field tests with practicing scientists.

Collaborations

**Cooperation Agreements**

- MUSE (Multiscale Environments): INRIA joint team (équipe associée) with University of Toronto Dynamic Graphics Project (2007-2008)

**Collaborations Leading to Joint Publications**

- Wolfgang Stuerzlinger (University of York, Canada), Olivier Chapuis (LRI) and Nicolas Roussel (LRI): *Adaptable User Interfaces* [44]
- Eric Lecolinet, Anne Roudaut (Telecom ParisTech) and Stéphane Huot (LRI): *Mobile Devices Interaction* [42]
- Yves Guiard (CNRS), Michel Beaudouin-Lafon (LRI): *Multiscale Navigation* [95, 18, 24]
- Gonzalo Ramos (U. Toronto), Andy Cockburn (U. Canterbury, New Zealand), Ravin Balakrishnan (U. Toronto) and Michel Beaudouin-Lafon (LRI): *Pointing Lenses* [38]
- Danielle Lottiridge (U. Toronto) and Wendy Mackay: *Generative design methods* [73]
- Atau Tanaka (Sony CSL), Wendy Mackay (LRI) and Olivier Bau (LRI): *Social interaction in music* [58]
- Nicolas Donin (IRCAM), Catherine Letondal (LRI) and Wendy Mackay (LRI): *Paperoles et musique, papier interactif* [53]

**Other Collaborations**

- Shumin Zhai (IBM Almaden Research Center) and Caroline Appert (LRI): *Gesture-based interaction and human performance*
- Carlos Agon and Gérard Assayag (IRCAM), Wendy Mackay (LRI) and Catherine Letondal (LRI): *Interactive paper*
- Victoria Bohler (INRA), Thierry Rose (Pasteur), Pierre Tuffery (INSERM), Wendy Mackay (LRI), Catherine Letondal (LRI, Pasteur), Aurélien Tabard (LRI): *Augmented lab notebooks*
Dissemination and Technology Transfer

Software Licensing and Distribution

IsaViz - A visual environment for browsing and authoring RDF models
http://www.w3.org/2001/11/IsaViz/
Contact: Emmanuel PIETRIGA

IsaViz is a visual environment for browsing and authoring RDF models represented as graphs. It features a 2.5D user interface allowing smooth zooming and navigation in the graph; creation and editing of graphs by drawing ellipses, boxes and arcs; RDF/XML, Notation 3 and N-Triple import and export, SVG and PNG export. Since version 2.0, IsaViz can render RDF graphs using GSS (Graph Stylesheets), a stylesheet language derived from CSS and SVG for styling RDF models represented as node-link diagrams.

JFresnel - A Java library that implements the Fresnel specification
http://jfresnel.gforge.inria.fr/
Contact: Emmanuel PIETRIGA

Fresnel is a presentation vocabulary for Semantic Web data designed to be application and representation paradigm independent. JFresnel is a Java library that implements the Fresnel specification for various RDF APIs, such as Jena and Sesame.

Metisse - Windowing System to explore innovative window management techniques
http://insitu.lri.fr/metisse/
Contact: Olivier CHAPIUS

Metisse is an X-based window system designed with two goals in mind. First, it should make it easy for HCI researchers to design and implement innovative window management techniques. Second, it should conform to existing standards and be robust and efficient enough to be used on a daily basis, making it a suitable platform for the evaluation of the proposed techniques. Metisse is not focused on a particular kind of interaction (e.g. 3D) and should not be seen as a new desktop proposal. It is rather a tool for creating new types of desktop environments.

Núcleo - Video toolkit
http://insitu.lri.fr/~roussel/projects/nucleo/
Contact: Nicolas ROUSSEL

Núcleo is a toolkit for exploring new uses of video and new human-computer interaction techniques. Most of it comes from a previous toolkit named videoSpace.

Like videoSpace, núcleo is motivated by the desire to focus on the uses of video, rather than the technologies it requires. In this perspective, the toolkit is not focused on performance or reliability issues, but rather on the ability to support rapid prototyping and incremental development of video applications. This approach contrasts with many of the research themes usually associated to video in the Multimedia or Network communities such as compression, transport...
or synchronization. Nucleo is not aimed at these topics. It is rather intended to help HCI and CSCW researchers (and other people!) who want to explore new uses of the images.

Nucleo source code compiles on Apple Mac OS X and Linux. It is freely available under the GNU Lesser General Public License (LGPL).

**SwingStates** - An extension to the Java Swing toolkit based on state machines

http://swingstates.sourceforge.net/

Contact: Michel BEAUDDOIN-LAPON

SwingStates is an extension to the Java Swing user interface toolkit that facilitates the creation of interactive applications by providing state machines to specify interactions. SwingStates also provides a powerful Canvas to create new widgets and a flexible input system to use non-standard input devices. State machines are specified directly in Java by taking advantage of the syntax of inner classes. The combinatorial explosion of the number of states is controlled by allowing multiple state machines to run in parallel.

**WMTRACE** - Logging and visualizing a user’s window management activity

http://www.lri.fr/~chapuis/software/wmtrace/

Contact: Olivier CHAPUIS

wmtrace 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 to replay the resulting logs and analyze the entire session.

**ZVTM** - Zoomable Visual Transformation Machine

http://zvtm.sourceforge.net/index.html

Contact: Emmanuel PIETRIGA

The ZVTM is a Zoomable User Interface (ZUI) toolkit implemented in Java, designed to ease the task of creating complex visual editors in which large amounts of objects have to be displayed, or which contain complex geometrical shapes that need to be animated. It is based on the metaphor of universes that can be observed through smart movable/zoomable cameras, and offers features such as perceptual continuity in object animations and camera movements, which should make the end-user’s overall experience more pleasing.

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**Popularisation of Research Results**

- Radio interview, France Bleu: Wendy Mackay (Apr 2008)
- Interview, Le Regard du Numérique, Microsoft: Wendy Mackay (Apr 2008)
- *Faire un logiciel simple ... C’est difficile !*, Invited talk, Unité ou Café ?, INRIA Saclay: Wendy Mackay (March 2008)
- VIA Valorisation of Innovation, Round Table: Wendy Mackay (Feb 2008)
- Radio interview, France Inter: Wendy Mackay (Sep 2007)
- *Encyclopédie de l’Informatique et des Systèmes d’Information* [90, 89, 94]; 2006: Michel
Beaudouin-Lafon (section coordinator, chapter author), Jean-Daniel Fekete (chapter author)

- Presentation at the Innovative Interfaces conference organized by FING (Fédération pour un Internet Nouvelle Génération) at the Cité des Sciences (Paris): Michel Beaudouin-Lafon and Wendy Mackay (2006)

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**Summer Schools, Tutorials, Invited Seminars**

### International

- Jean-Daniel Fekete, Seminar at Human-Computer Interaction Laboratory, University of Maryland, 2006.

### France

- Wendy Mackay, *ReActive Notebook*, presentation to C. Mundie, Microsoft president, Sep 2007.
- Wendy Mackay, Emmanuel Pietriga, *Research at InSitu*. Seminar, Xerox Research Centre Europe, France, March 2005;
Training and Education

Defended Habilitations (jan 2005 - sept 2008)

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<tr>
<td>FEKETE</td>
<td>Jean-Daniel</td>
<td>05.2005</td>
<td>DR, INRIA</td>
</tr>
<tr>
<td>ROUSSEL</td>
<td>Nicolas</td>
<td>12.2007</td>
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Defended doctorates (jan 2005 - sept 2008)

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<td>APPERT</td>
<td>Caroline</td>
<td>05.2007</td>
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<tr>
<td>BLANCH</td>
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<td>09.2005</td>
<td>MCF, Univ. Grenoble</td>
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<td>LABRUNE</td>
<td>Jean-Baptiste</td>
<td>12.2007</td>
<td>Post-doc, MIT Media Lab (USA)</td>
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<td>LARD</td>
<td>Jérôme</td>
<td>10.2008</td>
<td>Engineer, Thalès (France)</td>
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<td>NARS</td>
<td>Emmanuel</td>
<td>09.2007</td>
<td>Engineer, start-up (France)</td>
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<td>RICHE</td>
<td>Yann</td>
<td>09.2008</td>
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Graduate Courses

- Master Informatique, Université Paris-Sud, Conception et Evaluation des Interfaces : W. Mackay and M. Beaudouin-Lafon (2005-2008)
- Master Informatique, Université Paris-Sud, Collecticiel et Interaction Médiatisée : N. Roussel (2005)
- Master Intelligence Artificiel, Université Paris VI, Conception et Evaluation des Interfaces : W. Mackay, A. Tabard, N. Masson (2005-2008)
- C.I.E.S. Versailles, Centre d’Initiation à l’Enseignement Supérieur Recueil de données par interview et questionnaires : W. Mackay (2007)
- Ecole Doctorale, Université Paris-Sud, Technical Writing in English : W. Mackay (2007-2008)
Publications

Journal articles

Major international journals


Other journals


Conference articles

Major international conferences and workshops


[34] E. Pietriga. Semantic Web Data Visualization with Graph Style Sheets. In ACM Symposium on Software Visualization (SoftVis’06), pages 177–178, sep 2006.


**Major national conferences and workshops**


**Other conferences and workshops**


Posters and other short communications


Books and book chapters


Edited books


Dissemination


Other publications


[111] O. Chapuis and N. Roussel. Metisse is not a 3D desktop! Rapport de Recherche 1407, LRI, Université Paris-Sud, France. April 2005. 10 pages. This is an earlier version of the UIST’05 paper.


[115] S. Gueddana and N. Roussel. Pêle-Mêle, a video communication system supporting a variable degree of engagement. Rapport de Recherche 1437, LRI, Université Paris-Sud, France, Mars 2006. 4 pages. This is an earlier version of the CSCW’06 note.


[125] N. Roussel. Towards multiscale communication systems. Rapport de Recherche 1439, LRI, Université Paris-Sud, France, March 2006. 9 pages. This is an earlier version of the Multimedia’07 paper.

[126] N. Roussel. Vers des systèmes de communication multi-échelles. Rapport de Recherche 1431, LRI, Université Paris-Sud, France, Février 2006. 7 pages. This is an earlier version of the CEREN report.


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Theses and habilitations


