idiap
RESEARCH INSTITUTE

A N N U A L   R E P O R T   2 0 0 8

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NOTE FROM THE PRESIDENT

"CHOOSING GROWTH,
WHILE STILL MAINTAINING DYNAMISM AND FLEXIBILITY"

Olivier Dumas, President of the Foundation Council of Idiap

Let's admit it – when we talk about the canton of Valais, the first words that spring to mind are countryside, skiing or vineyards rather than biometrics, information interfaces or perceptive and cognitive systems.

Nevertheless...

In the heart of Europe, on this plain where the Rhône makes the first bend of its journey towards the Mediterranean, in this canton naturally oriented towards tourism, Idiap defies the laws of centralisation and proudly displays its great success. Since its creation in 1991, the Martigny research institute has grown from just ten to around one hundred employees, and its work now places it among the most successful research centres in the world in its specialist fields.

In this context, the partnership formed between Idiap and EPFL (Ecole polytechnique fédérale de Lausanne) in 2008, along with four times the support from the Confederation until 2011, symbolises once again, as if it was needed, the recognition granted to the Martigny institute, and heralds a new era for Idiap. The strategic alliance that now links the Martigny institute to the higher education establishment in Lausanne, not only enables Idiap to offer its best researchers academic recognition, but also to strengthen its integration into the university network of French-speaking Switzerland. An academic integration, which, at cantonal level, is regularly successful with regard to many projects that the institute conducts in partnership with HES-SO (University of Applied Sciences of Western Switzerland) in Valais.

We can see that all the right signals are there and Idiap's future looks bright. However, whether it concerns its growth or its partnership with EPFL, Idiap keeps a sense of moderation, and remains attentive to the values that have led and still lead to its success. Due to its simple but dynamic organisation, the institute attracts researchers from around the world, who are keen to work in an attractive environment in which they can express their creativity.

Lastly, I cannot take stock of 2008 without mentioning the growing importance accorded by Idiap to its third objective, technology transfer. Through IdeArk, which identifies and promotes promising new technologies, particularly those developed at the institute, Idiap actively supports the emergence of new businesses, training of start-ups and spin-offs supported by The Ark foundation, and through it by the State of Valais, which is firmly committed to this programme of growth through innovation.

In conclusion, I would like to thank the federal, but also the cantonal and municipal authorities, which, following the Confederation's example, also renewed and increased their support in 2008.

Also, I hope that this new stage of growth is a calm but exciting time for the institute's management and employees.

"NEW RESEARCH HORIZONS,
IN OUR SIGHTS"

Hervé Bourlard, Director of Idiap

At a research institute as dynamic and multi-disciplinary as Idiap, new research ideas and visions for the future are constantly emerging. Although many are abandoned, some prosper and open up new prospects. Idiap strongly believes in these values and always develops its research activities around the most promising of its "visions", often playing the role of pioneer. 2008 was a particularly fertile year as no less than three new research areas appeared on the horizon at Idiap – social signal processing, modelling and operation of social networks, and use of information technologies to improve creativity in the broad sense of the term. After one and a half years of preparation and incubation, Idiap has already been awarded several large-scale projects in these research areas, with significant financial spin-offs, and they have provided many ideas for future developments.

Therefore, while a considerable number of our projects continue to focus on improvement of communication interfaces between man and machine and processing of multimedia information, other areas of research are developing, which rely on the progress already made to put machines at the service of human communication. These new exploratory fields place Idiap, once again, at the forefront of world research in its areas.

Among many other successes, we were happy to be on the receiving end of the Confederation's renewed confidence in us. Switzerland now has around twenty National Centres of Competence in Research (NCCR), and Idiap is one of them. The institute was chosen in 2002 to lead a NCCR named IM2 (Interactive Multimodal Information Management), and has had its assignment renewed for the third time for a framework period of four years (2010-2013). The Federal Department of Home Affairs also recognised the exceptional quality of our research and development work by increasing its subsidy fourfold, on the condition that we create a strategic alliance with EPFL (Ecole polytechnique fédérale de Lausanne).

For that reason, 2008 was partly dedicated to finalizing the terms of our partnership with EPFL. At the same time, our institute began a restructuring, an evolution made necessary by the considerable size of our institution and by the progress made by our best researchers. They are major players in Idiap's success and now around ten of them have been awarded European projects and supervise their own research team. Each year, these researchers gain in autonomy and international recognition. The future structures of Idiap must therefore be able to adapt to this progress.

New research areas, renewed NCCR, partnership with EPFL, the signals are clear: Idiap has reached a turning point, and the stakes are high. Despite the growth and restructuring that its success imposes on it, the institute will have to be capable of maintaining its distinctive culture, as well as the values that have led to its success and progress.

Idiap is now in the hands of all those who will have the power, tomorrow, to map out its future. If, as in the past, all these partners pull in the same direction, I am convinced that the institute will be able to make its way along the path of prosperity.

I look forward to meeting this challenge with all the employees of Idiap, and thank them for their dedication.

Portrait

The Idiap Research Institute, based in Martigny (Valais/Switzerland), is a non-profit foundation specialised in the management of multimedia information and man-machine multimodal interactions. Idiap was founded in 1991 by the Town of Martigny, the State of Valais, EPFL (Ecole polytechnique fédérale de Lausanne), the University of Geneva and Swisscom, and is autonomous but connected to EPFL by a joint development plan.

The Idiap budget, which amounts to more than 9 million Swiss francs, is 75% financed by research projects awarded following competitive processes, and 25% by public funds (cf. Distribution of sources of financing, page 34).

Whereas it only employed around thirty people in 2001, in 2008 Idiap had around one hundred employees, including 80 researchers (senior researchers, researchers, postdoctoral students and PhD students). All the personnel work at Centre du Parc in Martigny, in the west wing. The institute moved there in August 2007. It now occupies 2,300 m^2 of premises over three floors.

Research areas

Idiap's main research areas are the following:

-   Perceptual and cognitive systems
    (speech processing / natural language understanding and translation / document and text processing / vision and scene analysis / multimodal processing / cognitive sciences)

-   Social and human behaviour
    (web social media / mobile social media / social interaction sensing / social signal processing / verbal and non-verbal communication analysis)

-   Information interfaces and presentation
    (multimedia information systems / user interfaces / system evaluation)

-   Biometric user authentication
    (speaker identification and verification / face detection, identification and verification / multimodal biometric user authentication)

-   Machine learning
    (statistical and neural network based ML / computational efficiency, targeting real-time applications / very large datasets)

Objectives

Through its activities, Idiap pursues three main objectives:

- Conducting fundamental research projects at the highest level in its preferred areas, thus taking its place among the best on a national, European and global scale. Idiap benefits from a wide network of partners internationally and works actively with large universities, public and private research centres, etc.

- Developing recruitment by helping its interns discover the world of research, by welcoming talented young researchers preparing their PhD and by providing a number of courses at EPFL and in-house.

- Ensuring technology transfer through the widest dissemination possible of its research results in the scientific community, but also by forging close ties with the world of industry.

Geographical situation

The Idiap Research Institute is in Martigny, one of the main towns of the Canton of Valais, in the French-speaking part of Switzerland, in the south of the country. In the heart of the Alps, Valais has an exceptional landscape and a pleasant microclimate, which makes it a very popular tourist destination and a very sought-after place to live.

Martigny is a town of approximately 15,000 inhabitants and is situated close to Montreux, Lausanne and Lake Geneva. Geneva airport is 90 minutes away by train. Martigny is well positioned in the centre of Europe.

Idiap in figures

Human resources (average over the past few years)

14 permanent researchers
11 postdoctoral students
29 PhD students
 9 development engineers
 6 system engineers
20 interns and visitors per year
 6 doctorates awarded
30 positions in start-ups on the IdeArk site
 9 administrative employees
25 nationalities represented

Scientific activities

- IM2 National Centre of Competence in Research (interactive and multimodal management of information systems) since 2001

- Participation in 37 research programmes

- Project management in 5 consortiums

- Participation in the economic development strategy of the Canton of Valais through The Ark programme and in particular the IdeArk company (cf. pages 18-19)

- 133 scientific publications

- Organisation of a number of international conferences

www.idiap.ch

MACHINES THAT STUDY HUMAN BEHAVIOUR

In 2008, three new areas of research appeared on the horizon at Idiap. Oriented towards human communication, behaviour and creativity, they are an extension of the institute's research fields, while easily fitting in with a new trend, which is for new technologies that serve human beings.

The machine at the service of man. The premise may seem ingenuous, and yet back in 1991, the year it was founded, the Idiap Research Institute set itself the task of working towards scientific progress for the well-being of humankind. Now, almost twenty years later, a quick look at the institute's research fields shows that it still puts the interests of society at the heart of its work.

Our society of the beginning of the XXIst century is witnessing a continuous stream of technological innovations – computer, mobile phone, PDA, personal stereo, game console, GPS navigation device, biometric passport, etc. New tools are constantly emerging in the daily lives of human beings and completely changing their habits. While they bring considerable advantages in terms of efficiency and convenience, they also create new tensions. A part of the population, incapable of following the trend, is left behind. And although the rest of the population adapts, almost all users willingly concede that the multiplication and recurrent modification of systems, software, interfaces, media and even authentication codes considerably complicate their lives.

**Improvement of man-machine
and man-man communication**
Perceptive and cognitive systems, human and social behaviour, information and presentation interfaces, biometric authentication, machine learning: through its five research fields, Idiap essentially works on improving man-machine relations and optimising human communication.

In this context, in 2008 Idiap developed three new areas, which, downstream of its preferred fields, form new avenues of research. When he talks about this recent development, the Director Hervé Bourlard has a sparkle in his eye. "For a researcher, foresight is essential. You have to distance yourself from past innovations, look towards the future and sense what can be done to further research."

The institute is familiar with this outlook. It has resulted, one by one, in the research fields that have made, and still make, Idiap's reputation. Therefore, at the rate of approximately once a year, a new tendency emerges. 2008 was an especially productive year, since no fewer than three new multidisciplinary areas made their appearance on the topics of social signals, behaviour and creativity. They were hatched after one and a half years of incubation, fed by past research. Their launch has already led to the institute being awarded several projects with significant financial spin-offs.

Social Signal Processing to decode non-verbal language
For more than ten years Idiap has dedicated a large part of its research to speech processing, vision and machine learning. Social Signal Processing (SSP) seemed to be the logical next step. The objective is to understand the way in which people communicate by analysing and interpreting the social signals that they send out (gestures, looks, tone of voice, etc.), and to then enable this communication to be improved through new technologies. Although decoding of non-verbal language is already carried out, both by image consultants and by commercial marketing experts, its interpretation by machine opens the way to a new form of understanding of communication via its modelling.

According to Hervé Bourlard, "machine analysis of human communication should even improve speech recognition: understanding the context of the exchange will help us to adapt the recognition system."

A mobile phone that tracks our habits
The mobile phone is an integral part of our daily lives and contains all the technology required to measure social behaviour: GPS tracker, clock, bluetooth, micro-transmitter and receiver.

Therefore, it is mainly through the mobile phone that research projects are being developed in this field. As part of a contract awarded by Nokia, Idiap plans to study, on the scale of a town, the position and movement of all mobile phones. The objective is to better understand social behaviour, particularly traffic flows, the means of transport used, etc.

At present mobile phones have tools that could make it possible for them to be context aware, to detect our social behaviour and adapt to it automatically. As Hervé Bourlard explains, "with the information that it has of the time, GPS position and sound level, and knowing that other phones located in the same area are equidistant and immobile, my phone should be able to understand that I am at the cinema and therefore it should switch to "silent mode" and "no vibration".

Using the same logic, the phone could, in the future, be able to indicate the presence of friends, the proximity of certain shops, or propose related services. Of course, such applications raise sensitive questions with regard to privacy. This issue would need to be discussed as part of a debate that could arise if such an application were developed.

New technologies to stimulate creativity

"After the era of productivity, we are going to enter the era of creativity. This is one of the themes that is currently occupying the world of industry, and therefore the world of research", confides Hervé Bourlard. Therefore, in answer to the invitation for tenders from the State Secretariat for Education and Research (SER) for new areas of national research, Idiap responded on 15 December 2008 with an original proposal on the theme of creativity. "Almost all the partners that we are putting forward are new. Since this project is extremely multi-disciplinary, we have included the University of Art and Design in Lausanne (ECAL), the Design and Architecture School of the University of Applied Sciences (HES) in Zurich, ergonomists of Fribourg, artists, etc." The project has been called "CREATE" by the director of Idiap, which stands for "Creative environments augmented by technology". The project is focused on how to construct systems that stimulate the creative process, a process with known stages. We know that creation arises partly from alternating between working alone and working in a group. The new technologies that could assist this process rely on the know-how that Idiap has acquired over many years: speech analysis, vision, management of multimedia information, cognitive systems, etc.

An Idiap senior researcher at the EPFL Centre for neuroprostheses

In 2008, the EPFL (Ecole polytechnique fédérale de Lausanne) announced the opening on 1st January 2009 of the Centre for neuroprostheses. Halfway between biology and engineering, this new multidisciplinary structure will approach the field of study of man-machine interfaces, which Idiap is also looking into with the research led by Professor José Millán. Mr Millán has been hired for this new project and will work on it from 2009.

For the institute, which initiated and has supported this research field for six years, the creation of this Centre is a fantastic chance to continue and consolidate the work that originated in Martigny. The results of Idiap's research will thus have a direct link with the world of medicine. EPFL will use this technology to facilitate patients' rehabilitation. To achieve this, five or six professors will be hired, specialists in hearing, sight, motor control, sensory control, deep brain stimulation, as well as experts in regenerative medicine.

NEW KEYS FOR DECIPHERING HUMAN COMMUNICATION

SSPNet: Social Signal Processing Network of Excellence. Behind the acronym and its explanation lies a new European project awarded to Idiap thanks to senior researcher Alessandro Vinciarelli. Here we lift the veil on a project that reveals the institute's new areas of research.
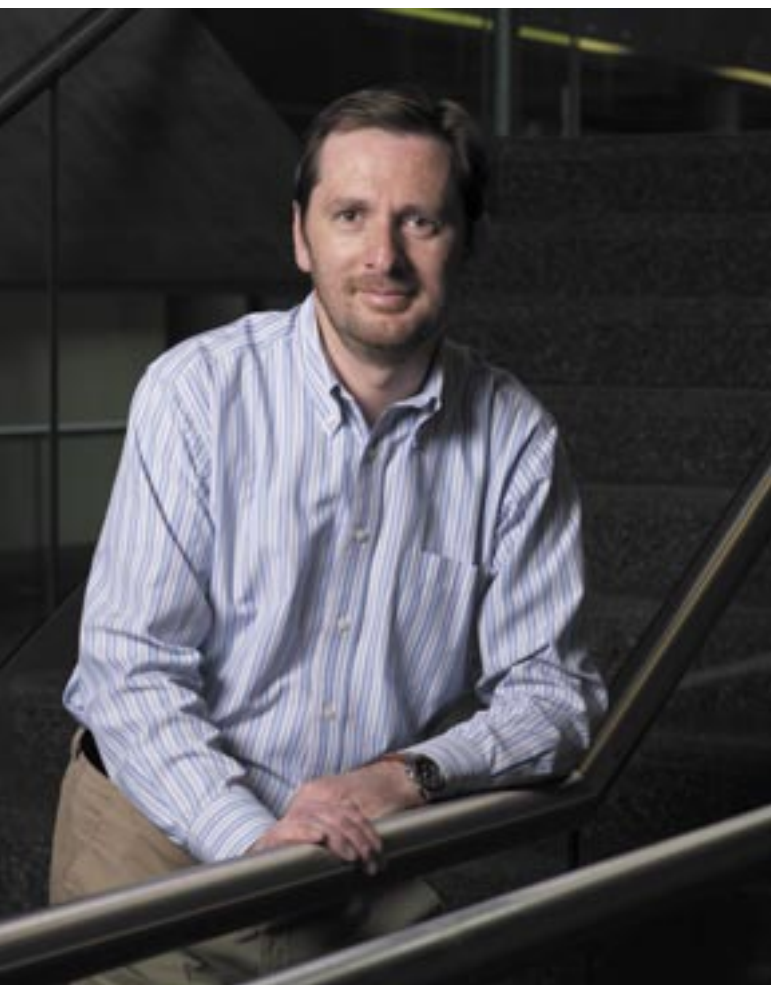
"The principle is simple", explains Alessandro Vinciarelli, senior researcher at Idiap. "If we can interpret non-verbal signals such as gestures or the voice with our eyes and ears, we must also be able to do so using cameras, microphones and sensors." Analysing social signals sent out by human beings is the subject of the new European project managed by Idiap: SSPNet, SSP for "Social Signal Processing", and Net for "Network of Excellence". The project focuses on the idea that psychology is based on objective and scientific foundations, and that a machine can therefore also be devoted to it. The project is to take five years.

The best scientists in Europe
Being responsible for a "Network of Excellence" involves setting up a research community with the highest level and most complementary skills possible. The one formed by Alessandro Vinciarelli can pride itself on having the best scientists in Europe among its ranks. "The network is extremely multidisciplinary," says Dr Vinciarelli. "It includes psychologists, sociologists and even ethnologists." The consortium has ten partners in total, two of which are in Switzerland: Idiap and the Swiss center for affective sciences (CISA) of the University of Geneva. "With the arrival of Web 2.0. and the multiplication of social networks, social signal processing has naturally come to the forefront."

After description, interpretation
Idiap is responsible both for overall coordination of the project – in partnership with Maja Pantic, researcher at Imperial College London – and part of the research work, particularly that which involves audio, video, retranscription, tracking, etc. "Until now," says Alessandro Vinciarelli, "we were satisfied merely with describing media content. With SSPNet, we are moving on to the next step: interpretation." This is welcome news for the Italian researcher, who joined Idiap in 1999 and whose training is both technical (physics), literary and artistic (drama).

SSPNet approaches the issue of non-verbal behaviour. When shown this picture, 50% of people see a couple arguing, a conclusion that arises from interpreting the non-verbal signals.

The SSPNet research focuses on three areas:

1. Political debates on television
   Based on recordings provided by Canal 9 regional television, Idiap can analyse interactions (conflicts, reconciliations, etc.), external expressions (anger, domination, withdrawal, etc.), the relationship between these, the status of the participants, and, in a more general way, the effectiveness of the communication.

2. Politeness
   What is politeness, how is it expressed, and how can we reproduce it artificially?

3. Interactions within a group
   What are the group dynamics, is there a leader, how effective is the group in completing a task?

www.sspnet.eu

Possible applications

The research carried out by the SSPNet team opens up a number of prospects for application, and in radically different areas.

Man-machine interactions
A machine that better understands a human being will interact better with him. Therefore, the voice guidance integrated into car GPS systems have been tuned to adopt a frequency, rhythm and warmth that encourages the driver to let himself be guided. When will we have a voice that adjusts to the driver's level of stress?

Image and video archiving
A machine able to decipher what is happening on a soundtrack, in an image or a film involving several people will be able to trace an audio or video document using keywords such as "debate", "anger", "cooperation", etc. This would be a revolution for radio station and television channel archives.

Disease prevention
If the warning signs of a degenerative cognitive or mental disease can be "modelled", a machine can recognise them and therefore enable the disease to be discovered early on.

FROM VISION TO INNOVATION,
FROM THE TENDER TO THE GRANT AGREEMENT

For security reasons, an increasing number of services are only accessible after an authentication stage. We have to remember more and more codes, which increases the risk of error, forgetting and theft. The European MOBIO project, awarded to Idiap, is proposing something of a revolution.

Since 1st January 2008, Idiap has managed a new European project named MOBIO, for Mobile Biometry. The MOBIO project was awarded to senior researcher, Sébastien Marcel, and aims to insert voice / face biometrics into a mobile phone in order to activate remote authentication services. In brief, the user would just have to speak or take a photograph of his face so that on the other end of the line, his banker, insurer or even his doctor could be sure of his identity.

Main difficulties? "Succeeding in programming complicated algorithms on small devices such as mobile phones," explains Sébastien Marcel, "and solving the problems of capturing voice and visual prints because even if it works well in a white corridor where the lighting is consistent, it's another story with pale light, sunlight, an echo, etc."

Financing
For a research project to exist, it must meet the objectives set out by the financing organisations such as the European Union or the Swiss National Science Foundation (SNSF) for scientific research. These set out the main areas of global, European or national research, and match them with financial budgets. Since mobile phones have become central objects, and security is an increasingly widespread concern, MOBIO took its place, first and foremost, among the research projects that Europe planned to support in 2007.

The researcher's vision
Some project names portray this vision of the future, which is immediately noticeable, such as "Solar Impulse" or "Smart meeting room". When he wrote his proposal, Sébastien Marcel was looking for a simple but eloquent name. The acronym MOBIO, for "Mobile Biometry" is the one that stood out.

Writing the proposal
Approximately three quarters of Idiap's financing comes from the research projects themselves. Suffice it to say that the researchers, in particular the senior researchers, are constantly on the lookout for invitations to tender, in particular those launched regularly by the European Union. In order to respond, they have to write a proposal. This contains a summary of the project, the objectives, the composition of the team, the role of each person, the budget, the schedule and even deliverables, i.e. elements that the researchers undertake to produce regularly.

Administrative management

For writing his proposal, Sébastien Marcel was able to rely on the skills of the program managers (see profile pages 23-25), François Foglia and Valérie Devanthéry. The latter drew up a budget simulation, which they distributed among the different partners, while integrating all the administrative tasks and costs inherent in such a project, and this over a period of three years.

▼

The selection criteria

The proposal, which may be as long as a hundred pages, is sent to the European Union. The board, which is composed of experts, takes 3 to 4 months to decide. The projects are assessed according to several criteria: scientific quality, economic impact, management, etc.

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Negotiation and signing the grant agreement

If the project is approved, all the terms still have to be validated. This is the negotiation phase, aimed at drawing up the grant agreement between the institution that has been awarded the project and the European Union. This agreement contains the budget, objectives, schedule, as well as the consortium agreement, in which all the partners commit themselves contractually. MOBIO involves around ten academic partners and one industrial partner. The agreement between the EU and MOBIO was signed in September 2007, and the project began formally on 1st January 2008.

Annual report

The MOBIO project is scheduled over three years. At the end of each year, an annual report is sent to the grant organisation to provide an update on achievement of the objectives. After the first year, MOBIO is showing satisfactory results. Sébastien Marcel is enthusiastic, "One of the biggest tasks consists of collecting audiovisual recordings from mobile phones. This operation is taking place simultaneously in Switzerland, England, Finland, Czech Republic and France. After one year, 40% of the database is already completed, and we have begun the phase in which we use the data."

Note: Depending on the financing agency, nature and size of the project, the details of the different stages may vary slightly.

N E T W O R K

IDIAP AND EPFL SIGN A JOINT DEVELOPMENT PLAN

For Idiap, which is ideally positioned in strategic research areas for Switzerland, 2008 was a year rich in significant events: the conclusion of a scientific partnership with the EPFL (Ecole polytechnique fédérale de Lausanne) and four times the support granted by the State Secretariat for Education and Research (SER). Here we take a closer look at these developments.

The news came in February 2008. Through Federal Councillor Pascal Couchepin, the Federal Department of Home Affairs (DFI) announced that it was quadrupling its support to Idiap for the next four years. "In our budget," explains Jean-Albert Ferrez, deputy director of the institute, "75% of our resources come from our projects, and only 25% from institutional support. This is evidently proof of our dynamism and competitiveness, but also a source of uncertainty. Thanks to this subsidy granted by Berne, we will be able to establish a solid financial basis again."

Better integrated into the Swiss academic scene
The pertinence and uniqueness of the research, scientific excellence, and the structural means to enable fixed objectives to be pursued are some of the qualities for which Idiap has

been granted this new subsidy of 6.5 million for 2008-2011. This support was accompanied by two major conditions – granting by the Canton of Valais and the Municipality of Martigny of at least an equivalent amount for the same period, and consolidation of the partnership between Idiap and EPFL.

Whereas the first condition was quickly accepted, the second required more preparation. "We have worked closely with the management of EPFL and the dean of its sciences and engineering faculty to finalize the details of this partnership," explains Hervé Bourlard, the institute's director. "Our institutions are different sizes and have different functions, but we finally agreed on a development plan, which was signed in July 2008." This plan sets out, for the 2008-2011 period, the objectives of the scientific partnership, as well as Idiap's objec-

tives in the area of services subsidised by the Confederation. "This agreement will help us to better integrate into the Swiss academic scene, and improve the financing of senior researchers, as well as recruitment promotion." The plan in question aims to further improve the integration and supervision of Idiap PhD students, increase the academic visibility of the researchers and step up exchanges between scientists from the two institutions.

Academic titles for the senior researchers

Therefore, the seventy Idiap researchers and PhD students will have their academic situation clarified. The PhD students will now have a permanent laboratory at EPFL. As for the researchers, they will be able to aspire to a real academic career path, with the prospect of teaching courses at EPFL and supervising PhD theses. "On 31 December 2008, four of our researchers successfully completed their assessment procedure, and are now qualified to supervise PhD theses. They will be the first to benefit from the new academic status of external senior lecturers (MER), which is in the process of being created," says Hervé Bourlard.

Another important innovation is the call for application for tenure track assistant professor (PATT) positions. Chosen and appointed by EPFL, these professors will carry out their teaching activities at EPFL and their research activities, with their teams, at Idiap, which will provide them with infrastructure and supervision. The cost of these positions will be shared between the two institutions.

New status, new organization chart

In 2008, as part of the development plan signed with EPFL, Idiap started to revise its organization chart, which should be completed in 2009. The scientific and administrative structures will be fleshed out, the management will include new scientific members, some of the senior researchers will benefit from EPFL academic recognition and the director will be supported by an assistant.

"WE HAVE MORE POINTS IN COMMON THAN DIFFERENCES"

Vice-President of EPFL and institutional business manager, Professor Martin Vetterli has also been Vice-President of the Foundation Council of Idiap since 2008. This appointment took place as part of the joint development plan signed by the two institutions.

Why this partnership with Idiap?
It's a logical next step. EPFL is one of the founding members of the institute; the majority of Idiap's PhD students take courses at EPFL; several Martigny researchers teach in Lausanne, etc. This joint development plan will only strengthen the bridges that have existed for a long time between the two institutions.

More formally, with the new demands of the State Secretariat for Education and Research (SER), EPFL is the guarantor of the quality of Idiap's work, a kind of academic guarantee.

What do Idiap and EPFL have in common?
Fundamentally, research subjects. Our preferred areas are similar to those of Idiap. On the other hand, EPFL is a research university where we focus both on education and research, while Idiap's priority is research. In reality the academic world and that of research complement each other. Idiap and EPFL are two similar environments and work on similar subjects, with joint projects, mutual interests and the same requirements with regard to funds, etc.

What are the advantages for EPFL in hiring teachers who are also Idiap researchers?
We are always looking for talented people. There are talented people at Idiap, and they are interested in teaching. Therefore, it would be as well to allow these researchers to come and teach courses, supervise PhD students, form part of mixed research teams, etc. The research environment relies heavily on networks. Having a larger joint work force is an advantage. Researchers and PhD students can expand their own network and have the opportunity to interact on the two sites.

What is your opinion of Idiap's progress over the last ten years?
It's very interesting to assess the distance travelled. This great progress is very much the result of the personality and hard work of its director, Hervé Bourlard. It must also be said that there is a strong commitment from the Town and the Canton to ensure that this investment bears fruit, and the results of this are evident.

What position does Switzerland occupy on the international stage in the research areas of Idiap and EPFL?
Switzerland is very well placed in the research environment in Europe and is very successful. The political will to support research at the highest level is very strong, the engineering schools are of a very good quality, and for this reason we attract researchers from around the world. All this gives us substantial power and a very high level of energy. Furthermore, Switzerland is always very well positioned in invitations to tender for European projects, even the most competitive ones, such as the European Research Council (ERC). Buoyed by its reputation, Switzerland is a sought-after partner, and this is excellent!

Does this mean that recruitment is guaranteed?
Along with Idiap, we are currently in a recruitment phase. The idea is to select researchers very early on in their career, to give them both academic independence and the means to form their own research team, and to find their niche. This concept of tenure track assistant professors (PATT) is the standard method of American academic recruitment. It is a good example of Switzerland's commitment to scientific recruitment.

What are EPFL's new projects?
I will give just a few examples, which are not exhaustive. We have just created a new centre for neuroprostheses, with five sponsored chairs. At the crossroads of fundamental research, clinical applications and industrial prospects, this centre works on the application of what we understand of the brain's mechanisms (perception, motor control, etc.) to create prosthetics. A project with great vision is the Blue Brain project, which simulates how the brain works. This leads to "High performance computing" efforts, therefore digital simulation, in partnership with the Lake Geneva area. Another large project is the offshore campus in Ras Al Khaimah, in the United Arab Emirates. It's very different to anything that we've done up until now. It offers interesting potential for development in a region where the possibilities are unlimited, and where technology can play an important role with regard to energies, the environment, town planning and transport. In Switzerland, our level of development and constraints makes this type of project impossible.

"ECONOMIC DEVELOPMENT THROUGH INNOVATION: A REALITY"

Four years after its creation, the IdeArk technology transfer platform is becoming increasingly successful. It has eight start-ups and one SME under its wing. Since 1st May 2008, IdeArk has had a new director, Stéphane Rey, and has developed into a true technological site. Progress and prospects.

Since 2004, Idiap has accommodated IdeArk within its walls, the technological site and technology transfer platform of The Ark programme (see box). In May 2008, IdeArk changed director and Stéphane Rey took over from Frank Crittin, who left to take up other professional challenges at a private bank in Geneva. After around twelve years spent in the world of industry, Stéphane Rey, from Lens in Valais, has found his ideal job at IdeArk. "I was looking for a position in Valais for three years. With my profile, one interesting position comes up per year… unless I start my own company!"

At 39 years of age and after having worked for General Motors in Zurich, then IBM Microelectronics and lastly the telephony operator Orange in Lausanne, Stéphane Rey wanted to find a job in the canton in which he would be able to use his experience acquired in international trade relations, industrial market studies and technology transfer. "This position interested me in particular, both due to its technical aspects – I spent a year at EPFL during my degree course – and its international outlook."

What does your role involve exactly?
Stéphane Rey: The role of IdeArk is to help Idiap interact with SMEs and start-ups. Therefore, my main task is to promote Idiap's technologies. Since my office is on the institute's premises, next to that of the industrial relations manager, Yann Rodriguez, we work together on development, specifically, of technology transfer between Idiap and the world of industry. The ideal process is to choose a technology developed by the institute, determine its potential for industrial application, perfect a prototype, and then find people interested in launching a start-up to implement the project. The process can also be carried out with a company looking for innovations. In this context, I am for example part of the European project MOBIO (see article on pages 12-13), in which I coordinate a community of interests. This tendency to involve industrial partners in research projects from the outset is becoming increasingly common. It keeps us rooted firmly in reality and ready for future openings. Now, due to this, we accommodate no less than eight start-ups and one SME on the IdeArk site.

What does IdeArk offer start-ups?

S.R: IdeArk, through The Ark Incubator, a joint structure of the six The Ark sites, primarily offers start-ups an equipped area in which to work. Having access to premises and a work infrastructure, free of charge and quickly, not only saves them from financial concerns but also enables them to dedicate themselves to their activity straightaway. Next, until the incubation period is complete and the start-ups become SMEs, we offer them 25 m^2 of premises with Internet access, advice, coaching, and we support them throughout their gestation through various services such as feasibility analyses or even help with obtaining permits to market their products.

What is your impression
after these first few months as director of IdeArk?

S.R.: A very positive impression. On my arrival, all the right signals were there. It is relatively rare to be supported by the authorities, which clearly know what direction they want to go in, and which provide the resources. This is however the case with The Ark, and this despite the crisis. The authorities understood that this was a way of creating companies and that it was necessary to capitalise on this.

The other encouraging element is the openness of people at Idiap. I come from the world of industry, where everyone is protective of his discoveries and power, and have found here a world where researchers cultivate an exchange of ideas and willingly share things in a spirit of cooperation. Their inspiration has nothing to do with the financial interests that motivate the world of industry. They are motivated by publication in specialised journals, the recognition of their peers and the enlargement of their network. The team of developers, which works in open source, also works with this frame of mind. It's surprising at the beginning, but quickly becomes very pleasant!

How do you see the future?

S.R.: I think that the most difficult thing will be to keep up the rhythm adopted during the last few years. It's very difficult today to find the right people to launch a start-up. And this is an essential element of its success, even more so than the quality of the product. However, I think that the construction of the new IdeArk premises will play a triggering role. "IdeArk technological site", which will bring together research, start-ups and SMEs, will stimulate exchanges and attract an

increasing number of projects. At the moment, research – Idiap has around one hundred employees – is a little disproportionate in relation to the other two entities, but we hope that new companies will be launched on this site. With this site, IdeArk will embody an enveloping structure. It will not be an element of the trio, but simply the binder, the catalyst between the entities.

www.ideark.ch
www.theark.ch

IdeArk, one of the six technological sites of The Ark foundation

The Ark foundation was created in 2004 by the Department of Economic Affairs and Territorial Development of the Canton of Valais to promote, through innovation, the creation, incubation and growth of companies on cantonal territory.

The Ark is comprised of six technological sites, situated in the six main towns of Valais, and which work in three main fields: information and communication sciences (3 sites), life sciences (2 sites), and engineering sciences (1 site).

In Martigny, IdeArk pursues the project's objectives by bringing together research, SMEs and start-ups, and by facilitating the transfer of technologies from Idiap to projects or companies.

COMPANIES ON THE IDEARK SITE

WITH THEM, INNOVATION GAINS A FOOTHOLD IN REALITY

Since 2004, the start of the partnership between Idiap and the technology transfer platform IdeArk, several start-ups have been launched from new technologies developed at Idiap, and some have even become SMEs. The IdeArk technological site now accommodates eight start-ups and one SME. Presentation.

SME

Cinetis
Cinetis develops solutions for digitisation of silver film and video processing software developed in partnership with Idiap.

www.cinetis.ch

START-UPS

Cnoté Mobile Solutions
Founded in 2006, Cnoté Mobile Solutions works in the mobile marketing field. Cnoté develops personalised mobile technology services and products.

www.cnote.ch

Fontself
Fontself is developing a solution for personalising communication by creating character fonts from handwriting.

www.fontself.com

KeyLemon
KeyLemon develops and markets face recognition applications for secure and simple access to your computer.

www.keylemon.com

Klewel
Klewel offers recording and online publishing of conferences (video, audio, slides) using a sophisticated indexing system for facilitated searching.

www.klewel.com

Mixin
Mixin offers a tool with which it is possible to share your agenda with friends via the Internet, and therefore organise your leisure time with them more easily.

www.mixin.com

Moka Studio
Moka Studio specialises in special effects, animation of 3D characters and motion capture for cinema, television and advertising.

www.mokastudio.tv

Quantesys
Quantesys develops financial decision making tools based on artificial intelligence that systematically detect Critical Points in financial markets.

www.quantesys.com

Snowpulse
Snowpulse develops and markets new generation avalanche airbags integrated into backpacks, thus increasing chances of survival in the event of an avalanche.

www.snowpulse.com

F A C E S

VALÉRIE DEVANTHÉRY AND FRANÇOIS FOGLIA, PROGRAM MANAGERS

TWO FANTASTIC ADMINISTRATORS... THERE TO SUPPORT THE RESEARCHERS ON ALL FRONTS!

In 2001, Idiap integrated program managers into its team. They do a bit of everything, are curious, perfectionists, and take care of all the administration for research projects, from their submission to their coordination, so that the researchers can concentrate on the scientific aspects of their projects. On the top floor of Idiap, Valérie Devanthéry and François Foglia describe themselves as "patient, available and diplomatic". Interview with the program managers.

Name: François Foglia

Age: 42

Marital status: married, tree children

Town of residence: Martigny

Date started at Idiap: January 2006

Position: Program Manager

PhD thesis (chemistry): Simulation by molecular dynamics of the structural and kinetic aspects of the solvation of lanthanides and trivalent chromium in aqueous media

Particular traits: pragmatic and imperturbable

Career:
Until now François Foglia's career has unfolded in cycles, "nine years in the world of academia, then nine years in the private sector", most of this time as manager of an IT department. But he is an individual who is eager to discover new things. He has a PhD in chemistry and an MBA in company management. In 2003, he decided to track down a job that would finally allow him to make the link between the worlds of science and management. The first time he applied to Idiap he was not chosen at the last selection stage. But far from being discouraged, he called every three months! At the same time, he applied to the Alliance technology transfer programme at the EPFL (Ecole polytechnique fédérale de Lausanne). The day that he received a letter from EPFL Human Resources saying that they wanted to hire him, Idiap offered him a full time position as Program Manager.

Name : Valérie Devanthéry

Age: 28

Marital status: cohabiting

Town of residence: Saint-Maurice

Date started at Idiap: February 2008

Position: Assistant Program Manager

Diploma subject: Personalised software for planning and financial management for the International Relations Office of the School of Business and Engineering Vaud (HEIG-VD)

Particular traits: self-confidence and perseverance

Career:
Valérie Devanthéry has three qualifications: Swiss Federal Certificate of Capacity (CFC) as a pharmacy assistant, a commercial course with integrated professional matriculation, and a comem+ diploma from HEIG-VD in Yverdon. "COMmunication, Engineering, Management": from project management to programming to accounting or law, it all fascinated her. Newly qualified, she threw herself "into the world of work" at Glassey Energie SA, then worked for LGE SA, the company that publishes Winbiz Business Solutions software, where she enjoyed being the "free electron" who had a go at everything. Then one day she came across the "big advertisement" for Idiap. She knew the institute because she had visited it with her former boss, and English being one of her passions, she applied. François Foglia and Sandra Micheloud took her on, and she is over the moon!

Dr François Foglia

How would you define your role at Idiap?

François Foglia: We are at the heart of everything! More precisely, we are the link between research and administration.

Valérie Devanthéry: Yes, I would say that we are really available for the researchers. They concentrate on hardcore research and they can rely on us for everything with regard to administration.

What does this consist of exactly?

F.F.: When a scientist wants to respond to an invitation to tender and submit his research project, he has to write a scientific summary but also fill in many administrative forms. We complete this task for them. As points of contact between the project participants and the financing representatives, we take care of drawing up the budget, keep up to date with existing laws (data protection, etc.) and we fill in the forms issued by the financing institutions. We also do the follow-up administration for projects in progress. As we are up-to-date with all the rules set by these institutions, we save the researchers a lot of time. It's a very useful service that Idiap offers its researchers, but this isn't the case at all research institutions!

What qualities do you need to be this link between research and administration?

F.F.: Patience with a capital "P"!

V.D.: Yes, I was going to say the same thing. And also curiosity, because you always need to be up-to-date with the latest events in the administrative field, and it changes very quickly. Not forgetting availability with a capital "A" and also diplomacy for juggling with partners who don't return the forms in time and who you have to remind of the deadlines dozens of times.

How many projects do you have to manage at the moment?

F.F.: Around thirty in total. Idiap is now the leader of three projects – SSPNET, MOBIO and IM2 – and a partner in others.

What is the hardest thing about your job?

V.D.: Not losing sight of the overall picture. When we are coordinating the activities of a lot of partners, it is essential that organisation is rigorous and that nothing is left to chance.

F.F.: The hardest thing is versatility. This job requires us to be specialized in a number of areas. But we are not doctors in law, or lawyers or chartered accountants. However, we have to acquire some skills in all these fields. Once you put your mind to it… nothing is insurmountable!

How are you kept informed of the projects in progress at Idiap?

V.D.: Mainly by TAMs, Tuesday Afternoon Meetings. The staff of Idiap meets every Tuesday afternoon. At each meeting, one of the scientists presents his work. This keeps us informed of how projects are progressing. And we are also kept informed

via newsletters, which are published as part of the projects. There are those that we receive as partners, and those that we write as project coordinators.

Is all this very scientific?…

V.D.: I have always been interested in technological developments, but previously this world seemed very far away to me. Since working at Idiap, it has been a real pleasure for me to be involved in this.

F.F.: Like Obélix, I fell into this when I was little! *(Laughs)* I have scientific training, I have always worked for "laboratory" companies, or on pilot projects, it's my daily life. Advancing in a scientific circle, being creative, putting people in contact, this is what I enjoy the most.

In your opinion, when a researcher is awarded a project, what proportion of the success is down to you?

F.F.: 2%. We only follow the rules, whereas the scientists have to provide evidence of innovation and prove to their peers that they have a vision of the future.

V.D.: I would say that it depends! Because if you think about it, it's often us who press the "submit" button. If we don't do it, the researcher has no chance of being awarded the project! *(Laughs)*

F.F.: OK. 99.9%! Actually, you can see the glass half full or half empty. But one thing is sure: if we weren't here they would do it anyway. But our presence is a relief to them, that's obvious. It's a support structure, even if some prefer to do everything themselves from A to Z.

If you could only keep one of the tasks of your job, which would it be?

F.F.: The most enjoyable, is organising events. In 2008, we held several meetings and workshops. Getting a hundred people to come and seeing them delighted is the icing on the cake. My other favourite task is setting up tools and procedures for improving the efficiency of our department. We worked on this intensely in 2008, for the management of publications, annual reports, etc. In this type of task there is the idea of a challenge, a real difference between before and after.

Valérie Devanthéry

V.D.: I couldn't be restricted to a single task, I would soon go crazy. It is precisely the variety of this job that I like, the fact of having to do everything at the same time. One of my favourite tasks is preparing LaTeX templates (editor's note: document preparation language, mainly used in the scientific field). I also really enjoy helping to organise meetings as part of the research projects that we manage here.

Which achievement are you most proud of in 2008?

F.F.: Having set up a quality department and procedures that improve our efficiency. These seem to benefit the whole institute and that's the most important thing!

"THIS JOB INTERVIEW THAT NEVER HAPPENED CHANGED MY DESTINY"

Between his baccalauréat in science and information technology and his PhD in artificial neural networks applied to image processing, Sébastien Marcel had eight eventful years during which he almost became a computer scientist, before being infected with the research virus. Today he is one of the top researchers at Idiap. Flashback.

"In France, when you are unsure of what to do, you are advised to do a science baccalauréat. In theory, that opens more doors", he says with a little irony. Sébastien Marcel, who is French, and a senior researcher at Idiap, is one of these people who only believe what they see. A scientist at heart who almost made do with becoming a computer scientist until destiny took over. "I was fascinated by information technology, I really wanted to make a career of it. But then everything fell into place after my baccalauréat, during an end of studies work placement." While most of his friends went to banks or insurance companies for these few months of practical experience, he chose a biology laboratory. Here he discovered the world of research. It was 1993.

A taste for research and challenge
"I wanted to find out what it was like to work in a laboratory… I wasn't disappointed!" says the 35-year old from Périgourd, who is now one of the senior researchers at Idiap. "I was put in charge of designing cartography software that could inventorize plant species." The researchers were making an inventory in Morocco, and needed tools to record the data

collected (topography, climatic conditions, etc.), and then to process them. The challenge filled Sébastien Marcel with enthusiasm. "Everything had to be done from scratch, creating the map of Morocco, the database, the tools, etc. It was fascinating! There were books everywhere, research students working day and night, there was a real air of excitement about research, about trying to resolve problems."

Priority objective: artificial neural networks
So, infected with the research virus, Sébastien Marcel went to university to do a degree in IT, a subject that involves a considerable research component, and then decided to opt for a PhD. At the time it was obligatory to do a DEA (post-graduate diploma) between the two, for which he chose an artificial intelligence course, because he was "fascinated by artificial neural networks". The only thing was that to get PhD funding, he had to come first or second in his year. Although he got his DEA, Sébastien Marcel did not make it onto the podium. No funding, no PhD.

"My parents said to me that from then on I had to take responsibility for myself. I understood. I had already been studying for quite a few years!" The young graduate then took advantage of his military service to give himself some time to think. And as if he wanted to trust in destiny, he launched himself at once into "plan A: apply to do a PhD thesis in a research laboratory", and "plan B: find a job at engineer level".

The job interview that never happened and changed the course of his life
"One day, I got a job interview at a very large IT services company in Paris. Unfortunately, when I arrived I was told that my interviewer had gone away for the weekend!" The secretary was confused. Sébastien left, and was asked to have the interview by telephone a few days later. "I refused. And this decision fundamentally influenced the course of my life."

In August 1997, while he was completing his military service, France Telecom invited him to an interview at its research laboratory in Lannion, North Brittany. "I love telling this part," says Sébastien Marcel, his eyes sparkling. "I was asked to go to Paris, to Issy-les-Moulineaux. I told myself that the interview would certainly take place there, since France Telecom also has a research centre there. Not at all. A shuttle bus took me

to Villacoublay military airport. And there I couldn't believe my eyes... A France Telecom plane was waiting for me! OK, so there were twenty or thirty of us on board, but even so!" The plane goes back and forth from Paris to Lannion every day.

However, on arrival, the laboratory visit left him a little sceptical. It concerned voice recognition, an area that did not interest him that much. They wanted to hire him but he asked for time to think it through. "A few weeks later, while I was on holiday, I received another letter from France Telecom, containing another invitation to visit another laboratory in Lannion!" Rebelote. Issy-les-Moulineaux, shuttle bus, military base, almost private plane. "The second time it wasn't as exciting!" *(Laughs)*. On the other hand, he loved the laboratory visit. "It was exactly what I wanted to do: artificial neural networks applied to image processing." He accepted the position and began his PhD in early October.

Three years of PhD in Lannion, Brittany
"I spent three fantastic years in Lannion. A motivating group leader, many highly qualified scientists: a perfect environment." He dedicated his PhD to gesture recognition, and took great pleasure in it. Nor have his fond memories faded over the years, "The idea was to enable a machine, using a camera, to recognise the gestures of a person in order to interact with him. It was therefore necessary to teach it to locate the face of the person, and then his hands. Next, it was a matter of recognising when the movement starts, when it finishes, how to classify it, label it, etc. And how does one do all that? At the time, no one knew. And that is what is fascinating about our job: finding the best way possible to solve a problem, making a minimum of errors, and as quickly as possible. This research took me three years."

"A friendly little institute, in Switzerland..."
In 2000, once his thesis was written, Sébastien Marcel started looking for a PhD examining board to reread his work, and to assess it during his viva voce. "I had studied a quite complicated algorithm, that few people in the world know well. I contacted one of its two creators, in Canada, and he put me in touch with his brother, Samy Bengio, who was working in the same field, but in Europe," (See annual report 2007, page 11). The latter granted his request. Sébastien Marcel obtained his PhD, and the Canadian then told him about a small research

institute, in Switzerland, which could be just right for him, a friendly place called Idiap…

Sébastien Marcel arrived in Martigny in 2000, and has never left. A little while ago he even moved, with his wife and children, into a little house only a short distance from the research institute. In 2007, he was awarded his first European project, MOBIO. (See pages 12-13)

"I AM FASCINATED
BY THE HUMAN BEING"

At 28 years old, Sarah Favre is one of the 29 PhD students at Idiap. After having completed her master's degree in electrical engineering at the EPFL (Ecole polytechnique fédérale de Lausanne), Sarah, who is from Haute-Nendaz in Valais, specialized in the field of social signals. Interview with a woman who is still fascinated by man-machine relationships.

Why did you choose to do technical training?
As my father trained as a physicist and my mother worked at EPFL, I naturally opted for a science degree followed by an electrical engineering course at EPFL! I was perhaps more suited to communication studies, but I have always succeeded in finding a human element in my technical studies.

How did you come to work at Idiap?
After my master's degree, I worked for a year and a half at Myotest SA, in Valais, on developing a device for measuring sports performance based on accelerometry. When Myotest reached its marketing phase, I decided to continue my training. Since I had really enjoyed the courses in signal and speech processing at EPFL, Professor Hervé Bourlard, Director of Idiap, asked me to do my PhD at the institute. I have been here for three years.

What is your PhD thesis on?
I am working on the study of human interactions in multimedia, and in particular in audio. The objective is to automatically extract information by applying algorithms. I have worked in particular on "Forum" programmes and news flashes on French-speaking Swiss radio (RSR). By analysing how many times people interject, at what moment, whom they address and in what way, we succeed in segmenting the recording and detecting the role of each person. Up until now, we were interested in the significance of words for recognition; here the idea is to concentrate solely on interactions between people. This will allow us, for example, to be able to automatically index multimedia content.

What is the main difficulty?
Locating semantic roles. Contrary to the functional role, predetermined by the person's function, the semantic role changes depending on the context (guest, observer, etc.), which makes it difficult to locate automatically. The other difficulty is the lack of databases, particularly of spontaneous discussions. To date there is no database containing natural interactions between people, mainly for ethical reasons.

What do you like most about working here?
The relationship that I have with my thesis supervisor, Dr Alessandro Vinciarelli, who is always available for me. At EPFL, I could only meet with my master's supervisor three times a year. Here, as my work is part of a research programme, we have updates once, or even several times a week, and I can go to his office at any time. It's an invaluable advantage.

**Few women advance in the world of science.
How do you deal with this?**
I don't really pay it much attention. I believe that men and women bring different things, and that this complementarity is interesting and useful. On the other hand, in general, I think it's a shame that young girls give up on science subjects on the pretext that they are "not as good at maths as boys". As for me, although maths isn't my strong point, I've found my place in this world. The ability to get on well and be at ease with people, which are two of my strong points, are also important for creating a network and defending your projects.

How do you see your future after your PhD?
In the field of interaction between man and machine, or in that of human communication. That will depend on what I am offered. Ideally, I would like to continue to learn while keeping this human dimension at the heart of my work.

EMPLOYEES LEAVING AND JOINING

In 2008 the Idiap science team took on twenty-four new talented researchers, while twenty-one left to meet new challenges elsewhere in the world.

First name, last name, position, country of origin, residence

Afsaneh Asaei, Research Assistant, Iran
Constantin-Cosmin Atanasoaei, Research Assistant, Romania
Ghita Berrada, Research Assistant, Morocco
Joan Isaac Biel, Research Assistant, Spain
Valérie Devanthéry, Ass. Program Manager , Switzerland, St-Maurice
Alfred Dielmann, Postdoc, Italy
Stefan Duffner, Postdoc, Germany
Giulia Garau, Postdoc, Italy
Niklas Johansson, Research Assistant, Sweden
Danil Korchagin, Postdoc, Russia
Eileen Lew Yi Lee, Research Assistant, Malaysia
Hui Liang, Research Assistant, China

Christopher McCool, Postdoc, Australia
Florent Monay, Development Engineer, Switzerland, Monthey
Alexandre Nanchen, Dev. Engineer, Switzerland, Martigny
Hugo Augusto Penedones Fernandes, Research Ass., Portugal
Elisa Ricci, Postdoc, Italy
Edgar Francisco Roman Rangel, Research Assistant, Mexico
Lakshmi Saheer, Research Assistant, India
Nicolae Suditu, Research Assistant, Romania
Flavio Tarsetti, Development Engineer, Switzerland, Martigny
Tatiana Tommasi, Research Assistant, Italy
Jagannadan Varadarajan, Research Assistant, India
Majid Yazdani, Research Assistant, Iran

THEY LEFT IN 2008

First name, last name, position, country of origin, year of arrival at Idiap, new employer

Guillermo Aradilla Zapata, Research Assistant, Spain, 2004, Harman Becker Automotive Systems, Germany
Ghita Berrada, Research Assistant, Morocco, 2008
Nicolas Bourdaud, Research Assistant, France, 2006, EPFL, Lausanne*
Ricardo Chavarriaga, Postdoc, Columbia, 2006, EPFL, Lausanne*
Frank Crittin, Industrial Relations, Switzerland, 2004, Lombard Odier Darier Hentsch & Cie, Geneva
Ferran Galan Moles, Research Assistant, Spain, 2006, Bernstein Center for Computational Neuroscience, Germany
Gangadhar Garipelli, Research Assistant, India, 2006, EPFL, Lausanne*
David Grangier, Research Assistant, France, 2003, NEC Laboratories America, United States
Hynek Hermansky, Senior Researcher, United States, 2002, Johns Hopkins University, United States
Alejandro Jaimes, Scientific Manager, Columbia, 2007, Telefonica R&D, Spain
Hamed Ketabdar, Research Assistant, Iran, 2004, Deutsche Telekom Laboratories, Germany
Kenichi Kumatani, Research Assistant, Japan, 2007, AISIN AW CO. LTD, Japan
Eileen Lew Yi Lee, Research Assistant, China, 2008, EPFL, Lausanne*
Weifeng Li, Postdoc, China, 2006, EPFL, Lausanne
Bertrand Mesot, Research Assistant, Switzerland, 2004
José del R. Millàn, Senior Researcher, Spain, 2002, EPFL, Lausanne*
Xavier Naturel, Postdoc, France, 2007, Orange Labs, France
Jean-François Paiement, Research Assistant, Canada, 2004, Yahoo!, Canada
Nancy-Lara Robyr, Program Manager, Switzerland, 2003
Tamara Tosic, Research Assistant, Serbia, 2007, EPFL, Lausanne
Jian Yao, Postdoc, China, 2006

*cf. page 9, Centre for neuroprostheses

HONOURS

Each year, Idiap awards two awards to its PhD students. The first rewards research and the second a publication. In order to award the Idiap PhD student Paper Award, the candidate is assessed by an in-house committee on the basis of five criteria: his publications, participation in the team, involvement in the project, communication skills and autonomy. For the PhD student Research Award, an initial selection is made by senior members of the institute from amongst the works mainly written by an Idiap PhD student. Members of the International strategic committee then grade the chosen publications, separately and anonymously.

In 2008, the PhD student Paper Award was awarded to **Deepu Vijayasenan** and the PhD student Research Award to **Tatiana Tommasi**.

Deepu Vijayasenan
recipient of
2008 Idiap PhD student Research Award

Tatiana Tommasi
recipient of
2008 Idiap PhD student Paper Award

**"Discriminative cue integration
for medical image annotation"**
Pattern Recognition Letters, 29 (15), 1996-2002
T. Tommasi, F. Orabona, B. Caputo
http://publications.idiap.ch/index.php/publications/show/1505

COMPLETED THESES

Almost half of the scientists who work at Idiap are PhD students. They generally spend four years here and complete their stay by writing a thesis. This year, fourteen new students joined the institute and twelve left. Five of them completed their thesis under the joint supervision of researchers from Idiap and EPFL (Ecole polytechnique fédérale de Lausanne).

● **Switching Linear Dynamical Systems for Noise Robust Speech Recognition of Isolated Digits**
Bertrand Mesot, 2 May 2008
Thesis director: Prof. Hervé Bourlard
Members of the Thesis Committee: Auke Ljspeert, Dr David Barber, Prof. Martin Hasler, Dr Ali Taylan Cemgil

● **Machine Learning for Information Retrieval**
David Grangier, 13 June 2008
Thesis directors: Prof. Hervé Bourlard and Dr Samy Bengio (co-director)
Members of the Thesis Committee: Prof. Juan Mosig, Dr Jean-Cédric Chappelier, Dr Yves Grandvalet, Prof. Tim Hofmann

● **Probabilistic Models for Music**
Jean-François Paiement, 28 July 2008
Thesis directors: Prof. Hervé Bourlard and Dr Samy Bengio (co-director)
Members of the Thesis Committee: Prof. Juan Mosig, Prof. Jean-Philippe Thiran, Prof. José Manuel Inesta Querada, Prof. Jan Larsen

● **Acoustic Models for Posterior Features in Speech Recognition**
Guillermo Aradilla Zapata, 19 September 2008
Thesis director: Prof. Hervé Bourlard
Members of the Thesis Committee: Prof. Juan Mosig, Prof. Climent Nadeu, Prof. Steve Renals, Prof. Michael Unser

● **Enhancing Posterior Based Speech Recognition Systems**
Hamed Ketabdar, 14 November 2008
Thesis director: Prof. Hervé Bourlard
Members of the Thesis Committee: Prof. Philippe Renaud, Prof. Bill Byrne, Prof. Richard Rose, Prof. Jean-Philippe Thiran
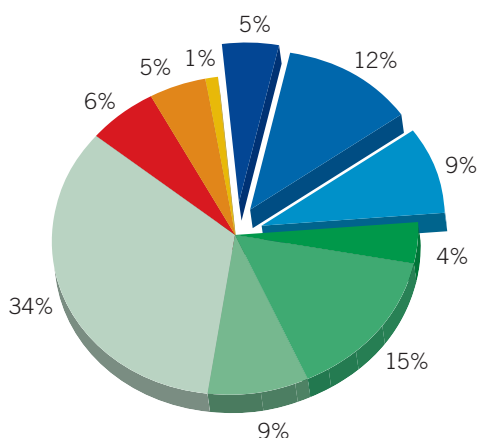
OPERATING ACCOUNT

(Swiss Francs)	2007	2008	%
INCOME			
Town of Martigny	527,500	520,000	5.29%
Canton of Valais	800,000	1,200,000	12.21%
Swiss Confederation	688,000	900,000	9.16%
TOTAL SUBSIDIES	**2,015,500**	**2,620,000**	**26.67%**
Loterie romande	0	150,000	1.53%
EPFL allowances	112,000	103,667	1.06%
Miscellaneous	70,000	115,000	1.17%
TOTAL DONATIONS - ALLOWANCES	**182,000**	**368,667**	**3.75%**
NCCR IM2 projects	1,628,298	1,477,423	15.04%
Swiss National Science Foundation projects	359,067	844,879	8.60%
European projects	2,041,256	3,415,514	34.76%
USA projects	708,477	567,544	5.78%
CTI projects, The Ark and manufacturers	643,162	467,511	4.76%
TOTAL PROJECTS	**5,380,261**	**6,772,871**	**68.94%**
Other income	264,318	63,168	0.64%
TOTAL INCOME	**7,842,078**	**9,824,706**	**100.00%**
EXPENSES			
Personnel expenses	6,049,799	6,772,575	68.93%
Training and travel	448,011	532,598	5.42%
Third party expenses	535,164	376,882	3.84%
Office equipment and supplies	37,693	15,388	0.16%
Computer equipment and maintenance	42,239	279,142	2.84%
Administrative costs	92,620	80,754	0.82%
Consulting and honoraria	53,448	36,875	0.38%
Promotion and communication	63,604	112,552	1.15%
Rent	512,436	710,602	7.23%
Moving expenses	50,409	-	0.00%
Depreciation	108,120	119,794	1.22%
Other provisions	40,000	551,000	5.61%
TOTAL EXPENSES	**8,033,544**	**9,588,162**	**97.60%**
OPERATING PROFIT / LOSS	**-191,466**	**236,544**	**2.40%**

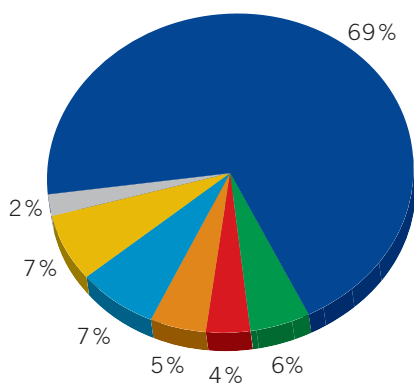## Distribution of sources of financing

- Town of Martigny
- Canton of Valais
- Swiss Confederation
- Donations - Allowances
- NCCR IM2 projects
- Swiss national science foundation projects
- European projects
- USA projects
- CTI projects, The Ark and manufacturers
- Other income

Distribution of costs

- Personnel expenses
- Training and travel
- Third party expenses
- Administrative costs
- Rent
- Amortizations and provisions
- Operating profit

Comments on the 2008 accounts

Idiap closed the year 2008 with a very favourable bottom line. Income totalled almost 10 million Swiss francs, an increase of nearly 2 million or 25%. The operating income will erase the loss for 2007. The ratio between the different sources of financing remains stable, with the authorities (Confederation, Canton, Municipality) providing a little over a quarter, while projects and contracts cover almost 70% of the budget. A contribution from the Lottery of French-speaking Switzerland for a project that will end in 2009 should be noted. The payroll represents more than two thirds of costs.

The balance sheet reflects the solid situation of the institute, marked on one hand by considerable liquidity arising from the method of prefinancing European projects, on the other hand by a reserve for fluctuation in contracts, which, although always less than the structural objective, enables us to deal with the sudden halt that can occur in some projects, as was the case three times in 2008.

Swiss Confederation, Canton, Municipality subsidies

(In thousands of Swiss francs)

YEAR	2008	2009	2010	2011	Total
Confederation	900	1,510	1,795	2,357	**6,562**
Canton	1,200	1,000	900	900	**4,000**
Municipality	550	600	600	650	**2,400**

Following the agreement signed with the SER (cf. page 15), which provides for a gradual increase in the federal subsidy, the Canton of Valais and the Municipality of Martigny have agreed to provide together an almost equivalent amount, in accordance with the distribution given in the table above.
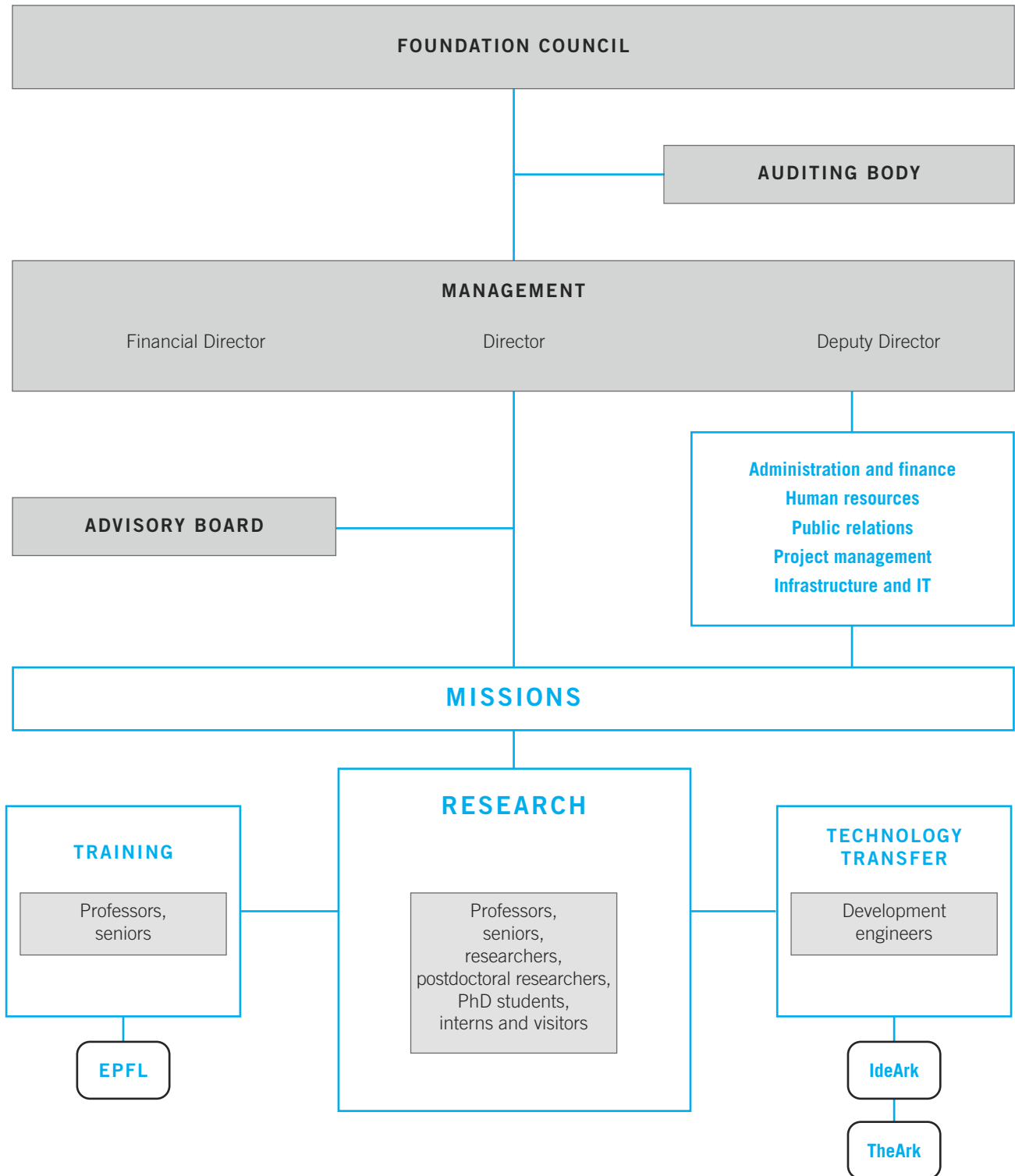
BALANCE SHEET

(Swiss Francs)	31.12.2007	31.12.2008
ASSETS		
Cash	1,636,232.06	3,951,731.76
Accounts receivable	9,077.64	178,849.76
Accrued income and other	1,465,545.11	360,645.34
TOTAL CURRENT ASSETS	**3,110,854.81**	**4,491,226.86**
Equipment	314,585.60	328,375.00
Financial assets	50,001.00	50,000.00
TOTAL NON-CURRENT ASSETS	**364,586.60**	**378,375.00**
TOTAL ASSETS	**3,475,441.41**	**4,869,601.86**
LIABILITIES		
Accounts payable	398,856.43	297,460.01
Accrued expense	2,197,863.73	2,905,876.51
Provisions	830,000.00	1,381,000.00
TOTAL FOREIGN FUNDS	**3,426,720.16**	**4,584,336.52**
Share capital	40,000.00	40,000.00
Retained earnings	200,187.19	8,721.25
Net income	-191,465.94	236,544.09
TOTAL OWN FUNDS	**48,721.25**	**285,265.34**
TOTAL LIABILITIES	**3,475,441.41**	**4,869,601.86**

ORGANIZATION

ORGANIZATION CHART

FOUNDATION COUNCIL

AUDITING BODY

MANAGEMENT

Financial Director Director Deputy Director

ADVISORY BOARD

Administration and finance
Human resources
Public relations
Project management
Infrastructure and IT

MISSIONS

RESEARCH

TRAINING

Professors,
seniors

TECHNOLOGY TRANSFER

Development
engineers

Professors,
seniors,
researchers,
postdoctoral researchers,
PhD students,
interns and visitors

EPFL

IdeArk

TheArk

EMPLOYEES

Scientific staff

First name, last name, position, country of origin, residence, arrived

Afsaneh Asaei, Research Assistant, Iran, 2008

Constantin-Cosmin Atanasoaei, Research Assistant, Romania, 2008

Silèye Ba, Postdoc, Senegal, 2002

Venkatesh Bala Subburaman, Research Assistant, India, 2007

Joan Isaac Biel, Research Assistant, Spain, 2008

Hervé Bourlard, Director, Belgium, 1996

Barbara Caputo, Senior Research Scientist, Italy, 2005

Alfred Dielmann, Postdoc, Italy, 2008

John Dines, Senior Research Scientist, Australia, 2003

Stefan Duffner, Postdoc, Germany, 2008

Katayoun Farrahi, Research Assistant, Canada, 2007

Sarah Favre, Research Assistant, Switzerland, Nendaz, 2006

Pierre Ferrez, Postdoc, Switzerland, Verbier, 2004

François Fleuret, Senior Research Scientist, France, 2007

Mike Flynn, Senior Research Scientist, England, 2003

Sriram Ganapathy, Research Assistant, India, 2006

Giulia Garau, Postdoc, Italy, 2008

Sri Venkata Surya Sivaramakrish Garimella, Research Ass., India, 2007

Philip Garner, Senior Research Scientist, England, 2007

Daniel Gatica-Perez, Senior Research Scientist, Mexico, 2002

Guillaume Heusch, Research Assistant, Switzerland, St-Légier, 2005

Hayley Shi-Wen Hung, Postdoc, England, 2007

Dinesh Babu Jayagopi, Research Assistant, India, 2007

Niklas Johansson, Research Assistant, Sweden, 2008

Joseph Keshet,Postdoc, Israel, 2007

Danil Korchagin, Postdoc, Russia, 2008

Stéphanie Lefèvre, Research Assistant, France, 2007

Hui Liang, Research Assistant, China, 2008

Jie Luo, Research Assistant, China, 2007

Mathew Magimai Doss, Research Scientist, India, 2007

Sébastien Marcel, Senior Research Scientist, France, 2000

Christopher McCool, Postdoc, Australia, 2008

Petr Motlicek, Research Scientist, Czech Republic, 2005

Radu-Andrei Negoescu, Research Assistant, Romania, 2007

Jean-Marc Odobez, Senior Research Scientist, France / Switzerland, Clarens, 2001

Francesco Orabona, Postdoc, Italy, 2007

Sree Hari Krishnan Parthasarathi, Research Assistant, India, 2007

Hugo Augusto Penedones Fernandes, Research Ass., Portugal, 2008

Joel Praveen Pinto, Research Assistant, India, 2005

Andrei Popescu-Belis, Senior Research Scientist, France / Romania, 2007

Elisa Ricci, Postdoc, Italy, 2008

Edgar Francisco Roman Rangel, Research Assistant, Mexico, 2008

Anindya Roy, Research Assistant, India, 2007

Lakshmi Saheer, Research Assistant, India, 2008

Hugues Salamin, Research Assistant, Switzerland, Réchy, 2007

Nicolas Scaringella, Research Assistant, Italy, 2006

Nicolae Suditu, Research Assistant, Romania, 2008

Samuel Thomas, Research Assistant, India, 2007

Tatiana Tommasi, Research Assistant, Italy, 2008

Fabio Valente, Research Scientist, Italy, 2005

Jagannadan Varadarajan, Research Assistant, India, 2008

Deepu Vijayasenan, Research Assistant, India, 2006

Alessandro Vinciarelli, Senior Research Scientist, Italy, 1999

Majid Yazdani, Research Assistant, Iran, 2008

Development engineers

Philip Abbet, Dev. Engineer, Switzerland, Conthey, 2006

Olivier Bornet, Senior Dev. Engineer, Switzerland, Nendaz, 2004

Maël Guillemot, Dev. Engineer, France, 2002

Christine Marcel, Dev. Engineer, France, 2007

Johnny Mariéthoz, Dev. Engineer, Switzerland, Chemin-Dessus, 1998

Olivier Masson, Dev. Engineer, Switzerland, Geneva, 2002

Florent Monay, Dev. Engineer, Switzerland, Monthey, 2008

Alexandre Nanchen, Dev. Engineer, Switzerland, Martigny, 2008

Flavio Tarsetti, Dev. Engineer, Switzerland, Martigny, 2008

Administrative staff

Céline Aymon Fournier, Public Relations, Switzerland, Fully, 2004

Valérie Devanthéry, Ass. Program Manager , Switzerland, St-Maurice, 2008

Jean-Albert Ferrez, Deputy Director, Switzerland, Verbier, 2001

François Foglia, Program Manager, Switzerland, Martigny, 2006

Edward-Lee Gregg, Financial Assistant, United States, 2004

Sandra Micheloud, Financial Director, Switzerland, Monthey, 2007

Sylvie Millius, Secretary, Switzerland, Vétroz, 1996

Yann Rodriguez, Industrial Relations, Switzerland, Vollèges, 2006

Nadine Rousseau, Secretary, Belgium, 1998

System engineers

Tristan Carron, System Administrator, Switzerland, Fully, 2003

Bastien Crettol, System Administrator, Switzerland, Sion, 2005

Norbert Crettol, System Administrator, Switzerland, Martigny, 2002

Cédric Dufour, System Administrator, Switzerland, Verbier, 2007

Frank Formaz, System Manager, Switzerland, Fully, 1998

Vincent Spano, Webmaster, Switzerland, Martigny-Combe, 2004

First name, last name, origin, institution of origin

Idiap trainees generally spend between six and ten months at the research institute. Some are students at EPFL (Ecole polytechnique fédérale de Lausanne) and do this work placement as part of their degree work. Others come as part of student exchange programmes set up within European projects in which Idiap participates.

Muhammad Ullah, Pakistan, Royal Institute of Technology, Stockholm, Sweden
Anh Thu Nguyen, Vietnam, EPFL, Lausanne, Switzerland
Lucas Matena, Czech Republic, Masaryk University, Brno, Czech Republic
Loïse Perruchoud, Switzerland, University of Toronto, Canada
Bogdan Raducanu, Romania, Computer Vision Center, Barcelona, Spain
Simon Jacquier, Switzerland, EPFL, Lausanne, Switzerland
Tatiana Tommasi, Italy, University of Rome 'La Sapienza', Italy
Yeo Chuohao, Singapore, University of California, Berkeley, United States
Srihari Yarlagadda, India, Indian Institute of Technology, Guwahati, India
Andrzej Pronobis, Poland, Royal Institute of Technology, Sweden
Marianna Pronobis, Poland, Royal Institute of Technology, Sweden
Lucas Gomez, Switzerland, HEIG-VD, Yverdon, Switzerland
Quoc Anh Le, Vietnam, University of Namur (FUNDP), Belgium
Vincent Bozzo, Switzerland, EPFL, Lausanne, Switzerland
Jordi Sanchez Riera, Spain, Polytechnic University Catalonia, Spain
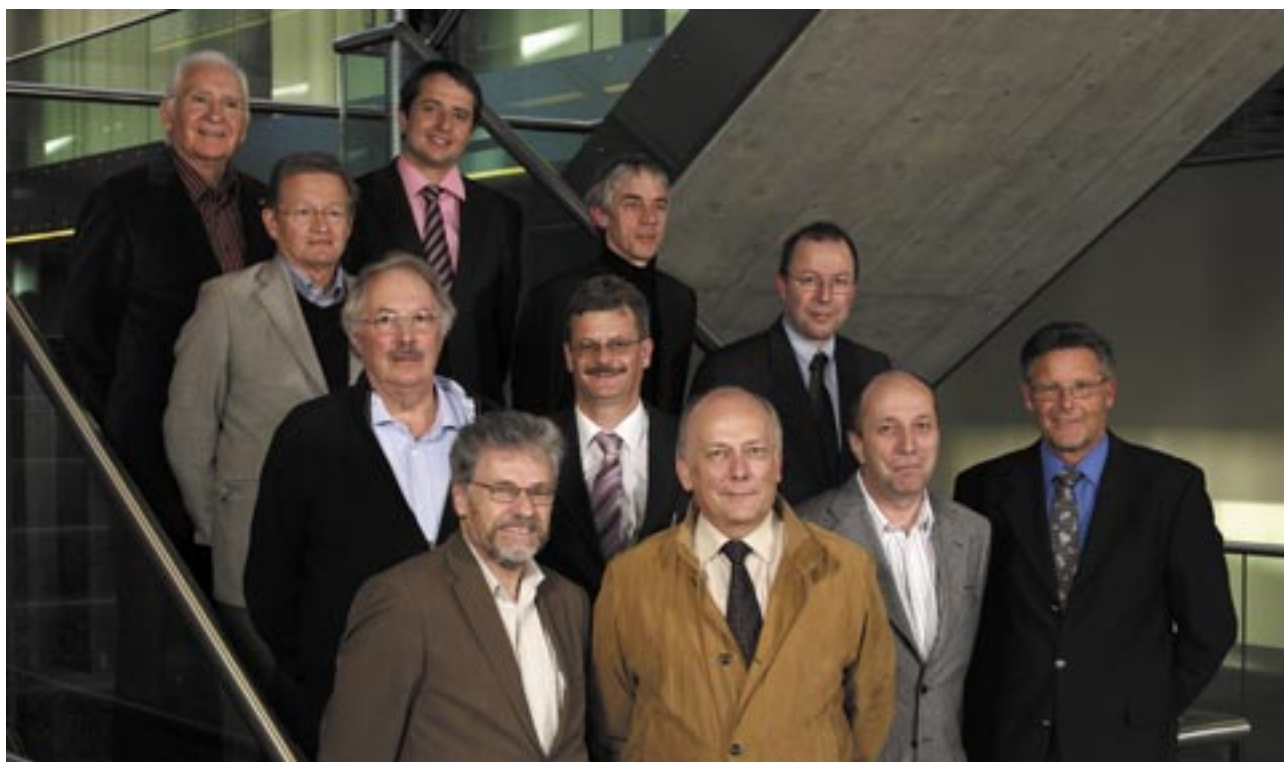
Visitors

First name, last name, origin, institution of origin

Visitors are researchers or manufacturers who only spend a few days or weeks at the institute, some to strengthen inter-institutional links and others to get an incite into the work carried out by the institute.
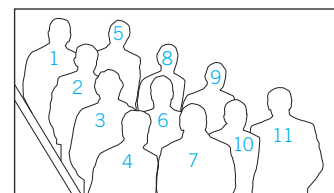
Yves Grandvalet, University of Technology of Compiègne (UTC), France
Prasanna Sompura R., Indian Institute of Technology (IIT), Guwahati, India
Javier Galbally, Universidad Autónoma de Madrid, Spain
Mannes Poel, University of Twente, Netherlands
Yang Liu, University of Texas, Dallas, United States
Don Geman, Johns Hopkins University, Baltimore, United States
Kazuhiro Otsuka, NTT, Japan
Nicoletta Noceti, University of Genoa, Italy
Jim Hieronymus, NASA Ames Research Center, California, United States

The Foundation Council is responsible for the economic and financial management of the research institute, defines its structures, appoints its director, and generally ensures that the foundation develops successfully by defending its interests. In 2008, as part of the strategic alliance with EPFL (see article pages 15-17), the Council appointed to the vice-presidency, in addition to Mr Jean-Daniel Antille, Mr Martin Vetterli, vice-president for International Relations at EPFL.

7 **Mr Olivier Dumas,** President
Mayor of the town of Martigny (until 31.12.2008)

11 **Mr Jean-Daniel Antille,** Vice-president
Manager of the regional office
for the economic development of French-speaking Valais

8 **Prof. Martin Vetterli,** Vice-president
Vice-president for international relations,
Ecole polytechnique fédérale de Lausanne (EPFL)

4 **Mr Jean-Pierre Rausis,** Secretary
Managing Director of BERSY Consulting

1 **Mr Josy Cusani**
President of CimArk SA

2 **Prof. Jean-Jacques Paltenghi**
Inter-institutional relations delegate,
Ecole polytechnique fédérale de Lausanne (EPFL)

3 **Mr Pierre Crittin**
Notary

5 **Dr Bertrand Ducrey**
Director of Debio Recherche pharmaceutique SA

6 **Mr Stefan Bumann**
Head of tertiary sector training,
Department of education, culture and sports (DECS)

9 **Mr Daniel Forchelet**
Swisscom Innovations

10 **Mr Jean-René Germanier**
National Councillor

Prof. Christian Pellegrini (not in the photo)
Director of the IT department,
University of Geneva

ADVISORY BOARD

The Advisory Board is comprised of members of the scientific community chosen by Idiap's management for their exceptional skills and avant-garde outlook. Although their role is strictly advisory, their support and advice is frequently sought and often proves to be invaluable when making decisions on matters of research, training and technology transfer.

Prof. Christopher Mr Bishop
Assistant Director
Microsoft Research, Cambridge, UK

Prof. James Flanagan
Board of Governors Professor Emeritus
Rutgers University, Piscataway, USA

Prof. Nelson Morgan
Director, International Computer Science Institute (ICSI)
Professor, University of California at Berkeley, USA

Dr David Nahamoo
Speech CTO & Strategist
Senior Manager, Human Language Technologies
IBM Research, New York, USA

Prof. Bayya Yegnanarayana
Professor and Microsoft Chair, International Institute of Information Technology (IIIT) Hyderabad, India

Prof. Steve Young
Head of Information Engineering Division
Engineering Department, Cambridge University, UK

Dr HongJiang Zhang
Managing Director
Advanced Technology Center, Microsoft Research
Beijing, China

Dr Jordan Cohen
Senior Scientist, SRI International
Menlo Park, CA, USA

TOWN OF MARTIGNY

CANTON OF VALAIS

SWISS CONFEDERATION
State Secretariat for Education and Research (SER)

www.loterie.ch

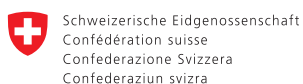**www.swisscom.com**

www.groupemutuel.ch

www.epfl.ch

www.theark.ch

www.ideark.ch

www.snf.ch

www.bbt.admin.ch/kti

cordis.europa.eu/fp7

SCIENTIFIC INSERTS

"Juicer":

A Realtime Large Vocabulary Speech Recognition System

In 2008, Idiap (in collaboration with the universities of Edinburgh, Sheffield and Brno) released their real-time capable speaker independent large vocabulary speech recognition system. It is based on a state of the art Weighted Finite State Transducer (WFST) grammar, allowing it to be easily reconfigured whilst retaining optimal pruning and search capabilities. The system features a data flow architecture allowing on-line feature acquisition from such modules as a microphone array, speaker identification and neural network based feature extraction. An output module allows resulting speech meta-data to be fed to the Hub for immediate use by other multi-modal applications. The system has been shown to be as accurate as reference systems in off-line use, and 1-2% more accurate when constrained to run in real-time. The system will be tested in the spring of 2009 in the context of an international evaluation run by NIST.

Speech Processing:

Information Fusion and Feature Extraction

In 2008, Idiap contributed significantly to the third year of the US DARPA GALE (Global Autonomous Language Exploitation) project founded by DARPA as part of the Nightingale team lead by SRI international (USA) with partners in ICSI (Berkeley, USA) and RWTH University (Aachen Germany). Idiap activities focus on advanced techniques for acoustic modeling and information fusion with application to multilingual speech recognition. In 2008, Idiap significantly contributed to the speech recognition system tested in the international evaluation campaign organized by NIST. Major research findings integrated into the ICSI/SRI and RWTH systems have been in the following area:

1. Information fusion: A new acoustic classifier combination based on Dempster-Shafer rule has been proposed and fully integrated into the ICSI/SRI large vocabulary speech recognition system used in the 2008 evaluation efforts. Dempster-Shafer rule aims at combining evidence from classifiers trained on different speech signal representations (streams). This approach has outperformed all previously proposed combination techniques.

2. Advanced acoustic modeling: Speech verbal information is largely contained in the dynamics of the signal (i.e. the modulation frequencies). Idiap proposed a novel approach that processes different ranges of modulation frequencies in hierarchical (sequential) fashion. Whenever the processing moves sequentially from fast to slow modulation frequencies, this technique achieves state-of-the-art results in terms of recognition rate and noise robustness. The hi-

erarchical modulation spectrum features have been trained on very large amount of data (1500 hours of speech i.e. approximately 600 million speech vectors) and integrated into the RWTH 2008 evaluation system.

Speaker Diarization

Speaker diarization refers to the problem of automatically detecting "who spoke when". Speaker diariziation thus involves determining the number of speakers in a given audio stream and clustering together segments belonging to the same speakers. While already at the origin of the current state-of-the-art (in collaboration with ICSI, Berkeley), in 2008, Idiap implemented a novel non-parametric speaker diarization system based on an information theoretic principle called "Information Bottleneck Method''. The developed system now achieves state-of-the-art results while running four times faster then real time. The current framework can easily be extended to include multiple features while keeping the computational requirements low.

Wide-Band Speech Compression

In the context a project with Qualcomm, Idiap has proposed and implemented a novel approach for wide-band generic (audio, speech) compression based on processing relatively long input segments in critical frequency sub-bands. Current version of the codec operating in the range of 32 - 66 kbps has shown to provide competitive performance (evaluated using subjective listening quality tests) with the state-of-the-art MPEG codecs operating at similar bit-rates. In particular, the proposed audio compression system exploits auto-regressive modeling applied in frequency domain to approximate sub-band instantaneous energies. Due to the processing of relatively long input segments, the technique is mainly intended to be exploited in non-interactive audio services. Since the frequency sub-bands are processed independently (i.e., sub-band correlations are not taken into account), the proposed technique ensures high robustness to channel drop-outs (packet loss).

Visual Focus of Attention

In 2008, and as part of its efforts towards automatic analysis and understanding of the human-to-human communication patterns, Idiap has pursued its research on the recognition of gaze (also called the Visual Focus of Attention - VFOA) in meetings from head pose information. On one hand, a novel framework has been developed to represent conversations in meetings, in order to model the interactions between the VFOA

of people, their speaking status, and the meeting context (slide presentation). Improvements of 15% in VFOA recognition has been achieved in this way when compared to recognizing the VFOA from head pose alone. On the other hand, Idiap has been working on the implementation of a simplified yet robust system for real-time VFOA identification VFOA for application in larger system, by optimizing its head pose estimation algorithm. In collaboration with Twente University, this module has been successfully integrated within an application that favors the engagement of participants with a distant access to a meeting, by providing them a better understanding of the social interactions going on in the main meeting room.

Activity Monitoring in Public Spaces
In 2008, Idiap has developed new approaches towards automatic activity analysis in metro stations, more specifically:
(1) real-time detection of abandoned luggage, and
(2) person density monitoring

In the context of the European Caretaker project, Idiap has developed several state-of-the-art modules to monitor the activities of passengers in public transportation systems from surveillance cameras. The first one detects abandoned luggage by passengers, and relies on some analysis of the different layers of static and moving objects in the scene, as well as on the detection of potential people remaining close to these objects. The second module detects and counts the number of people present in different camera views, and allows to build statistical models of the metro overall activity, as well as to spot anomalous situation in function of the context (location, week day, time) like exceptional congestions due to overloaded traffic or the presence of a group of loitering people.

In collaboration with their EU partner, these modules were successfully integrated within a large scale system that was deployed in the Roma and Torino metros to detect events and extract knowledge from 16 to 30 cameras of a metro station. A user interface allowed true metro operators to monitor the detected events, select cameras views, and replay the detected events to control their validity. The evaluation of the Idiap modules by these operators revealed their high reliability. In particular, the abandoned luggage detector raised the interest of the Roma metro managers, as it proved to be better than commercial systems that they had previously tested, providing much fewer false alarms while still detecting relevant events.

Automatic Analysis of Social Behavioral Patterns
In 2008, Idiap has developed a framework for the automatic analysis of some of the most important social phenomena (e.g., roles, conflicts, and group forming) in real-world conversational settings like meetings, political debates and talk-shows. Based on the analysis of Social Networks extracted from turn-taking patterns (using speaker diarization, as described above), the current systems allows for the automatic recognition of roles in broadcast data (e.g., the Anchorman, the Guest, etc.) as well as in meetings (e.g., the Chairman, the Moderator, etc.). Experiments performed over large corpora of recordings (around 100 hours) show that the initial system can perform correct social role labeling with an accuracy of 85%. Furthermore, the same framework allows for the reconstruction of groups involved in bipolar debates where two factions defend opposite views about a given subject. Experiments performed over 45 political debates show that in two third of the cases, the participants are correctly split into two groups according to their opinions. Identification (with high purity, around 0.75) of the group's discussion topics can also be performed using the same approach.

Large-Scale Human Behavior Modeling from Mobile Phones
Idiap has developed methods for unsupervised learning of daily routines at large-scale from mobile phone users, which operate on low-level observations obtained from phone sensor data, such as the locations of an individual and who they are in proximity with, as well as the time of the day when this occurs. In order to discover location-driven and proximity-driven routines from a day in the life of a person without any supervision, our methodologies rely on bag representations of people's daily life (histograms of discrete contextual cues, which account for their temporal variations over multiple time scales during a day) and probabilistic topic models, including Latent Dirichlet Allocation (LDA), and Author-Topic Model (ATM). Using a massive data set depicting one year of the life of 100 people from MIT's Reality Mining project, we showed that our methods proved to be effective in making sense of behavioral patterns at large-scale while filtering out some of the noise in this highly complex data. For instance, using location-based semantic categories ("home", "work", etc.), LDA automatically discovered characteristic routines for all individuals, like "going to work at 10am", "leaving work at night", "working constantly", "working sporadically", or "staying home for the entire evening". ATM discovered routines characteristic of selected groups of users, and ranked users by their probability of conforming to certain daily routines. Our methodology is probabilistic, and so provides the benefits of ranking users and days with probability values, and generates identifiable routines with semantic meaning. This work will now be extended through new research collaboration with Nokia.

Pose of Complex Objects in Cluttered Scenes

In 2008, and resulting of several years of research, Idiap finalized the development of a novel algorithm for the detection and the estimation of the pose of complex objects in cluttered scenes. We introduced the notion of pose-indexed features, which should ideally have a response distribution that does not dependent on the pose, given the presence of a target. This novel idea allows training a single classifier, common to many different poses, while generalizing the usual scene-parsing of most of the machine-learning based detection algorithms. The resulting system fixes the main weakness of the coarse-to-fine strategy for object detection by allowing the training of a classifier which can be dedicated on the fly to specific populations of targets instead of having one predictor for every homogeneous sub-family. We demonstrate the performance of that approach on cat detection in gray-scale cluttered scenes. The complete data set and source code under the open-source GPL v3.0 license are available at http://www.idiap.ch/folded-ctf/.

Medical Image Annotation

In 2008, and following up on the success achieved in 2007, Idiap participated again to the international ImageCLEF benchmark evaluation in the Medical Annotation track, ranking first for the second year in a row. We proposed a multi-cue, discriminative approach that took into account the confidence of the classifier and, in case of low confidence, assigned a "don't know" label down a hierarchical tree. Our algorithm build on our experience of 2007, when Idiap proposed a cue-integration approach, based on Support Vector Machine (SVM) that ranked first. In 2008 we explored a technique to estimate the confidence of the classifier's decision. When it is not considered reliable, a soft decision is made using SVM as an opinion maker and combining its first two opinions to produce a less specific label. This approach was derived from the label hierarchical structure and the possibility to insert a ``don't know'' in some point in it. We also created examples for the classes with few images to enrich them. The new images were produced as slightly modified copies of the original ones through translation, rotation and brightness changes. Our approach ranked first among all other systems, and represents today the state of the art in medical image annotation.

The "Hub":
Realtime Multimodal Annotation Distribution and Storage

The Hub is a novel real-time annotation distribution and storage mechanism. It enables multiple "producers" to send data to multiple "consumers", in real time. Typically, there are recognition systems (e.g. automatic speech recognition, focus of attention recognition) that detect patterns (words, focus changes etc.) and produce annotations. On the other side there are browsers, or other processing (such as summarizers), which have registered to receive such data. Internally, all the data is structured identically - as "triples" - making it trivial to incorporate new kinds of ad-hoc data. All the data, which passes through the Hub, is recorded for retrieval, or "real-time" playback, at a later date. During 2008, a layered set of APIs have been developed, which allow easy programmatic access - culminating in an abstract object model, where meetings, people and locations appear to be simple objects with attributes and relationships - but which update in real-time. These APIs have been used to realise a number of demonstrations, where the Hub provides a simple integration mechanism between disparate sub-systems, such as the ACLD below. During the early part of 2009, the Hub will incorporate AMIDA corpus, and should become ready for more widespread adoption.

Automatic Content Linking Device

In 2008, and as part of several projects like AMIDA and IM2, Idiap implemented the first design of the Automatic Content Linking Device (ACLD), in collaboration with EU and Swiss partners. The ACLD is an integrative application aimed at end users, which provides the participants to an ongoing discussion with documents and fragments of past recorded meetings that are potentially related to the content of this discussion. To capture the discussion in real-time, the ACLD makes use of Idiap's Large Vocabulary Continuous Speech Recognition system (see above), along with other sensing modules. The multimedia document archive to which the ACLD provides access in real-time includes documents from a group's history, but also past meetings recorded in smart meeting rooms and processed using automatic speech recognition, speech segmentation, speaker diarization, and other content abstraction modules. The ACLD makes use of "The Hub" architecture (also developed at Idiap, see above) to integrate its modules, and has at its core a Query Aggregator which manages queries and results over time. The first prototype of the ACLD was very positively received by the audience, which included in 2008 many representatives from companies working on meeting technology. The feedback that was received is being integrated into an improved version with a new user interface that will be submitted soon to task-based evaluation in order to measure the users' efficiency and satisfaction when using the ACLD in realistic meetings.

MAIN PROJECTS IN PROGRESS

ACRONYM NAME, NAME	PARTNERS

EUROPEAN PROJECTS

AMIDA
Augmented Multiparty Interaction with
Distance Access

Idiap Research Institute
German Research Centre for Artificial Intelligence (DFKI)
International Computer Science Institute (ICSI)
Netherlands Organisation for Applied Scientific Research (TNO)
CSIRO ICT Centre
University of Edinburgh (UEDIN)
Sheffield University (USFD)
Brno University of Technology (BUT),
Munich University of Technology (TUM),
University of Twente (UT)
Philips Consumer Electronics

BACS
Bayesian Approach to Cognitive Systems

Eidgenössische Technische Hochschule Zürich (ETHZ)
INRIA - GRAVIR, Rhône Alpes, e-Motion Group
CNRS - Lab. Physiologie de la Perception et de l'Action (LPPA) - Collège de France
CNRS - Ecole normal Superior - Département des Etudes Cognitives
Max Plack Institute for Biological Cybernetics
Neurology Department of Geneva University Hospital (HUG)
Facultade de Ciencias e Tecnologia, Universidade de Coimbra,
Probayes, Grenoble, France
BlueBotics SA, Lausanne
Electricité de France, EDF

CARETAKER
Content Analysis and Retrieval Technologies
to Apply Knowledge Extraction to massive
Recording

Multitel
nstitut National de Recherche en Informatique et en automatique (INRIA)
Kingston University
Agenzia per I Trasporti Autoferrotramviari del Comune di Roma
Solid Information Technology Oy
Vysoke Uceni Technicke V Brne

DIRAC
Detection and Identification
of Rare Audio-visual Cues

Eidgenössische Technische Hochschule Zürich (ETHZ)
The Hebrew University of Jerusalem
Czech Technical University in Prague
Carl Von Ossietzky Universität Oldenburg
Leibniz Institute for Neurobiology
Katholieke Universiteit Leuven
Oregon Health and Science University Ogi School of Science and Engineering
University of Maryland, Neural Systems Laboratory

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euCognition
The European Network for the
Advancement of Artificial Cognitive
Systems

University of Bath
University College Dublin
Centre National de la Recherche Scientifique (CNRS)
University Medical Center Hamburg-Eppendorf
Association pour la Recherche et le Développement des Méthodes et Processus Industriels - ARMINES
Max Planck Institute for Mathematics in the Sciences
Notre Dame University
The Appliance Studio Ltd.
Etisalat University College (Network Coordinator)
Technische Universitaet Wien
Frankfurt Institute for Advanced Studies
Högskolan i Skövde

DURATION (MONTH/YEAR)	WEB	COORDINATOR	CONTACT
10.06 – 12.09	www.amiproject.org	Idiap Research Institute	Prof. Hervé Bourlard
01.06 – 12.08	www.bacs.ethz.ch	ETHZ	Prof. José Millàn (moved to EPFL)
03.06 – 09.08	www.ist-caretaker.org	Thales Communications	Dr Jean-Marc Odobez
01.06 – 12.10	www.diracproject.org	Idiap Research Institute	Dr Barbara Caputo
01.06 – 12.08	www.eucognition.org	University of Genoa	Dr Barbara Caputo

ACRONYM NAME, NAME	PARTNERS
EMIME Effective Multilingual Interaction in Mobile Environments	University Edinburgh Helsinki University of Technology Nagoya Institute of Technology Nokia Corporation University of Cambridge
MOBIO Mobile Biometry	University of Manchester University of Surrey Laboratoire d'Informatique d'Avignon Brno University of Technology University of Oulu EyePmedia IdeArk
PASCAL2 Pattern Analysis, Statistical Modelling and Computational Learning	56 sites in the network
SSPnet Social Signal Processing Network	Imperial College of Science, Technology and Medicine University of Edinburgh University of Twente Università Di Roma Tre Queen's University Belfast DFKI CNRS Université de Genève Technische Universiteit Delft
TA2 Together Anywhere, Together anytime	EURESCOM - European Institute for Research and Strategic Studies in Telecommunications GmbH, British Telecommunications plc Alcatel-Lucent Bell NV Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. Goldsmiths' College Netherlands Organisation For Applied Scientific Research – TNO The Interactive Institute II Aktiebolag Stichting Centrum voor Wiskunde en Informatica, Ravensburger Spieleverlag GmbH Philips Consumer Electronics BV Limbic Entertainment GmbH Joanneum Research Forschungsgesellschaft GmbH

DURATION (MONTH/YEAR)	WEB	COORDINATOR	CONTACT
03.08 – 02.11	www.emime.org	University of Edinburgh	Dr John Dines
02.08 – 01.11	www.mobioproject.org	Idiap Research Institute	Dr Sébastien Marcel
03.08 – 02.13	www.pascal-network.org	University of Southampton	Dr François Fleuret
02. 09 – 01.14	www.sspnet.eu	Idiap Research Institute	Dr Alessandro Vinciarelli
02.08 – 01.12	www.ta2-project.eu	Eurescom	Phil Garner

ACRONYM NAME, NAME	PARTNERS

NCCR IM2
Interactive Multimodal Information
Management

Ecole polytechnique fédérale de Lausanne (EPFL)
University of Geneva
University of Fribourg
University of Bern
Swiss Federal Institute of Technology in Zurich (ETHZ)

CODICES
Automatic Analysis of Mexican
Codex Collections

GMface I + II
Graphical Models for Face Authentiction

MULTI
Multimodal Interaction and
Multimedia Data Mining

SNSF PROJECTS (INDO SUISSE)

KEYSPOT
Keyword Spotting in Continuous Speech

KERSEQ
Kernel Methods for Speech and
Video Sequence Analysis

HASLER FOUNDATION

EMMA
Enhanced Medical Multimedia data Access

US PROJECTS

GALE
Global Autonomous Language Exploitation   International Computer Science Institute (ICSI)

VACE / ROADMAP
Robust Automatic Detection of   International Computer Science Institute (ICSI)
Meeting-events with Audiovisual Perception

In addition to the above projects a number of industrials projects (CTI, The Ark) and grants are ongoing at Idiap.

DURATION (MONTH/YEAR)	WEB	COORDINATOR	CONTACT
01.02 – 12.09	www.im2.ch	Idiap Research Institute	Prof. Hervé Bourlard
09.08 – 08.11	www.idiap.ch/~eroman/codices.html	Idiap Research Institute	Dr Daniel Gatica-Perez Dr Jean-Marc Odobez
07.07 – 06.09		Idiap Research Institute	Dr Sébastien Marcel
10.02 – 10.10		Idiap Research Institute	Prof. Hervé Bourlard
10.06 – 09.09		Idiap Research Institute	Prof. Hervé Bourlard
06.06 – 05.09		Idiap Research Institute	Prof. Hervé Bourlard
01.08 – 12.09		Idiap Research Institute	Dr Barbara Caputo
09.05 – 04.09		SRI	Prof. Hervé Bourlard
11.06 – 06.08		Idiap Research Institute	Dr Daniel Gatica-Perez

MAJOR PUBLICATIONS / CONFERENCES

This selection, from among the many publications of Idiap illustrates the diversity of our research.

JOURNAL PAPERS

A Brain-Actuated Wheelchair: Asynchronous and Non-Invasive Brain-Computer Interfaces for Continuous Control of Robots
Ferran Galán, Marnix Nuttin, Eileen Lew, Pierre W. Ferrez, G. Vanacker, Johan Philips and José del R. Millán
Clinical Neurophysiology

A Discriminative Kernel-based Model to Rank Images from Text Queries
David Grangier and Samy Bengio
IEEE Transactions on Pattern Analysis and Machine Intelligence

Brain-Controlled Robots
José del R. Millán
IEEE Intelligent Systems

Characterizing the EEG Correlates of Exploratory Behavior
Nicolas Bourdaud, Ricardo Chavarriaga, Ferran Galán and José del R. Millán
IEEE Transactions on Neural Systems & Rehabilitation Engineering

Class specific object recognition using kernel Gibbs distributions
Barbara Caputo
ELectronic Letters on Computer vision and Image Analysis

Classification-based Probabilistic Modeling of Texture Transition for Fast Line Search Tracking and Delineation
Ali Shahrokni, Tom Drummond, Francois Fleuret and Pascal Fua
IEEE Transactions on Pattern Analysis and Machine Intelligence

Dimensionality of Dialogue Act Tagsets: An Empirical Analysis of Large Corpora
Andrei Popescu-Belis
Language Resources and Evaluation

Discriminative cue integration for medical image annotation
Tatiana Tommasi, Francesco Orabona and Barbara Caputo
Pattern Recognition Letters

Error-Related EEG Potentials Generated during Simulated Brain-Computer Interaction
Pierre W. Ferrez and José del R. Millán
IEEE Trans. on Biomedical Engineering

Fast Recognition of Anticipation Related Potentials
Gangadhar Garipelli, Ricardo Chavarriaga and José del R. Millán
IEEE Transactions on Biomedical Engineering

Modeling Dominance in Group Conversations using NonVerbal Activity Cues
Dinesh Babu Jayagopi, Hayley Hung, Chuohao Yeo and Daniel Gatica-Perez
IEEE Transactions on Audio, Speech and Language Processing

Modulation Frequency Features for Phoneme Recognition In Noisy Speech
Sriram Ganapathy, Samuel Thomas and Hynek Hermansky
Journal of Acoustical Society of America - Express Letters

Multi-Camera People Tracking with a Probabilistic Occupancy Map
Francois Fleuret, Jerome Berclaz, Richard Lengagne and Pascal Fua
IEEE Transactions on Pattern Analysis and Machine Intelligence

Non-Invasive Brain-Machine Interaction
José del R. Millán, Pierre W. Ferrez, Ferran Galán, Eileen Lew and Ricardo Chavarriaga
International Journal of Pattern Recognition and Artificial Intelligence

Recognition Of Reverberant Speech Using Frequency Domain Linear Prediction
Samuel Thomas, Sriram Ganapathy and Hynek Hermansky
IEEE Signal Processing Letters, 2008.

Recognizing Human Visual Focus of Attention from Head Pose in Meetings
Silèye O. Ba and Jean-Marc Odobez
IEEE Transactions on Systems, Man, Cybernetics, Part-B

SimpleMKL
Alain Rakotomamonjy, Francis Bach, Stéphane Canu and Yves Grandvalet
Journal of Machine Learning Research, 2008.

Stationary Features and Cat Detection
Francois Fleuret and Donald Geman
Journal of Machine Learning Research

Tracking the visual focus of attention for a varying number of wandering people
Kevin C. Smith, Silèye O. Ba, Jean-Marc Odobez and Daniel Gatica-Perez
IEEE Trans. on Pattern Analysis and Machine Intelligence

Multi-party Focus of Attention Recognition in Meetings from Head Pose and Multimodal Contextual Cues
Silèye O. Ba and Jean-Marc Odobez
IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)

Object Category Detection using Audio-visual Cues
Jie Luo, Barbara Caputo, Alon Zweig, Jorg-Hendrik Back and Jorn Anemuller
International Conference on Computer Vision Systems (ICVS08)

On the Combination of Auditory and Modulation Frequency Channels for ASR applications
Fabio Valente and Hynek Hermansky
Interspeech 2008

Perceptually motivated Sub-band Decomposition for FDLP Audio Coding
Petr Motlicek, Sriram Ganapathy, Hynek Hermansky, Harinath Garudadri and Marios Athineos
Text, Speech and Dialogue, Brno, Czech Republic, Springer-Verlag Berlin, Heidelberg

Predicting the Dominant Clique in Meetings through Fusion of Nonverbal Cues
Dinesh Babu Jayagopi, Hayley Hung, Chuohao Yeo and Daniel Gatica-Perez
ACM MM 2008

Predicting Two Facets of Social Verticality in Meetings from Five-Minute Time Slices and Nonverbal Cues
Dinesh Babu Jayagopi, Silèye O. Ba, Jean-Marc Odobez and Daniel Gatica-Perez
Proceedings - ICMI 2008

Principled Detection-by-classification from Multiple Views
Jerome Berclaz, Francois Fleuret and Pascal Fua
proceedings of the International Conference on Computer Vision Theory and Applications

Recognition and Understanding of Meetings Overview of the European AMI and AMIDA Projects
Hervé Bourlard and Steve Renals
LangTech 2008

Recognition of Anticipatory Behavior from Human EEG
Gangadhar Garipelli, Ricardo Chavarriaga and José del R. Millán
In proceedings, 4th Intl. Brain-Computer Interface Workshop and Training Course

Reference-based vs. task-based evaluation of human language technology
Andrei Popescu-Belis
LREC 2008 ELRA Workshop on Evaluation, ELRA, Marrakech, Morocco

Reverse Correlation for analyzing MLP Posterior Features in ASR
Joel Praveen Pinto, G. S. V. S. Sivaram and Hynek Hermansky
11th International Conference on Text, Speech, and Dialogue

Role Recognition for Meeting Participants: an Approach Based on Lexical Information and Social Network Analysis
Sarah Favre, Hugues Salamin, Alessandro Vinciarelli, Dilek Hakkani Tür and N. P. Garg
ACM International Conference on Multimedia, Vancouver, Canada

Role Recognition in Multiparty Recordings using Social Affiliation Networks and Discrete Distributions
Sarah Favre, Hugues Salamin, John Dines and Alessandro Vinciarelli
International Conference on Multimodal Interfaces, Chania, Greece

Silence Models in Weighted Finite-State Transducers
Philip N. Garner
Interspeech, 2008

Simultaneous Real-Time Detection of Motor Imagery and Error-Related Potentials for Improved BCI Accuracy
Pierre W. Ferrez and José del R. Millán
Proceedings of the 4th International Brain-Computer Interface Workshop and Training Course

Social Signal Processing: State-of-the-Art and Future Perspectives of an Emerging Domain
Alessandro Vinciarelli, Maja Pantic, Hervé Bourlard and Alex Pentland
Proceedings of the ACM International Conference on Multimedia

Social Signals, their Function, and Automatic Analysis A Survey
Alessandro Vinciarelli, Maja Pantic, Hervé Bourlard and Alex Pentland, in: Proceedings of International Conference on Multimodal Interfaces (to appear), 2008

Spectral Noise Shaping: Improvements in Speech/Audio Codec Based on Linear Prediction in Spectral Domain
Sriram Ganapathy, Petr Motlicek, Hynek Hermansky and Harinath Garudadri
INTERSPEECH 2008

Spectro-Temporal Features for Automatic Speech Recognition using Linear Prediction in Spectral Domain
Samuel Thomas, Sriram Ganapathy and Hynek Hermansky
EUSIPCO 2008

Support Vector Machines with a Reject Option
Yves Grandvalet, Alain Rakotomamonjy, Joseph Keshet and Stéphane Canu
Proceedings of the 22nd Annual Conference on Neural Information Processing Systems

SVM-based Discriminative Accumulation Scheme for Place Recognition
Andrzej Pronobis, Oscar Martinez Monos and Barbara Caputo
Proceedings of the IEEE International Conference on Robotics and Automation (ICRA08)

Task-based evaluation of meeting browsers:
from BET task elicitation to user behavior analysis
Andrei Popescu-Belis, Mike Flynn, Pierre Wellner
and Philippe Baudrion
6th International Conference on Language Resources and Evaluation,
Marrakech, Morocco

Temporal Masking for Bit-rate Reduction in Audio Codec
Based on Frequency Domain Linear Prediction
Sriram Ganapathy, Petr Motlicek, Hynek Hermansky
and Harinath Garudadri
IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)

The AMIDA Automatic Content Linking Device:
Just-in-Time Document Retrieval in Meetings
Andrei Popescu-Belis, Erik Boertjes, Jonathan Kilgour,
Peter Poller, Sandro Castronovo, Theresa Wilson, Alejandro Jaimes
and Jean Carletta
Machine Learning for Multimodal Interaction V, Utrecht,
Springer-Verlag

The DIRAC AWEAR Audio-Visual Platform
for Detection of Unexpected and Incongruent Events
Joern Anemueller, Joerg-Henrik Bach, Barbara Caputo, Michal
Havlena, Jie Luo, Hendrik Kayser, Bastian Leibe, Petr Motlicek, Tomas
Pajdla, Misha Pavel, Akihiko Torii, Luc Van Gool, Alon Zweig and
Hynek Hermansky
Proceedings of the International Conference on Multimodal Interfaces

The Projectron: a Bounded Kernel-Based Perceptron
Francesco Orabona, Joseph Keshet and Barbara Caputo
Int. Conf. on Machine Learning

Timbre and Rhythmic TRAP-TANDEM features
for music information retrieval
Nicolas Scaringella
Int. Conf. on Music Information Retrieval (ISMIR)

Topickr: Flickr Groups and Users Reloaded
Radu-Andrei Negoescu and Daniel Gatica-Perez
MM '08: Proc. of the 16th ACM Intl. Conf. on Multimedia, ACM

Towards Audio-Visual On-line Diarization
of Participants In Group Meetings
Hayley Hung and Gerald Friedland
European Conference on Computer Vision Workshop on Multi-camera
and Multi-modal Sensor Fusion

Towards Robust Place Recognition for Robot Localization
Muhammad Muneeb Ullah, Andrzej Pronobis, Barbara Caputo,
Jie Luo, Patric Jensfelt and Henrik I. Christensen
IEEE International Conference on Robotics ad Automation

Understanding Metro Station Usage
using Closed Circuit Television Cameras Analysis
C. Carincotte, Xavier Naturel, M. Hick, Jean-Marc Odobez, Jian Yao,
A. Bastide and B. Corbucci
11th International IEEE Conference on Intelligent Transportation
Systems (ITSC), Bejing

Visual Focus of Attention Estimation from Head Pose Posterior
Probability Distributions
Silèye O. Ba and Jean-Marc Odobez
International Conference on Multi-media & Expo

What Did You Do Today?
Discovering Daily Routines from Large-Scale Mobile Data
Katayoun Farrahi and Daniel Gatica-Perez
ACM International Conference on Multimedia (ACMMM)

The complete list, abstracts and full texts are available on the Idiap web site at the following address:
http://publications.idiap.ch