Activity Report 2014

Section Partnerships and Cooperations

<p style="text-align: center; color: red;">**DAHU Project-Team**</p>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR

Acronym: PRODAQ

Title: Proof systems for Data Queries

Coordinator: Sylvain Schmitz

Duration: January 2015 – September 2019

Abstract: The project aims at developing proof systems for data logics. It is at the interface between several research communities in database theory, infinite-state system verification and proof theory. The main thrust behind the project is the investigation of proof-theoretic tools for data logic, using in particular insights from substructural logics, and using counter systems as a means to obtain algorithms and complexity results.

8.2. International Initiatives

8.2.1. Inria International Partners

8.2.1.1. Declared Inria International Partners

Victor Vianu, UC San Diego, USA. Chaire Inria depuis 2013.

8.3. International Research Visitors

8.3.1. Visits of International Scientists

- Thomas Schwentick

  Subject: Automata methods for data processing

  Institution: Dortmund University, Dortmund, Germany.

- Sławomir Lasota

  Subject: Reasoning with data using sets with atoms

  Institution: Warsaw University, Warsaw, Poland.

<div align="center">

DREAM Project-Team

</div>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. PEPS: Pharmaco-epidemiology for Health Products

Participants: Thomas Guyet, René Quiniou, Véronique Masson, Alexandre Termier.

The PEPS project (Pharmaco-epidemiology des Produits de Santé) is funded by ANSM (national agency for health security). The project leader is E. Oger from the clinical investigation center CIC-1414 INSERM/CHU Rennes. The other partners located in Rennes are the Institute of Research and Technology (IRT) B<>Com, EHESP and the LTSI. The project will start in january 2015 and is funded for 4 years (3.6M€).

The PEPS project has two parts: the clinical studies and a research program dedicated to the development of innovative tools for pharmaco-epidemiological studies with medico-administrative databases. The pharmaco-epidemiology is the study of the uses, the effectiveness and the effects of health products (especially drugs) for the patients in a real live context, on a large population. Using medico-administrative databases – that contains information about the reimbursement of the medication, the medical visits and the cares – is a recent approach to enable studies on large cohortes and to reduce the response time to a pharmaco-epidemiology question.

Our contribution to this project will be the proposal of pattern mining algorithms and reasoning techniques to analyze typical care pathways of specific groups of insured patients.

8.2. International Initiatives

8.2.1. Inria International Partners

8.2.1.1. Informal International Partners

8.2.1.1.1. Monitoring cattle in big herds with multiple sensors

Participant: René Quiniou.

The state of Alberta produces a significant part of the beef meat in Canada. Big farms feeds up around 40.000 bull calves in feedlots grouping 200-300 animals. Diseases such as Bovine Respiratory Diseases (BRD) are frequent and may propagate quickly in such conditions. So, it is important to detect as soon as possible when an animal is sick. We are collaborating with the Department of Production Animal Health, University of Calgary for designing monitoring systems able to generate early alarms when an animal is sick. Precisely, we are studying the properties of new sensors and their aptitude to provide relevant data for BRD detectors. This year, we had a contract with the university of Calgary to fund a grant for a master student.

EXMO Project-Team

7. Partnerships and Cooperations

7.1. National Initiatives

7.1.1. ANR Datalift

Program: ANR-ContInt

Project acronym: Datalift

Project title: DATALIFT

Instrument: platform

Duration: September 2010 - March 2014

Coordinator: Inria EXMO/François Scharffe

Participants: Jérôme Euzenat, Zhengjie Fan, Jérôme David

See also: http://www.datalift.org

Abstract: EXMO coordinates with LIRMM the DATALIFT project whose goal is to produce a platform for publishing governmental data as linked data. EXMO is particularly involved in the generation of links between datasets (see §6.3).

7.1.2. ANR Lindicle

Program: ANR-Blanc international 2

Project acronym: LINDICLE

Project title: Linking data in cross-lingual environment

Duration: January 2013 - December 2016

Coordinator: Inria EXMO/Jérôme David

Participants: Jérôme Euzenat, Manuel Atencia Arcas, Jérôme David, Tatiana Lesnikova, Adam Sanchez Ayte

Other partners: Tsinghua university (CN)

See also: http://lindicle.inrialpes.fr

Abstract: The LINDICLE project investigates multilingual data interlinking between French, English and Chinese data sources (see §6.3).

7.2. European Initiatives

7.2.1. FP7 & H2020 Projects

7.2.1.1. Ready4SmartCities

Type: CAPACITIES

Defi: ICT-2013.6.4 - Optimising Energy Systems in Smart Cities

Instrument: Coordination and Support Action

Project acronym: Ready4SmartCities

Project title: ICT Roadmap and Data Interoperability for Energy Systems in Smart Cities

Objectif: Optimising Energy Systems in Smart Cities

Duration: October 2013 - September 2015

Coordinator: D'appolonia Spa (Italy)

Other partners: D'appolonia (Italy) Universidad Politecnica de Madrid (Spain) CSTB (France), CERTH (Grèce), VTT (Finland), AIT (Austria), AEC3 (UK), Politecnico di Torino (Italy), Empirica (Germany)

Inria contact: Jérôme Euzenat

Participants: Jérôme Euzenat, Luz Maria Priego-Roche, Jérôme David, Adam Sanchez Ayte

See also: http://www.ready4smartcities.eu

Abstract: The Ready4SmartCities project aims at increasing awareness and interoperability for the adoption of OCT and semantic technologies in energy system to obtain a reduction of energy consumption and CO_2 emission at smart cities community level through innovative relying on RTF and innovation outcomes and ICT-based solutions.

7.3. International Research Visitors

7.3.1. Visits of International Scientists

- Giuseppe Pirrò (Free University of Bozen-Bolzano) visited EXMO in February 2014 working on web query languages.

- Juanzi Li and Zhigang Wang (Tsinghua university) visited EXMO in October 2014, working on multilingual data interlinking.

- Kate Revoredo and Frenanda Baião (Federal University of the State of Rio de Janeiro) visited EXMO in October, 2014, working on learning alignments.

GRAPHIK Project-Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR

8.1.1.1. ASPIQ
Participants: Jean-François Baget, Fabien Garreau, Marie-Laure Mugnier, Jérôme Fortin, Michel Leclère.

ASPIQ (ASP technologIes for Querying large scale multisource heterogeneous web information), is an ANR white project (duration: 4 years) that started in Oct. 2012. It involves partners from CRIL, LERIA and LSIS. The project coordinator is Odile Papini (LSIS). http://aspiq.lsis.org/

The main objective of this project is to propose:
- extensions of standard ASP for representing OWL2 tractable sublanguages;
- new operations for merging conflicting information in this extended ASP;
- the identification of subclasses of this extended ASP allowing for efficient query answering mechanisms;
- an implementation of a prototype reasoning system.
- *See Section 6.2 for this year's results (Extensions of the Framework).*

8.1.1.2. Pagoda
Participants: Jean-François Baget, Marie-Laure Mugnier, Mélanie König, Swan Rocher, Michaël Thomazo.

Pagoda (Practical Algorithms for Ontology-based Data Access)is an ANR JCJC (young researchers) project that started in Jan. 2013 (duration: 4 years). The project coordinator is Meghyn Bienvenu (LRI). It involves partners from the EPI LEO, the LIG, and the Anatomy Laboratory of Grenoble. http://pagoda.lri.fr/

The primary aim of this project is to address challenges brought by scalability and the handling of data inconsistencies by developing novel OBDA (Ontology Based Data Access) query answering algorithms and practical methods for handling inconsistent data.
- *See Section 6.2 for this year's results.*

8.1.1.3. Qualinca
Participants: Michel Leclère, Michel Chein, Madalina Croitoru, Léa Guizol, Rallou Thomopoulos, Alain Gutierrez, Swan Rocher, Marie-Laure Mugnier.

Qualinca is an ANR Contint project that started in Apr. 2012 (duration: 4 years). The project coordinator is Michel Leclère (GraphIK). It involves partners from LRI, LIG, ABES and INA. http://www.lirmm.fr/qualinca/index8ece.html?q=en/en/home

The main objective is to elaborate mechanisms allowing to:
- evaluate the quality of an existing document base;
- maintain a given level of quality by controlling updating operations;
- increase the quality of a given base;
- develop generic methods that take into account the quality of a given base (for instance for searching documents or interconnecting bases).
- *See Section 6.4 for this year's results.*

8.1.1.4. Dur-Dur
Participants: Abdallah Arioua, Patrice Buche, Madalina Croitoru, Jérôme Fortin, Rallou Thomopoulos.

Dur-Dur (Innovations agronomiques, techniques et organisationnelles pour accroître la DURabilité de la filière blé DUR) is an ANR project that started in 2014 (duration: 3 years). It is led by IATE Laboratory. http://umr-iate.cirad.fr/projets/dur-dur

The Dur-Dur project develops a systematic approach to investigate the questions related to the management of the nitrogen, energy and contaminants, to guarantee a global quality of products throughout the production and the processing chain. The knowledge representation task of Dur-Dur proposes to map the stakeholders' objectives into a multicriteria cartography, as well as possible means to reach them, and computes the compatibility / incompatibility of these objectives on the basis of argumentation methods. The research methods used are qualitative and based both on argumentation theory and on Social Multi- Criteria Evaluation (SMCE) theory. They will be extended and adapted to the needs of the project to provide a formal framework of assessment of the various orientations considered for the durum wheat chain.

8.1.2. Competitivity Clusters

We are taking part in the Laboratory of Excellence ("labex") *NUMEV* (Digital and Hardware Solutions, Modelling for the Environment and Life Sciences), led by University of Montpellier 2 in partnership with CNRS, University of Montpellier 1 and Inria. This project aims at developing information and communication technologies for environmental and life sciences. We are participating to one of the four axis, namely "Scientific Data: processing, integration and security".

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. EcoBioCap
Participants: Patrice Buche, Madalina Croitoru, Jérôme Fortin, Patricio Mosse.

EcoBiocap is a FP7-KBEE project that started in March 2011 (duration: 4 years). It is led by INRA (and scientifically managed by Montpellier IATE laboratory). It involves sixteen partners among which Cork University (Ireland), CSIC (Spain), Roma University La Sapienza (Italy), SIK (Sweden). The objective of EcoBioCAP is to "provide the EU food industry with customizable, ecoefficient, biodegradable packaging solutions with direct benefits both for the environment and EU consumers in terms of food quality and safety". The budget is managed by IATE team.

- *See Section 6.3 for this year's results.*

8.2.2. Collaborations with Major European Organizations

Richard Booth: University of Luxembourg, Interdisciplinary Centre for Security, Reliability and Trust (Luxembourg)

Souhila Kaci collaborates with Richard Booth on abstract argumentation. Madalina Croitoru collaborates with Richard Booth on argumentation labelling distances.

Leon van der Torre: University of Luxembourg, Computer Science and Communications Research Unit (Luxembourg)

Souhila Kaci collaborates with Leon van der Torre on argumentation aspects. They co-supervised a PhD student (Tjitze Rienstra) from 2010 to 2014.

Sebastian Rudolph and Michaël Thomazo: TU Dresden (Germany)

Jean-François Baget and Marie-Laure Mugnier collaborate with Sebastian Rudolph and Michaël Thomazo on existential rules.

Markus Krötzsch: TU Dresden (Germany)

Jean-François Baget, Marie-Laure Mugnier and Clément Sipieter collaborate with Markus Krötzsch who is associated with the ADT QUASAR (Section 5.2), as an expert in the Semantic Web.

Ricardo Rodriguez: University of Buenos-Aires(Argentina)

Madalina Croitoru collaborates with Ricardo Rodriguez on axiomatization of consistent query answering semantics inspired from axiomatization of belief revision operators.

Milos Stoiakovitch: University of Novi Sad (Serbia)

Madalina Croitoru collaborates with Milos Stoiakovitch on properties of positional games in argumentation.

8.3. International Research Visitors

8.3.1. Visits to the GraphIK team

- January 2014: Camille Pradel, IRIT. He gave a talk presenting his PhD results *D'un langage de haut niveau à des requêtes graphes permettant d'interroger le web sémantique*. http://thesesups.ups-tlse.fr/2237/1/2013TOU30261.pdf

- January 2014: Florent Domenach, Nicosia University, Chypre. He gave a talk *Analyse formelle de concepts, application à l'analyse d'annotations sémantiques*.

- February 2014: Aymeric Ledorze, LERIA Aymeric Ledorze (LERIA). He gave a talk presenting his PhD results *Validation, synthèse et paramétrage des cartes cognitives*. https://tel.archives-ouvertes.fr/tel-00956983/document

- February 2014: Pierre Bisquert, IRIT. He gave a talk presenting his PhD results on *Étude du changement en argumentation*. http://thesesups.ups-tlse.fr/2272/1/2013TOU30302.pdf

- February 2014: Lakhdar Saïs, CRIL. He gave a talk on *Approches déclaratives pour la fouille de données*. http://www.cril.univ-artois.fr/decMining/pdf/slidesSeminaireLirmm.pdf

- April 2014: Meghyn Bienvenu, LRI, One week work on query rewriting as part of the Pagoda project (see 8.1).

- April 2014: Federico Ulliana, Inria Grenoble. He gave a talk on *Deductive RDF Triplestores : domain-specific applications and bounded-size module extraction*.

- June 2014: Slawek Staworko, Inria Lille. He gave a talk on *Prioritized Repairing and Consistent Query Answering in Relational Database*. http://researchers.lille.inria.fr/~staworko/research/talk-montpellier14.pdf

- September 2014: Jérôme Lang, LAMSADE. He gave a talk on *Introduction au choix social computationnel*. http://www.afia.asso.fr/tiki-download_wiki_attachment.php?attId=83

- October 2014: Bernardo Cuenca Grau, Department of Computer Science, Oxford. Work on algorithms for reasoning with existential rules.

- October 2014: Meghyn Bienvenu, LRI, One week work on query rewriting as part of the Pagoda project (see 8.1).

8.3.2. Visits to International Teams

- January 2014: Madalina Croitoru was invited by the Universitat Autonònoma de Barcelona (UAB). Work with Lluís Godo Lacasa (Artificial Intelligence Research Institute, IIIA) and Ricardo Rodriguez (University of Buenos Aires) on the axiomatisation of consistent query answering via belief revision (see 6.2).

<h2 style="text-align:center; color:red">LINKS Team</h2>

7. Partnerships and Cooperations

7.1. Regional Initiatives

7.1.1. FUI Région AAP 14 Hermes(2013-2015)

Participants: Angela Bonifati [correspondent], Joachim Niehren, Iovka Boneva Denis Debarbieux

The Hermes projecton "Relation Client Personalisée et Contextualisée" is coordinated by Bonifati from Links. Our partners are the Université Lille 1, Logos Keyneosoft, Cylande, Norsys, Numsight, Leroy Merlin, Kiabi and Auchan. The project addresses the problem of enriching the client communication within the marketing process. Starting from heterogeneous data sources (connected devices, social networks and traditional marketing channels), one has to extract the necessary information at hand. The data sources can be seen in a streaming fashion as they produce continuous data.

7.2. National Initiatives

7.2.1. ANR

7.2.1.1. ANR Aggreg

Particpants: Joachim Niehren [correspondent], Pierre Bourhis, Aurelien Lemay, Adrien Boiret This project has been accepted this year and it is in collaboration with University Paris 7, University of Marseille and University of Caen. The main goal of the Aggreg project is to develop efficient algorithms for answering aggregate queries for databases and data streams of various kinds.

7.2.2. Competitivity Clusters

We participate to the following http://www.picom.fr/ (Pôle de compétitivité PICOM - regional research cluster on commerce industries). In particular, the Hermes project has been conceived within the cluster.

7.3. European Initiatives

7.3.1. Collaborations with Major European Organizations

Partner 1: University of Oxford, Departement of Computer Science Database Group.

This collaboration is related the Inria North-European Lab Lille-Oxford. It is related to managing linked data and its exchange. If the Database Group has deep roots with Joachim Niehren and Angela Bonifati, new topics have been recently developped by younger researchers as Slawek Staworko and Pierre Bourhis.

7.4. International Initiatives

7.4.1. Inria International Partners

7.4.1.1. Declared Inria International Partners

Links is in Inria North-European Lab team with University of Oxford. The main people involved are Joachim Niehren [correspondent] , Pierre Bourhis and Angela Bonifati, but the cooperation is equally relevant for Iovka Boneva, Aurélien Lemay, Slawek Staworko, Sophie Tison, Radu Ciucanu (PhD student). The Oxford database group (http://www.cs.ox.ac.uk/isg/db) is one of the top database groups world wide. The main persons involved will be Michael Benedikt [correspondent], Dan Olteanu, Andreas Pieris (postdoc). Further promising cooperation opportunities are to be explored with members of Georg Gottlob's ERCproject DiaDem(http://www.cs.ox.ac.uk/projects/DIADEM/index.html) on semantics-based information extraction.

7.5. International Research Visitors

7.5.1. Visits of International Scientists

Martin Musicante from Universidade Federal do Rio Grande do Norte has been an invited Professor since December 2014.

7.5.2. Visits to International Teams

7.5.2.1. Sabbatical programme

Slawomir Stawork has been in sabbatical at University of Edinburg for a year.

7.5.2.2. Research stays abroad

Pierre Bourhis has visited University of Oxford for more than a month in different visits over the year.

<h2 style="color:red; text-align:center">MAGNET Team</h2>

8. Partnerships and Cooperations

8.1. Regional Initiatives

MARC TOMMASI and PASCAL DENIS supervise the PhD thesis of DAVID CHATEL on semi-supervised spectral clustering. The PhD is funded by Inria and the "Région Nord – Pas de Calais".

MARC TOMMASI belongs to the scientific committee involved in the process of building the IDEX proposal for Lille.

8.2. National Initiatives

8.2.1. ANR

8.2.1.1. ANR Lampada (2009-2014)
Participants: Marc Tommasi [correspondent], Rémi Gilleron, Fabien Torre.

The Lampada project on "Learning Algorithms, Models and sPArse representations for structured DAta" is coordinated by Tommasi from Mostrare. Our partners are the SEQUEL project of Inria Lille Nord Europe, the LIF (Marseille), the HUBERT CURIEN laboratory (Saint-Etienne), and LIP6 (Paris). More information on the project can be found on http://lampada.gforge.inria.fr/.

8.2.2. Competitivity Clusters

We are part of FUI HERMES (2012-2015), a joint project in collaboration with many companies (Auchan, KeyneSoft, Cylande, ...). The main objective is to develop a platform for contextual customer relation management. The project started in November 2012.

8.2.3. EFL

PASCAL DENIS is an associate member of the Laboratoire d'Excellence *Empirical Foundations of Linguistics* (EFL), http://www.labex-efl.org/.

8.2.4. Conseil national des universités

FABIEN TORRE is elected for "CNU section 27 (informatique)" since Oct. 2011

8.3. European Initiatives

8.3.1. Collaborations in European Programs, except FP7 & H2020

Program: ERC Advanced Grant
Project acronym: STAC
Project title: Strategic conversation
Duration: Sept. 2011 - Aug. 2016
Coordinator: Nicholas Asher, CNRS, Université Paul Sabatier, IRIT (France)
Other partners: School of Informatics, Edinburgh University; Heriot Watt University, Edinburgh
Abstract: STAC is a five year interdisciplinary project that aims to develop a new, formal and robust model of conversation, drawing from ideas in linguistics, philosophy, computer science and economics. The project brings a state of the art, linguistic theory of discourse interpretation together with a sophisticated view of agent interaction and strategic decision making, taking advantage of work on game theory.

8.4. International Research Visitors

8.4.1. Visits of International Scientists

We invited Prof. Claudio Gentile (University of Insubria, Italy) in January (he gave a talk on "Online Clustering of Bandits in a Social Network") and in June.

Prof. Nicolò Cesa-Bianchi (University of Milan, Italy) visited us in July (he gave a talk on "The Online Approach to Machine Learning").

Finally, we invited Prof. Mark Herbster (University College London) in July (he gave a talk on "Online Approximate Prediction at the Limit of Zero Temperature in an Ising Model") and November.

8.4.2. Visits to International Teams

In May FABIO VITALE visited the Department of Computer Science of the University of Milan, collaborating with Prof. Nicolò Cesa-Bianchi.

<p style="text-align:center; color:red;">**MAIA Project-Team**</p>

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. AME Satelor SATELOR

Participants: François Charpillet, Maxime Rio, Nicolas Beaufort, Xuan Nguyen, Thomas Moinel, Mélanie Lelaure, Theo Biasutto-Lervat.

Economic mobilisation agency in Lorraine has launched a new project SATELOR providing it with 2.5 million Euros of funding over 3 years, out of an estimated total of 4.7 million. The leader of the project is Pharmagest-Diatelic. PHARMAGEST is the French leader in computer systems for pharmacies, with a 43.5 % share of the market, 9,800 clients and more than 700 employees. Pharmagest is in Nancy. Recently, PHARMAGEST Group expanded its activities into e-health and the development of telemedicine applications. The SATELOR project will accompany the partners of the project in developing new services for maintaining safely elderly people with loss of autonomy at home or people with a chronic illness. Maia team will play an important role for bringing some research results such as :

- developing a low cost environmental sensor for monitoring the daily activities of elderly people at home
- developing a low cost sensor for fall detection
- developing a low cost companion robot able to interact with people and monitoring their activities while detecting emergency situations.
- developing a general toolbox for data-fusion : bayesian approach.

8.1.2. CNRS / Université de Lorraine PEPS project "MAJESTIC" (2014)

Participants: Vincent Thomas, Amine Boumaza, Olivier Buffet, Alain Dutech.

Sylvain Castagnos (KIWI team, LORIA/UL), and several members of the Centre de recherche sur les médiations (CREM) of Université de Lorraine —in particular Sébastien Genvo— are external members.

This multidisciplinary project —which involves humanities, social sciences, computer science, and cognitive sciences— proposes to evaluate the playful elements of "expressive" games, which involve and express complex social or individual issues. It aims at elaborating and testing —through qualitative usage analyses— a set of hypotheses allowing to study the factors contributing to reinforce, on the one side, the commitment of the user in these often atypical products and, on the other side, the player's knowledge-building.

This project led to the organisation of an international seminar "expressive game" and to the creation of two platforms for qualitative usage analysis: one in tcrm-Blida (Metz), and one in Artem (Nancy).

8.1.3. Université de Lorraine MSH project "PSYPHINE"

Participants: Amine Boumaza, Alain Dutech.

This multidisciplinary project – which involves philosophy, sociology, psychology and computer sciences – aims at exploring the concept of consciousness in an artificial being. Our main objective is to devise a new non-verbal "Turing test" in order to think about various cognitive levels that are less linked to the capacity of using a language.

8.2. National Initiatives

8.2.1. Inria IPL PAL Personally Assisted Living

Participants: François Charpillet, Olivier Simonin, Mihai Andries.

The PAL project is a national Inria Large Scale Initiative involving several teams of the institute (Arobas, Coprin, E-motion, Lagadic, Demar, Maia, Prima, Pulsar and Trio). It is coordinated by David Daney (Inria Sophia-Antipolis, EPI Coprin). The project focuses on the study and experiment of models for health and well-being. Maia is particularly involved in the People Surveillance work package, by studying and developping intelligent environments and distributed tracking devices for people walking analysis and robotic assistance (smart tiles, 3D camera network, assistant robots).

The PhD of Mihai Andries in funded by the PAL project.

8.2.2. PIA LAR Living Assistant Robot

Participants: François Charpillet, Abdallah Dib.

Partners : Crédit Agricole, Diatelic, Robosoft

LAR project has the objective to designing an assistant robot to improve the autonomy and quality of life for elderly and fragile persons. The project started at the beginning of the year. The role of the Maia Team is to develop a simultaneous localisation and mapping algorithm using a RGB-D camera. The main issue is to develop an algorithm able to deal with dynamic environment. An other issue is for the robot to be able to behave with acceptable social skills.

8.2.3. ANR

8.2.3.1. ANR PHEROTAXIS

Participants: François Charpillet, Olivier Simonin.

Dominique Martinez (Cortex team, Inria NGE) is an external collaborator and the coordinator of the project for Nancy members.

PHEROTAXIS is an "Investissements d'Avenir" ANR 2011-2014 (Coordination: J.-P. Rospars, UMR PISC, INRA Versailles).

The theme of the research is localisation of odour sources by insects and robots. By associating experimental data with models, the project aims at defining a behavioral model of olfactive processes. This work provides several applications, in particular the development of bio-inspired components highly sensitive and selective.

The project is organized in five work packages and involves the PISC research unit (Versailles), Pasteur Institute (Paris) and LORIA/Inria institute (Nancy).

8.3. European Initiatives

8.3.1. FP7 & H2020 Projects

8.3.1.1. CoDyCo

Serena Ivaldi, arrived in November 2014, participates to the European Project CODYCO since its beginning. Her participation to the project has been formalized by including Inria as a new partner of the consortium.

> Type: FP7
>
> Defi: NC
>
> Instrument: STREP
>
> Objectif: Cognitive Systems and Robotics (b)
>
> Duration: Marc 2013 - February 2017 (4 years)
>
> Coordinator: Francesco Nori (Italian Institute of Technology)
>
> Partners: TU Darmstadt (Germany), Université Pierre et Marie Curie (France), Josef Stefan Institue (Slovenia), University of Birmingham (UK)
>
> Inria contact: Serena Ivaldi

Abstract: The aim of CoDyCo is to advance the current control and cognitive understanding about robust, goal-directed whole-body motion interaction with multiple contacts. CoDyCo will go beyond traditional approaches: (1) proposing methodologies for performing coordinated interaction tasks with complex systems; (2) combining planning and compliance to deal with predictable and unpredictable events and contacts; (3) validating theoretical advances in real-world interaction scenarios. First, CoDyCo will advance the state-of-the-art in the way robots coordinate physical interaction and physical mobility. Traditional industrial applications involve robots with limited mobility. Consequently, interaction (e.g. manipulation) was treated separately from whole-body posture (e.g. balancing), assuming the robot firmly connected to the ground. Foreseen applications involve robots with augmented autonomy and physical mobility. Within this novel context, physical interaction influences stability and balance. To allow robots to surpass barriers between interaction and posture control, CoDyCo will be grounded in principles governing whole-body coordination with contact dynamics. Second, CoDyCo will go beyond traditional approaches in dealing with all perceptual and motor aspects of physical interaction, unpredictability included. Recent developments in compliant actuation and touch sensing allow safe and robust physical interaction from unexpected contact including humans. The next advancement for cognitive robots, however, is the ability not only to cope with unpredictable contact, but also to exploit predictable contact in ways that will assist in goal achievement. Third, the achievement of the project objectives will be validated in real-world scenarios with the iCub humanoid robot engaged in whole-body goal-directed tasks. The evaluations will show the iCub exploiting rigid supportive contacts, learning to compensate for compliant contacts, and utilizing assistive physical interaction.

8.3.2. Collaborations in European Programs, except FP7 & H2020

8.3.2.1. PHC MUROTEX

This project is with Olivier Simonin from Insa Lyon, Citi lab and Jan Faigl from Czech Technical University in Prague.

Program: Hubert Curien Partnerships

Project acronym: MUROTEX

Project title: Multi-agent coordination in robotics exploration and reconnaissance missions

Duration: 2 years from 1st january 2014

Coordinator: O. Simonin (INSA LYON)

Other partners: Czech Technical University in Prague

Abstract: The main objective of the project is to develop a distributed planning framework for efficient task-allocation planning in exploration and reconnaissance missions by a group of mobile robots operating in an unknown environment with considering communication constraints and uncertainty in localization of the individual team members. One main challenge is to decentralize the decision, in order to scaling up with large fleet of robots (existing solutions are centralized or depend on full communication).

8.4. International Initiatives

Serena Ivaldi and Francois Charpillet are part of the joint Inria-TUD team that was selected to participate to the KUKA Innovation Award. On December 2014, the team received a new industrial manipulator, KUKA iiwa, to prepare the challenge for the first quarter of 2015. The manipulator is lent by KUKA and will be returned at the end of the competition.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

- Dr. Samuel Nicol, postdoctoral researcher at CSIRO, Ecosystem Sciences division (Brisbane, Australia), visited MAIA for 2 weeks in June 2014.

<p style="text-align:center;color:red;">**OAK Project-Team**</p>

7. Partnerships and Cooperations

7.1. Regional Initiatives

DW4RDF is a Digiteo project joint between Inria and U. Paris Sud, focused on analytic platforms for RDF data. The project has ended in October 2014, it has lasted three years, and it was coordinated by François Goasdoué. The project has provided the framework for the PhD of Alexandra Roatis [10], [28], [4], [28], [2].
S4 (Social, Structured and Semantic Search) is a Digicosme project joint between Inria and U. Paris Sud, focused on developing novel models and algorithms for user-centric search in a social context where complex documents are authored and endowed with rich semantics. The project provides the framework for the PhD of Raphael Bonaque [19].

7.2. National Initiatives

7.2.1. ANR

Apprentissage Adaptatif pour le Crowdsourcing Intelligent et l'Accès à l'Information (ALICIA) is a 4-year project, started in February 2014, supported by the ANR CONTINT call. The project is coordinated by Bogdan Cautis, with Nicole Bidoit, and Ioana Manolescu. Its goal is to study models, techniques, and the practical deployment of adaptive learning techniques in user-centric applications, such as social networks and crowdsourcing.
Cloud-Based Organizational Design (CBOD) is a 4-year ANR started in 2014, coordinated by prof. Ahmed Bounfour from UNIV. PARIS-SUD. Its goal is to study and model the ways in which cloud computing impacts the behavior and operation of companies and organizations, with a particular focus on the cloud-based management of data, a crucial asset in many companies.
Datalyse is funded for 3.5 years as part of the *Investissement d'Avenir - Cloud & Big Data* national program. The project is led by the Grenoble company Eolas, a subsidiary of Business & Decision. It is a collaboration with LIG Grenoble, U. Lille 1, U. Montpellier, and Inria Rhône-Alpes aiming at building scalable and expressive tools for Big Data analytics.

7.2.2. LabEx, IdEx

Structured, Social and Semantic Search is a 3-year project started in October 2013, financed by the *LabEx (Laboratoire d'Excellence)*DIGICOSME. The project aims at developing a data model for rich structured content enriched with semantic annotations and authored in a distributed setting, as well as efficient algorithms for top-k search on such content.
BizModel4Cloud is a one-year (2014) interdisciplinary research project funded under a *Projet Exploratoire Premier Soutien (PEPS)* call joint between the CNRS and the IdEx Paris Saclay. It reunites the same partners as the ANR CBOD project of which it is an initial, short version.

7.2.3. Others

ODIN is a four-year project started in 2014, funded by the Direction Générale de l'Armement, between the SemSoft company, IRISA Rennes and Inria Saclay (OAK). The project aims to develop a complete framework for analytics on Web data, in particular taking into account uncertainty, based on Semantic Web technologies such as RDF.

7.3. European Initiatives

7.3.1. Collaborations in European Programs, except FP7 & H2020

Program: COST

Project acronym: Keystone

Project title: Semantic keyword-based search on structured data sources

Duration: Oct 2013 – Oct 2018

Coordinator: Francesco Guerra (U. Modena, Italy)

Other partners: The project involves 24 countries, see http://www.cost.eu/domains_actions/ict/Actions/IC1302?parties

Abstract: To build efficient and expressive keyword search tools, the action "semantic KEYword-based Search on sTructured data sOurcEs" (KEYSTONE) proposes to draw upon competencies from several disciplines, such as semantic data management, the semantic web, information retrieval, artificial intelligence, machine learning, user interaction, service science, service design, and natural language processing.

7.4. International Initiatives

7.4.1. Inria Associate Teams

7.4.1.1. OAKSAD

Title: Languages and techniques for efficient large-scale Web data management

International Partner (Institution - Laboratory - Researcher):

University of California, San Diego (ÉTATS-UNIS)

Duration: 2013 - 2015

See also: https://team.inria.fr/oak/oaksad/

Data on the Web is increasingly large and complex. The ways to process and share it have also evolved, from the classical scenario where users connect to a database, to today's complex processes whereas data is jointly produced on the Web, disseminated through streams, corroborated and enriched through annotations, and exploited through complex business processes, or workflows. The OAK and San Diego teams work together to devise expressive languages, efficient techniques and scalable platforms for such applications. The main areas on which our interest is shared are: semantic Web annotations; large-scale distributed data sharing; monitoring and verification of automated data processing workflows in the cloud.

7.4.2. Inria International Partners

7.4.2.1. Informal International Partners

We have started discussions with the University of Tsukuba (Japan) and prepare a future submission of an associate team with them, on topics related to efficient techniques for querying distributed heterogeneous data sources.

7.5. International Research Visitors

7.5.1. Visits of International Scientists

- Yannis Velegrakis (U. Trento) visited the team in December 2014 and gave a seminar on recommender systems.
- Konstantinos Karanasos (Microsoft Research) visited the team in November 2014 and gave a seminar on dynamic query optimization in large-scale data processing platforms.
- Tamer Ozsu (U. Waterloo) visited the team in October 2014 and gave a seminar on distributed RDF data management.
- Alin Deutsch (UCSD) visited the team in October 2014 as part of our OAKSADjoint work.
- Dan Olteanu (Oxford U.) visited the team in October 2014 and gave a seminar on modern Datalog evaluation engines.
- Julien Leblay (Oxford U.) visited the team in May 2014 and gave a seminar on querying the deep web.
- Laurent Daynès (Oracle) visited the team in February 2014 and gave a seminar on optimization techniques for evaluating arithmetic expressions in Oracle.

7.5.1.1. Internships

- Sejla Cebiric (M2 intern), from University of Sarajevo, Bosnia (March - August 2014)
- Elham Akbari Azirani (M2 intern), from University of Teheran, Iran (April - September 2014)

7.5.2. Visits to International Teams

7.5.2.1. Research stays abroad

Bogdan Cautis visited Yahoo Labs Barcelona, in July, on the account of ongoing collaborations in as-you-type search and query recommendation in social media. He also visited the University of Singapore for one week in April (Stephane Bressan's team).

<p style="text-align:center">**ORPAILLEUR Project-Team**</p>

8. Partnerships and Cooperations

8.1. International Initiatives

8.1.1. Participation In International Programs

8.1.1.1. Ciência Sem Fronteiras
Participant: Amedeo Napoli [contact person].

Program "Ciência Sem Fronteiras" is a Brazilian research fellowship which provides a funding for the stay of a visiting French researcher in Brazil at Universidade Federal Pernambuco Recife for three years. The on-going project is called "Formal Concept Analysis as a Support for Knowledge Discovery" and is aimed at combining FCA methods with numerical clustering methods used by Brazilian colleagues. This project is supervised in Brazil by Professor Francisco de A.T. de Carvalho (CIn/UFPE).

The project aims at developing and comparing classification and clustering algorithms for complex data (especially interval and multi-valued data). Two families of algorithms are studied, namely "clustering algorithms" based on the use of a similarity or a distance for comparing the objects, and "classification algorithms in Formal Concept Analysis (FCA)" based on attribute sharing between objects. The objectives here are to combine the facilities of both families of algorithms for improving the potential of each family in dealing with more complex and voluminous datasets.

8.1.1.2. Pronex Brasilia
Participant: Bernard Maigret [contact person].

In this research project, the goal is to identify, using virtual screening techniques that we developed, new compounds against tropical diseases (e.g. trypanosome, dengue and mycosis) in collaboration with several Brazilian laboratories among which the Department of Biology at University of Brasilia, together with the Harmonic Pharma start-up. Through this collaboration, several PhD and postdocs came to the lab for one year training with our home-developed virtual screening engine (VSM-G). This project is in part supported by the Brazilian CNPq agency. Fruitful results were already obtained leading to several papers in preparation and patents. These patents concern the discovery of new putative treatment of strong mycosis due to fungi particularly virulent in South America. These patents were funded by the University of Brasilia, Embrapa and Harmonic Pharma.

8.1.2. Inria Associate Team: Snowflake
Participants: Adrien Coulet [contact person], Gabin Personeni, Malika Smaïl-Tabbone.

Snowflake (http://snowflake.loria.fr/) is an Inria Associate Team which started in 2014. It is aimed at facilitating the collaboration between researchers from the Inria ORPAILLEUR team and the Stanford Center for Biomedical Informatics Research, Stanford University, USA. The main objective of Snowflake is to improve biomedical knowledge discovery by connecting Electronic Health Records (EHRs) with LOD (Linked Open Data). Such a connection could allow to complete domain knowledge w.r.t. EHRs. The initial focus of Snowflake is the identification and characterization of groups of patients w.r.t. reactions to drugs. Identifies features associated with such groups of patients could be used as predictors of over- or under-reactions to some drugs. The considered use case is related to pharmacogenomics drugs, i.e., drugs known to cause variable effects depending on the genetic profile of patients. Data associated with pharmacogenomics drugs and their mechanisms are available in LOD and, once connected to EHRs, they can be used to classify drugs and then patients presenting a specific reaction profile to a given group of drugs.

8.1.3. Explorer Programme
Participant: Chedy Raïssi [contact person].

Chedy Raïssi visited the MIT Lab (Massachusetts Institute of Technology, MIT http://web.mit.edu/) during one month between July and August 2014. The objective of this research visit was the following.

Over the last decade, the annual turnovers generated by the electronic entertainment industry went beyond those of both cinema and music industries, making video game production a highly profitable business. In parallel with the game industry growth, watching video-game live streams is becoming an increasingly popular way of entertainment. Given the shared interests, between Orpailleur team and the GameLab at MIT, in emerging broadcasting platforms for games and work on analytics, Chedy Raïssi started a productive collaboration with researchers from the GameLab at MIT where we he explored for one month the potential for future collaborations between the MIT and Inria on this interesting new topic.

8.1.4. Miscellaneous

Participants: Mehwish Alam, Aleksey Buzmakov, Melisachew Chekol, Victor Codocedo, Adrien Coulet, Elias Egho, Ioanna Lykourentzou, Amedeo Napoli [contact person], Chedy Raïssi, Jean-Sébastien Sereni, Mario Valencia.

- The team had a Fapemig – Inria research project between 2009 and 2013, called "Incorporating Knowledge Models into Scalable Data Mining Algorithms" (IKMSDM). The IKMSDM project involved researchers at Universidade Federal de Minas Gerais in Belo Horizonte –a group led by Prof. Wagner Meira– and the Orpailleur team at Inria Nancy Grand Est. In this project we were interested in the mining of large amount of data with two relevant application scenarios: text mining and graph mining. This year, contact and work was going on, focusing on the preparation of a joint publication on the notion of skylines for tensor data.

- An on-going collaboration involves the Orpailleur team and Sergei Kuznetsov at Higher School of Economics in Moscow (HSE). Amedeo Napoli visited HSE laboratory several times (with the support of HSE) while Sergei Kuznetsov visited Inria Nancy Grand Est several times too. The collaboration is materialized by the joint supervision of the thesis of Aleksey Buzmakov and the organization of scientific events, and in particular the workshop FCA4AI whose fourth edition will take place this year in July at IJCAI 2014 (see http://www.fca4ai.hse.ru).

- LEA STRUCO is an "Associated International Laboratory" of CNRS between IÚUK, Prague, and LIAFA, Paris. It focuses on high-level study of fundamental combinatorial objects, with a particular emphasis on comprehending and disseminating the state-of-the-art theories and techniques developed. The obtained insights shall be applied to obtain new results on existing problems as well as to identify directions and questions for future work. Jean-Sébastien Sereni is the contact person for LEA STRUCO which was initiated when Jean-Sébastien was a member of LIAFA.

- At present, Mario Valencia is the international coordinator of the MathAmSud project 13MATH-07 "Structural an algebraic problems on graph theory" (2013–2015). This project is funded by the following research institutes: CNRS in France, MinCyT in Argentina, CAPES in Brazil and CMM in Chile.

8.2. National Initiatives

8.2.1. ANR

8.2.1.1. HEREDIA

Participant: Jean-Sébastien Sereni [contact person].

HEREDIA (http://www.liafa.univ-paris-diderot.fr/~sereni/Heredia/) is an ANR JCJC ("Jeunes Chercheurs") focusing on hereditary properties of graphs, which provide a general perspective to study graph properties. Several important general theorems are known and the approach offers an elegant way of unifying notions and proof techniques. Further, hereditary classes of graphs play a central role in graph theory. Besides their theoretical appeal, they are also particularly relevant from an algorithmic point of view. With Jean-Sébastien Sereni, the HEREDIA project involves Pierre Charbit (LIAFA, Paris), Louis Esperet (G-SCOP, Grenoble) and Nicolas Trotignon (LIP, Lyon).

8.2.1.2. Hybride

Participants: Adrien Coulet, Luis-Felipe Melo, Amedeo Napoli, Matthieu Osmuk, Chedy Raïssi, My Thao Tang, Mohsen Sayed, Yannick Toussaint [contact person].

The Hybride research project (http://hybride.loria.fr/) aims at combining Natural Language Processing (NLP) and Knowledge Discovery in Databases (KDD) for text mining. A key idea is to design an interacting and convergent process where NLP methods are used for guiding text mining and KDD methods are used for guiding the analysis of textual documents. NLP methods are mainly based on text analysis and extraction of general and temporal information. KDD methods are based on pattern mining, e.g. patterns and sequences, formal concept analysis and graph mining. In this way, NLP methods applied to texts extract "textual information" that can be used by KDD methods as constraints for focusing the mining of textual data. By contrast, KDD methods extract patterns and sequences to be used for guiding information extraction from texts and text analysis. Experimental and validation parts associated with the Hybride project are provided by an application to the documentation of rare diseases in the context of Orphanet.

The partners of the Hybride consortium are the GREYC Caen laboratory (pattern mining, NLP, text mining), the MoDyCo Paris laboratory (NLP, linguistics), the INSERM Paris laboratory (Orphanet, ontology design), and the Orpailleur team at Inria NGE (FCA, knowledge representation, pattern mining, text mining).

8.2.1.3. ISTEX

Participants: Luis-Felipe Melo, Amedeo Napoli, Yannick Toussaint [contact person].

ISTEX is a so-called "Initiative d'excellence" managed by CNRS and DIST ("Direction de l'Information Scientifique et Technique"). ISTEX aims at giving to the research and teaching community an on-line access to scientific publications in all the domains. Thus ISTEX is in concern with a massive acquisition of documentation such as journals, proceedings, corpus, databases...ISTEX-R is one research project within ISTEX in which is involved the Orpailleur team, with two other partners, namely the ATILF laboratory and the INIST Institute (both in Nancy). ISTEX-R aims at developing new tools for querying full-text documentation, analyzing content and extracting information. A platform is currently under development to provide robust NLP tools for text processing, as well as methods in text mining and domain conceptualization.

8.2.1.4. Kolflow

Participants: Jean Lieber [contact person], Alice Hermann, Amedeo Napoli, Emmanuel Nauer, My Thao Tang, Yannick Toussaint.

Kolflow (http://kolflow.univ-nantes.fr/) is a 3-year basic research project taking place from February 2011 to November 2014, funded by French National Agency for Research (ANR), program ANR CONTINT. The aim of the project is to investigate man-machine collaboration in continuous knowledge-construction flows.

Kolflow partners are GDD (LINA Nantes), Silex (LIRIS Lyon), Orpailleur (Inria NGE/LORIA), Coast (Inria NGE/LORIA), and Wimmics (Inria Sophia Antipolis).

8.2.1.5. PEPSI: Polynomial Expansions of Protein Structures and Interactions

Participants: David Ritchie [contact person], Marie-Dominique Devignes, Malika Smaïl-Tabbone, Seyed Ziaeddin Alborzi.

The PEPSI ("Polynomial Expansions of Protein Structures and Interactions") project is a collaboration with Sergei Grudinin at Inria Grenoble (project Nano-D) and Valentin Gordeliy at the Institut de Biologie Structurale (IBS) in Grenoble. This four-year project funded by the ANR "Modèles Numériques" program involves developing computational protein modeling and docking techniques and using them to help solve the structures of large molecular systems experimentally (http://pepsi.gforge.inria.fr).

8.2.1.6. Termith

Participants: Luis-Felipe Melo, Yannick Toussaint [contact person].

Termith (http://www.atilf.fr/ressources/termith/) is an ANR Project which involves the following laboratories: ATILF, LIDILEM, LINA, INIST, Inria Saclay and Inria Nancy Grand Est. It aims at indexing documents belonging to different domain of Humanities. Thus, the project focuses on extracting candidate terms (information extraction) and on disambiguation.

In the Orpailleur team, we are mainly concerned by information extraction using Formal Concept Analysis techniques, but also pattern and sequence mining. The objective is to define "contexts introducing terms", i.e. finding textual environments allowing a system to decide whether a textual element is actually a candidate term and its corresponding environment.

8.2.1.7. Trajcan: a study of patient care trajectories
Participants: Elias Egho, Nicolas Jay [contact person], Amedeo Napoli, Chedy Raïssi.

Since 30 years, many patient classification systems (PCS) have been developed. These systems aim at classifying care episodes into groups according to different patient characteristics. In France, the so-called "Programme de Médicalisation des Systèmes d'Information" (PMSI) is a national wide PCS in use in every hospital. It systematically collects data about millions of hospitalizations. Though it is used for funding purposes, it includes useful information for public health domains such as epidemiology or health care planning.

The objective of the Trajcan project was to represent and analyze "patient care trajectories" (patient suffering from cancer limited to breast, colon, rectum, and lung cancers) and the associated healthcares (it should be noticed that the Trajcan Project ended at the beginning of 2014). The data are related to patients receiving hospital cares in the "Bourgogne" region and using data from PMSI. Such an analysis involves various data, e.g. type of cancer, number of visits, type of stays, hospitalization services, therapies used, and demographic factors such as age, gender, place of residence.

Elias Egho defended a Phd thesis on this subject in July 2014 [15]. Combining knowledge discovery and knowledge representation methods for improving the definition of patients as temporal objects (sequential data mining), he successfully developed different approaches for characterizing Patient Care Trajectories (PCT). A first characterization is based on sequential pattern structures, extending Formal Concept Analysis techniques to multidimensional sequential data. A second one, involves an algorithm called MMISP for "Mining Multidimensional Itemsets Sequential Patterns" and makes use of external knowledge to improve the mining process and discover sequential patterns at different levels of granularity [62]. Finally, a new similarity measure was developed for comparing sequences of itemsets and for applying clustering methods to classify patients having similar healthcare trajectories. This later work was distinguished by a forthcoming publication in Data Mining and Knowledge Discovery.

8.2.2. Other National Initiatives and Collaborations

8.2.2.1. Towards the discovery of new nonribosomal peptides and synthetases

We have initiated a collaboration with researchers from the LIFL and Université Lille Nord de France on the NRPS toolbox. Data was cleaned and integrated from various public and specific analysis programs. The resulting database should facilitate the process of knowledge discovery of new nonribosomal peptides and synthetases. Actual results of this research collaboration were published in [21].

8.2.2.2. FUI Poqemon
Participant: Chedy Raïssi [Contact Person].

The POQEMON project aims at developing new pattern mining methods and tools for guiding knowledge discovery from mobile phone networks for monitoring purposes. The main idea is to develop sound approaches that handle the trade-off between privacy of data and the power of analysis.

8.3. Regional Initiatives

8.3.1. Le Bois Santé (LBS)

Participants: Marie-Dominique Devignes [contact person], Malika Smaïl-Tabbone.

The project "LBS – Le Bois Santé – #38017" is funded by the European Regional Development Fund (FEDER) and the French "Fonds Unique Interministériel (FUI)" in the framework of the BioProLor consortium. This project is coordinated by "Harmonic Pharma", a start-up specialized in the identification of active principles in natural products. The aim of LBS is to exploit wood products in the pharmaceutical and nutriment domains. Concerned people in the team are working on data management and knowledge discovery about new therapeutic applications.

8.3.2. PEPS Mirabelle EXPLOD-Biomed

Participants: Adrien Coulet [contact person], Marie-Dominique Devignes, Gabin Personeni, Malika Smaïl-Tabbone.

This project has initiated a collaboration with geneticists from the Hospital of Nancy, namely Philippe Jonveaux and Céline Bonnet. The aim of the EXPLOD-Biomed project is to propose novel knowledge discovery methods applied to Linked Open Data for discovering gene that could be responsible for intellectual deficiencies. Linked Open Data are available on-line, interconnected and encoded in a format which can be straightforwardly mapped to ontologies. Thus they offer novel opportunities for knowledge discovery in biomedical data. Here, geneticists play the role of experts and guide the knowledge discovery process at different steps.

8.3.3. Hydreos

Participant: Jean-François Mari [contact person].

Hydreos is a state organization –actually a so-called "Pôle de compétitivité"– aimed at evaluating the quality of water (http://www.hydreos.fr/fr). Actually, water resources rely on many agronomic variables, including land use successions. Accordingly, one objective of our participation in Hydreos is to have a better understanding of the changes in the organization of a territory. The data to be analyzed are obtained by surveys or by satellite images and describe the land use at the level of the agricultural parcel. Then there is a search for detecting changes in land use and for correlating these changes to groundwater quality.

The systems ARPEnTAge (see § 5.2.2) and CarottAge (see § 5.2.1) are used in this context, especially by agronomists of INRA (ASTER Mirecourt http://www6.nancy.inra.fr/sad-aster.

This year, our research work focused on implementing various display tools to have a better understanding of the clustering results that a stochastic modeling provide http://www.loria.fr/~jfmari/App/Arpentage/Yar.avi.

8.3.4. Contrat Plan État Région" (CPER)

A part of the links between the Regional Administration and Inria Nancy Grand Est/LORIA are materialized through the so-called "Contrat Plan État Région" (CPER) which is running from 2015 to 2020. There is an associated scientific program in which the Orpailleur team is involved.

Some members of the Orpailleur team participated to the definition of a project in one of the two tracks of the interdisciplinary scientific program called "Santé et Vieillissement". The other track called "Innovations Technologiques, Modélisation et Médecine Personnalisée (IT2MP)" is coordinated by Pr. Zannad (CHU-Nancy). We proposed a project called "Simulation et Modélisation pour l'Extraction de Connaissances (SMEC)" which gathers physicians, bio-statisticians, chemists and computer scientists. The objective of this project is to design innovative methodologies for analyzing cohort data and make progress towards personalized medicine.

<p style="text-align:center">**SMIS Project-Team**</p>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR KISS (Dec. 2011 - Dec. 2015)

Partners: Inria-SMIS (coordinator), Inria-SECRET, LIRIS, Univ. of Versailles, CryptoExperts, Gemalto, Yvelines district.
SMIS funding: 230k€.

The idea promoted in KISS is to embed, in trusted devices, software components capable of acquiring, storing and managing securely various forms of personal data (e.g., salary forms, invoices, banking statements, geolocation data, depending on the applications). These software components form a Personal Data Server which can remain under the holder's control. The scientific challenges include: embedded data management issues tackling regular, streaming and spatio-temporal data (e.g., geolocation data), data provenance-based privacy models, crypto-protected distributed protocols to implement private communications and secure global computations.

8.1.2. CAPPRIS Project-Lab (Dec. 2011 - Dec. 2015)

Inria Partners: PRIVATICS (coordinator), SMIS, PLANETE, CIDRE, COMETE.
External partners: Univ. of Namur, Eurecom, LAAS.
Funding: not associated to individual project-teams.

An Inria Project Lab (IPL) is a long-term multi-disciplinary project launched by Inria to sustain large scale risky research actions in line with its own strategic plan. CAPPRIS stands for "Collaborative Action on the Protection of Privacy Rights in the Information Society". The key issues that are addressed are: (1) the identification of existing and future threats to privacy, (2) the definition of formally grounded measures to assess and quantify privacy, (3) the definition of the fundamental principles underlying privacy by design and methods to apply them in concrete situations and (4) The integration of the social and legal dimensions. To assess the relevance and significance of the research results, they are confronted to three classes of case studies CAPPRIS partners are involved in: namely Online Social Networks, Location Based Services and Electronic Health Record Systems.

8.1.3. PEPS PAIP (Pour une Approche Interdisciplinaire de la Privacy) (Sept. 2013 - Sept. 2014)

Partners: ADIS and SMIS (co-organizers), CERDI, DANTE, COMETE, GRACE, TPT, LIMSI.
Funding: 30K€ from CNRS, not associated to individual project-teams.

The Digital Society Institute (DSI) is the UPSa IDEX catalyst for multidisciplinary research on societal challenges inherent to eLife/life digitization. DSI plans to be one of the European leading institutes fostering multidisciplinary research across ICTS and SHES. In 2013 DSI already hosts two kick-off major research projects : (1) Human and Machine Coevolution and (2) Privacy/digital identities. ADIS and SMIS are co-organizing project (2) on data privacy. The PEPS PAIP is part of project (2) and aims at fostering the cooperation between lawyers, economists and computer scientists on privacy issues, through the organization of brainstorming days and workshops and a study of possible joint experiments of privacy preserving applications.

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. PDS4NRJ (Aug. 2013 - Aug. 2014)

Instrument: Marie Curie Intra-European Fellowships for Career Development

Duration: 2013 Aug. - 2014 Aug.

Inria contact: Philippe Bonnet

This project, called PDS4NRJ, is based on the insights that (a) secure personal data management can be radically improved with the advent of secure hardware embedded on personal devices at the edges of the Internet, and (b) that a secure personal data management infrastructure should be applied in the context of smart buildings. Our overall objective is to define a new form of decentralized infrastructure for sharing smart meter data with access and usage control guarantees. The PDS4NRJ project is a unique opportunity for Philippe Bonnet, currently associate professor at ITU (Denmark), to become a leading expert in the field of secure personal data management thanks to a tight cooperation with SMIS members.

8.2.2. Collaborations in European Programs, except FP7

Program: Danish Council for Independent Research (FTP call)

Project acronym: CLyDE

Project title: Cross-LaYer optimized Database Engine

Duration: 10/2011 - 10/2014

Partners: IT University of Copenhagen (Denmark), SMIS

Abstract: The goal is to explore how flash devices, operating system and database system can be designed together to improve overall performance. Such a co-design is particularly important for the next generation database appliances, or cloud-based relational database systems for which well suited flash components must be specified. More generally, our goal is to influence the evolution of flash devices and commodity database systems for the benefit of data intensive applications. The project should result in two complementary open-source software systems: (i) a bimodal flash device software component based on the idea from [30], and (ii) a database system optimized for bimodal flash devices. The project funding is managed by the IT University of Copenhagen and covers the expenses for two co-supervised PhD students (including regular visits to and from Denmark).

8.2.3. Collaborations with Major European Organizations

The SMIS members have developed tight European cooperations with the following persons/teams:

Philippe Bonnet (Associate Professor at the University of Copenhagen, Denmark)

Collaboration on Flash-based data management for high-end servers with Philippe Bonnet from IT University of Copenhagen and Björn Þór Jónsson from Reykjavík University (see Section 8.2.2). The study of flash devices started during a short sabbatical of Luc Bouganim (from April to August 2008) in Copenhagen.

Michalis Vazirgiannis (Athens University of Economics and Business)

Collaboration on Minimal Exposure in the context of Michalis' Digiteo Chair at LIX (Ecole Polytechnique).

8.3. International Research Visitors

Philippe Bonnet, associate professor at the IT University of Copenhagen, visited SMIS in the context of a Marie Curie grant from August 2013 until July 2014 (see Section 8.2.1.1).

WIMMICS Project-Team

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. GéoIncertitude
Participant: Andrea Tettamanzi.

We participate in the CNRS PEPS GéoIncertitude, with researchers of the UMR 7300 ESPACE de Nice and of the IRIT of Toulouse on the modeling of uncertainty in Geography using fuzzy logic and possibility theory.

8.1.2. HCI Group of GLC I3S Laboratory
Participant: Alain Giboin.

This work is done in collaboration with Philippe Renevier-Gonin, Christian Brel, Anne-Marie Déry (I3S Rainbow team).

The HCI Group brings together researchers from GLC teams conducting or wishing to conduct research related to HCI. The group specifically addresses the issues of how to conduct user experiments to evaluate the UIs of the software developed in GLC. The group establishes collaborations between researchers in the design and implementation of experiments. Last year a collaboration was initiated between the teams Rainbow and Wimmics on the assessment of (1) an application composition process driven by the composition of UIs, and (2) the prototype OntoCompo supporting this process.

This year, too, a collaboration started to design visualization services assisting caregivers in their night watch tasks.

8.1.3. FUI PadDOC
Participant: Alain Giboin.

This work is done in colaboration with Karima Boudaoud and Marc Arnaert (I3S Rainbow team).

PadDOC goal is to contribute to accelerating the digital transition of citizen, local and regional authorities, administrations and enterprises, by : (1) developing an open standard and innovative software and hardware resources to facilitate nearby or distant administrative formalities and procedures; (2) improving the security of the holder's personal data by putting these data under the exclusive control of the holder; (3) by exploiting unmarked communicating supports (such as smartphones or tablets) for all chain actors. PadDOC partners are: Docapost BPO, Anyces, ABC SmartCard and the teams Rainbow, Media-Coding and Wimmics. Wimmics will contribute to: (1) the analysis, design and evaluation of the PadDOC security-oriented user interfaces; (2) the impact assessment of the chain of actors participating in the experiment to validate the viability of the PadDOC social system. The PadDOC project officially began in November 2014.

8.1.4. SyReMuse Project: collaboration Agorantic-Inria
Participants: Alain Giboin, Isabelle Mirbel, Serena Villata.

This work is done in collaboration with Bernard Senach (Hephaistos, Inria), Brigitte Trousse (Focus Lab, Inria), with Agorantic partners.

Started last year, the collaboration continued this year with ITCS and HSS teams from the Agorantic Federative Structure for Research of the Université d'Avignon et des Pays du Vaucluse. Distant and face-to-face meetings were organized to refine the so-called SyReMuse project, the goal of which is to analyze, design, and evaluate a system recommending visit tours to museum visitors (individuals and groups).

8.1.5. MSHS: Axis-2 ICT, Usage and Communities

Participants: Alain Giboin, Alexandre Monnin, Fabien Gandon.

This work is done in collaboration with Lise Arena and Bernard Conein (Gredeg).

Axis-2 of the "Maison des Sciences Humaines et Sociales (MSHS) du Sud-Est (Nice)" is interested in the relationships between ICT, Practices and Communities. Axis-2 objective is to make explicit two aspects of the relationship between digital technology and community building: (1) networks and (2) artifacts. Two Axis-2 groups-projects address these aspects: (1) the group-project "Social networks and digital networks" and the group-project "Artifacts and coordination".

The first group-project examines how the Internet allows reconstructing the dynamics of interaction networks by making explicit interaction phenomena that could not be observed and treated before the event of Big Data. The second group-project studies the impact of cognitive technologies on the social and cognitive coordination between individuals in organizational and community contexts. Wimmics was mainly involved in the second group-project. In this context, we co-organized the COOP 2014 conference and the COOP 2014 workshop on "The role of artefacts in social coordination".

8.2. National Initiatives

8.2.1. BPI funded project : AZKAR

AZKAR is a two years french project funded by BPI (Banque Publique d'Investissement), focused on *Fast Control of Mobile Robots over the Internet*, using web technologies such as WebRTC and semantic web technologies. The project started September 15th 2014. The first step of the project will be the evaluation/benchmarking of video and data solutions over internet, based on the WebRTC technology. The second step will consist in helping the robotic partner in the project (the Robosoft company) to implement these solutions on a real mobile robot that will be deployed in museums or in homes for helping seniors in their daily tasks. Semantic web technologies, will be used in the project for describing the services, the context of the application domain, the content transmitted, etc.

8.2.2. ANR LabCom SMILK

SMILK (Social Media Intelligence and Linked Knowledge) is a joint laboratory (LabCom, 2013-2016) between the Wimmics team and the Research and Innovation unit of VISEO (Grenoble). Natural Language Processing, Linked Open Data and Social Networks as well as the links between them are at the core of this LabCom. The purpose of SMILK is both to develop research and technologies in order to retrieve, analyze, and reason on textual data coming from Web sources, and to make use of LOD, social networks structures and interaction in order to improve the analysis and understanding of textual resources. Topics covered by SMILK include: use of data and vocabularies published on the Web in order to search, analyze, disambiguate and structure textual knowledge in a smart way, but also to feed internal information sources; reasoning on the combination of internal and public data and schemes, query and presentation of data and inferences in natural formats.

8.2.3. Ministry of Culture: DBpedia.fr

This project named "DBpedia.fr" proposes the creation of a French chapter of the base DBpedia used in many English applications, in particular for the publication of cultural collections. Because DBpedia is focused on the English version of Wikipedia it ignores some of the French topics and their data. This projects aims at extracting a maximum of RDF data from the French version and providing a stable and scalable end-point for them. We now consider means to improve both the quantity and the quality of the data. The DBpedia.fr project was the first project of the Semanticpedia convention signed by the Ministry of Culture, the Wikimedia foundation and Inria.

Web site: http://wimmics.inria.fr/projects/dbpedia

8.2.4. Ministry of Culture
Participant: Alexandre Monnin.

We organized a joint project between Inria and the Ministry of Culture from September 2013 to November 2014. The goal of this project was to discuss the Semantic Web with a special emphasis on cultural project. We organized three conference. The first, to get some feedback from the main projects that were launched the previous years (DBPedia, HDA-Lab and Joconde-Lab, Data.bnf.fr, Centre Pompidou Virtuel, MIMO, Hadoc, etc.), together with the feedback gathered from a major player in the field, the BBC. The second conference took place inside the Ministry of Culture. It raised the question of trust on the Web following Snowden's revelations and Tim Berners-Lee's campaign to re-decentralize the Web. Finally, the last session of the cycle, at Inria Sophia Antipolis, discussed the future of the Web, and presented the Semantic Web/Linked Data as providing some of the solutions that are currently needed to maintain the Web open, decentralized, trustful and safe.

8.2.5. Ministry of Culture: Group Cultural Metadata and Web 3.0 transition
Participant: Alain Giboin.

In order to develop a Transition-to-Web-3.0 cultural policy, the French Ministry of Culture and Communication defined 9 operational actions allowing cultural sector to take into account opportunities and challenges offered by Web 3.0 (also called "Semantic Web", or "Web of Data"), and set up 9 working groups for these actions. Wimmics contributed to the Working Group 5 "Cultural metadata and Transition to Web 3.0: Exploring the interaction modes with audiences using Web 3.0 potentialities".

8.2.6. ANR Kolflow

Kolflow is an ANR project (2011-2014), it proposes to extend collective intelligence with smart agents relying on automated reasoning. Smart agents can significantly reduce the overhead of communities in the process of continuously building knowledge. Consequently, continuous knowledge building is much more effcient. Kolflow aims at building a social semantic space where humans collaborate with smart agents in order to produce knowledge understandable by humans and machines.

Partners: Inria Orpailleur & Wimmics, Silex U. Claude Bernard Lyon, GDD U. of Nantes

Web site: http://kolflow.univ-nantes.fr

8.2.7. ANR OCKTOPUS

OCKTOPUS is an ANR project (2012-2015). The objective of OCKTOPUS is to increase the potential social and economic benefit of the large and quickly growing amounts of user-generated content, by transforming it into useful knowledge. We believe that it is possible to considerably improve upon existing generic Information Retrieval techniques by exploiting the specific structure of this content and of the online communities which produce it. Specifically, we will focus on a multi-disciplinary approach in order to address the problem of finding relevant answers to questions within forums and question-answer sites. To create metrics and predictors of content quality and use them to improve the search experience of a user, we will take advantage of:

- the experience of the CRG (the management research institute of Ecole Polytechnique and CNRS) to understand better the incentives of, and interactions between individuals who produce online content within large communities;
- the experience of the Wimmics research team to analyze the structural and temporal aspects of the complex typed social graphs found within these communities;
- the ability of Alcméon (a start-up developing a search application dedicated to user-generated content) to integrate and test the results of OCKTOPUS within a common demonstration framework, in order to assess their practical usefulness when applied to concrete large-scale datasets.

Partners: Alcméon, CRG, Inria Wimmics.

Web site: http://ocktopus.alcmeon.com

8.2.8. CNRS Mastodons CrEDIBLE

Participants: Olivier Corby, Catherine Faron Zucker, Alban Gaignard.

We participate to the CrEDIBLE research project funded by the MASTODONS program of the interdisciplinary mission of CNRS which objective is to bring together scientists from all disciplines involved in the implementation of systems sharing of distributed and heterogeneous medical imaging, provide an overview of this area and to evaluate methods of state of the art and technology that affect this area. In this framework, we participated to the organization of a 3-days workshop and we worked with members of the I3S Modalis team (Johan Montagnat) on the distribution of algorithms in the Corese/KGRAM engine.

Catherine Faron Zucker was chairman of one of its session and worked with members of the I3S Modalis team on a survey of existing approaches for the translation of relational data to RDF data.

Web site: https://credible.i3s.unice.fr

8.2.9. GDRI Zoomathia

Participants: Olivier Corby, Catherine Faron Zucker, Alexandre Monnin.

Wimmics is partner of International Research Group (GDRI) Zoomathia funded by two CNRS institutes: INEE and INSHS. It aims at studying transmission of zoological knowledge from Antiquity to Middle-Age through material resources (bio residues, artefacts), iconography and texts.

One of the goals of the project is to design a thesaurus and semantically annotate resources, capturing different types of knowledge: zoonyme, historical period, zoological speciality (ethology, anatomy, physiology, psychology, zootechnique, etc.), litterary genre or iconography.

We started to work on 1) the translation of manual annotations of middle-age structured texts from XML to RDF, 2) the automatic extraction of RDF annotations from text using NLP techniques and 3) the exploitation of these semantic metadata to help historians in their studies of knowledge transmission through these texts.

8.2.10. Inria Large Scale Initiative Action PAL (Personally Assisted Living)

Participants: Alain Giboin, Célia Ormea.

This work is done in collaboration with David Daney and Jean-Pierre Merlet (Coprin/Hephaistos), Patrick Rives (Lagadic).

Last year, Wimmics was involved in a socio-ergonomic field study to inform the design of a device (such as a robotic shopping trolley) assisting elderly and frail persons to do their shopping autonomously. This year this work was synthesized and published in [61].

Web site: http://pal.inria.fr

8.2.11. Carnot Project

Participants: Elena Cabrio, Serena Villata.

This project was just accepted this year on the topic of *Natural Language Argumentation on Twitter: Retrieval of Argumentative Structures and Reasoning*.

Partner : Vigiglobe.

8.3. European Initiatives

8.3.1. Collaborations in European Programs, except FP7 & H2020

Program: CHIST-ERA

Project acronym: ALOOF

Project title: Autonomous Learning of the Meaning of Objects

Duration: October 2014 - October 2017

Coordinator: University of Rome La Sapienza Italy

Other partners: University of Birmingham United Kingdom, Technische Universität Wien Austria.

Abstract: The goal of ALOOF is to enable robots to tap into the ever-growing amount of knowledge available on the Web, by learning from there about the meaning of previously unseen objects, expressed in a form that makes them applicable when acting in situated environments. By searching the Web, robots will be able to learn about new objects, their specific properties, where they might be stored and so forth. To achieve this, robots need a mechanism for translating between the representations used in their real-world experience and those on the Web. We propose a meta-modal representation, composed of meta-modal entities and relations between them. A single entity is composed of modal features extracted from sensors or the Web. A modal completion supports perception in the absence of a complete set of features. The combined features link to the semantic properties associated to each entity. All entities are organized into a structured ontology, supporting formal reasoning. This is complemented with methods for detecting gaps in the knowledge of the robot, for planning where to effectively obtain the knowledge, and for extracting relevant knowledge from Web resources. By situating meta-modal representations into the perception and action capabilities of robots, we will achieve a powerful mix of Web-supported and physical-interaction-based open-ended learning. Our scenario consists of a home setting where robots have to find/retrieve objects while understanding their meaning and relevance in the assigned task. Our measure of progress will be how many gaps, i.e. incomplete information about objects, can be resolved autonomously given specific prior knowledge. We will integrate results on different mobile robot platforms ranging from smaller mobile platforms, over Metralabs Scitos to a home service robot HOBBIT.

8.4. International Initiatives

8.4.1. Inria Associate Teams

Program: International Initiatives

SEEMPAD

Social Exchanges and Emotions in Mediated Polemics - Analysis and Data

International Partner (Institution - Laboratory - Researcher):

University of Montréal, Heron Lab (Canada)

Duration: 2014 - 2017

See also: https://project.inria.fr/seempad/

Generating, annotating and analyzing a dataset that documents a debate. We aim at synchronizing several dimensions: social links (intensity, alliances, etc.); interactions happening (who talks to whom); textual content of the exchanged messages; social-based semantic relations among the arguments; emotions, polarity, opinions detected from the text; emotions, physical state detected from sensors.

During the first year, we have defined the protocol for the first experimental setting, which will represent the first stage of the proof-of-concept. The goal of the first experiment is to address a feasibility study of the annotation of a corpus of natural language arguments with emotions. The experiment involved a group of 20 participants, recruited by the Heron Lab. In particular, the first experiment has considered the following steps:

- Starting from an issue to be discussed provided by the animators, the aim of the experiment is to collect the arguments proposed by the participants.
- These arguments are then associated with the emotional component detected through apposite devices of the Heron Lab. More precisely, the workload/engagement emotional states and the facial emotions of the participants are extracted during the debate, using an EEG headset and a Face Emotion Recognition tool respectively.

- In a post-processing phase on the collected data, we have synchronized the arguments put forward at instant t with the emotional indexes we retrieved.

- The output of this post-processing phase (ongoing) will result in an argumentation graph representing each discussion addressed by the discussion groups. These argumentation graphs connect the arguments to each other by a support or an attack relation, and they will be labeled with the source that has proposed the argument, and the emotional state of the source itself and of the other participants at the time when the argument has been put on the table.

8.4.1.1. Declared Inria International Partners

Fabien Gandon acts as Inria representative at W3C.

We participate to W3C Data Shape WG, Linked Data Platform WG and Semantic Web Interfaces Community Group.

8.4.1.2. Informal International Partners

Software Engineering Laboratory (Head: Pierre Robillard), Polytechnique Montréal, Canada.

Topic of the collaboration: Modeling of software development processes and teams for quality assessment purposes.

8.4.2. Inria International Labs

We participate to the LIRIMA where we have a long term collaboration with University Gaston Berger at Saint-Louis, Senegal, with Moussa Lo. We host two PhD students in collaboration with UBG: Papa Fary Diallo and Oumy Seye.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

Faten Ayachi is professor, director of Computer Science dept. at SUPCOM Engineering School in Tunis, Tunisia. Visit: august 25-31. *New security policies in RDBMS: retro-conception algorithms.*

Pr Liam J. Bannon (University of Limerick, Ireland), gave a talk about *Towards a More Human-centred Informatics? Examining the Role of HCI and CSCW in Computing.* It was an invited talk co-organized with the MSHS Project "Artefacts, coordination et communautés numériques", October 16th.

8.5.1.1. Internships

> **Cristian Adrián Cardellino**
>
> > June – 2014
> >
> > Universidad Nacional de Córdoba (Argentina)
> >
> > *Design and development of a data licensing framework for Linked Data*

<p align="center" style="color:red">ZENITH Project-Team</p>

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. Labex NUMEV, Montpellier
URL: http://www.lirmm.fr/numev

We are participating in the Laboratory of Excellence (labex) NUMEV (Digital and Hardware Solutions, Modelling for the Environment and Life Sciences) headed by University of Montpellier 2 in partnership with CNRS, University of Montpellier 1, and Inria. NUMEV seeks to harmonize the approaches of hard sciences and life and environmental sciences in order to pave the way for an emerging interdisciplinary group with an international profile. The NUMEV project is decomposed in four complementary research themes: Modeling, Algorithms and computation, Scientific data (processing, integration, security), Model-Systems and measurements. Florent Masseglia co-heads (with Pascal Poncelet) the theme on scientific data.

8.1.2. Institut de Biologie Computationnelle (IBC), Montpellier
URL: http://www.ibc-montpellier.fr

IBC is a 5 year project with a funding of 2Meuros by the MENRT ("Investissements d'Avenir" program) to develop innovative methods and software to integrate and analyze biological data at large scale in health, agronomy and environment. Patrick Valduriez heads the workpackage on integration of biological data and knowledge.

8.2. National Initiatives

8.2.1. PIA

8.2.1.1. Datascale (2013-2015), 250Keuros
Participants: Reza Akbarinia, Florent Masseglia, Saber Salah, Patrick Valduriez.

The Datascale project is a "projet investissements d'avenir" on big data with Bull (leader), CEA, ActiveEon SAS, Armadillo, Twenga, IPGP, Xedix and Inria (Zenith) . The goal of the project is to develop the essential technologies for big data, including efficient data management, software architecture and database architecture, and demonstrate their scalability with representative applications. In this project, the Zenith team works on data mining with Hadoop MapReduce.

8.2.1.2. Xdata (2013-2015), 125Keuros
Participants: Emmanuel Castanier, Julien Diener, Patrick Valduriez.

The X-data project is a "projet investissements d'avenir" on big data with Data Publica (leader), Orange, La Poste, EDF, Cinequant, Hurence and Inria (Indes, Planete and Zenith) . The goal of the project is to develop a big data plaftform with various tools and services to integrate open data and partners's private data for analyzing the location, density and consuming of individuals and organizations in terms of energy and services. In this project, the Zenith team heads the workpackage on data integration.

8.2.2. Others

8.2.2.1. RTRA Pl@ntNet (2009-2014), 1Meuros
Participants: Alexis Joly, Hervé Goëau, Julien Champ.

The Pl@ntNet project http://www.plantnet-project.org/ was launched in 2009 by a large international consortium headed by three groups with complementary skills (UMR AMAP [0], IMEDIA project team at Inria, and the French botanical network TelaBotanica [0]), with financial support from the Agropolis Foundation. Due to the departure of Nozha Boujemaa from the head of IMEDIA and the mobility of Alexis Joly in 2011, Zenith has been entrusted with the Inria's management and scientific coordination of the project in spring 2012. The objectives of the project are (i) to develop cutting-edge transdisciplinary research at the frontier between integrative botany and computational sciences, based on the use of large datasets and expertise in plant morphology, anatomy, agronomy, taxonomy, ecology, biogeography and practical uses (ii) provide free, easy-access software tools and methods for plant identification and for the aggregation, management, sharing and utilization of plant-related data (iii) promote citizen science as a powerful means to enrich databases with new information on plants and to meet the need for capacity building in agronomy, botany and ecology.

8.2.2.2. CIFRE INA/Inria (2013-2016), 100Keuros

Participants: Alexis Joly, Valentin Leveau, Patrick Valduriez.

This CIFRE contract with INA allows funding a 3-years PhD (Valentin Leveau). This PhD addresses research challenges related to large-scale supervised content-based retrieval notably in distributed environments.

8.2.2.3. CNRS INS2I Mastodons (2013-2014), 60Keuros

Participants: Alexis Joly, Florent Masseglia, Esther Pacitti [leader], Patrick Valduriez.

This project deals with the problems of big data in the context of life science, where masses of data are being produced, e.g. by Next Generation Sequencing technologies or plant phenotyping platforms. In this project, Zenith addresses the specific problems of large-scale data analysis and data sharing.

8.3. European Initiatives

8.3.1. FP7 Projects

8.3.1.1. CoherentPaaS

Project title: A Coherent and Rich Platform as a Service with a Common Programming Model
Instrument: Integrated Project
Duration: 2013 - 2016
Total funding: 5 Meuros (Zenith: 500Keuros)
Coordinator: U. Madrid, Spain
Partner: FORTH (Greece), ICCS (Greece), INESC (Portugal) and the companies MonetDB (Netherlands), QuartetFS (France), Sparsity (Spain), Neurocom (Greece), Portugal Telecom (Portugal).
Inria contact: Patrick Valduriez

Accessing and managing large amounts of data is becoming a major obstacle to developing new cloud applications and services with correct semantics, requiring tremendous programming effort and expertise. CoherentPaaS addresses this issue in the cloud PaaS landscape by developing a PaaS that incorporates a rich and diverse set of cloud data management technologies, including NoSQL data stores, such as key-value data stores and graph databases, SQL data stores, such as in-memory and column-oriented databases, hybrid systems, such as SQL engines on top on key-value data stores, and complex event processing data management systems. It uses a common query language to unify the programming models of all systems under a single paradigm and provides holistic coherence across data stores using a scalable, transactional management system. CoherentPaaS will dramatically reduce the effort required to build and the quality of the resulting cloud applications using multiple cloud data management technologies via a single query language, a uniform programming model, and ACID-based global transactional semantics. CoherentPaaS will design and build a working prototype and will validate the proposed technology with real-life use cases. In this project, Zenith is in charge of designing an SQL-like query language to query multiple databases (SQL, NoSQL) in a cloud and implementing a compiler/optimizer and query engine for that language.

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[0]http://amap.cirad.fr/en/
[0]http://www.tela-botanica.org/

8.4. International Initiatives

8.4.1. Inria Associate Teams

8.4.1.1. MUSIC

Title: MUltiSite Cloud (MUSIC) data management
Inria principal investigator: Esther Pacitti
International Partner (Institution - Laboratory - Researcher):

Laboratorio Nacional de Computaçao Cientifica, Petropolis (Brazil) - Fabio Porto

Universidade Federal do Rio de Janeiro (Brazil) - Alvaro Coutinho and Marta Mattoso

Universidade Federal Fluminense, Niteroi (Brazil) - Daniel Oliveira

Centro Federal de Educa cao Tecnologica, Rio de Janeiro (Brazil) - Eduardo Ogasawara

Duration: 2014 - 2016
See also: https://team.inria.fr/zenith/projects/international-projects/music/

The cloud has become a good match for managing big data since it provides unlimited computing, storage and network resources on demand. By centralizing all data in a large-scale data-center, the cloud significantly simplifies the task of system administration. But for scientific data, where different organizations may have their own data-centers, a distributed (multisite) cloud model where each site is visible from outside, is needed. The main objective of this research and scientific collaboration is to develop a multisite cloud architecture for managing and analyzing scientific data, including support for heterogeneous data; distributed scientific workflows, and complex big data analysis. The resulting architecture will enable scalable data management infrastructures that can be used to host a variety of scientific applications that benefit from computing, storage, and networking resources that span multiple data-centers.

8.4.1.2. BIGDATANET

Title: A hybrid P2P/cloud for big data
Inria principal investigator: Patrick Valduriez
International Partner :

University of California at Santa Barbara (USA) - Amr El Abbadi and Divy Agrawal

Duration: 2013 - 2015
See also: https://team.inria.fr/zenith/projects/international-projects/bigdatanet/

The main objective of this research and scientific collaboration is to develop a hybrid architecture of a computational platform that leverages the cloud computing and the P2P computing paradigms. The resulting architecture will enable scalable data management and data analysis infrastructures that can be used to host a variety of next-generation applications that benefit from computing, storage, and networking resources that exist not only at the network core (i.e., data-centers) but also at the network edge (i.e., machines at the user level as well as machines available in CDNs – content distribution networks hosted in ISPs).

8.4.2. Inria International Partners

8.4.2.1. Informal International Partners

We have regular scientific relationships with research laboratories in

- North America: Univ. of Waterloo (Tamer Özsu), Mc Gill, Montreal (Bettina Kemme).
- Asia: National Univ. of Singapore (Beng Chin Ooi, Stéphane Bressan), Wonkwang University, Korea (Kwangjin Park)
- Europe: Univ. of Amsterdam (Naser Ayat, Hamideh Afsarmanesh), Univ. of Madrid (Ricardo Jiménez-Periz), UPC Barcelona (Josep Lluis Larriba Pey, Victor Munoz)
- North Africa: Univ. of Tunis (Sadok Ben-Yahia)

8.4.3. Inria International Labs

The Bigdatanet associated team takes part of the Inria@SiliconValley lab.

8.4.4. Participation In other International Programs

We are involved in the following international actions:

- CNPq-Inria project Hoscar (HPC and data management, 2012-2015) with LNCC (Fabio Porto), UFC, UFRGS (Philippe Navaux), UFRJ (Alvaro Coutinho, Marta Mattoso) to work on data management in high performance computing environments.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

Ruiming Tang (National University of Singapore) gave a seminar on "Quality and Price of Data" in January.

Xiao Bai (Yahoo Labs Barcelona) gave a seminar on "Improving the Efficiency of Multi-site Web Search Engines" in January.

Philippe Bonnet (IT University of Copenhagen) gave a seminar on CLyDE Mid-Flight: What we have learnt so far about the SSD-Based IO Stack in May.

Antoine Chambille and Romain Colle (QuartetFS, Paris) gave a seminar on "In-Memory Analytics: Accelerating Business Performance" in June.

Divy Agrawal and Amr El Abbadi (UCSB, USA) gave keynote talks on "Emerging Technologies for Big Data Management and Analytics" and "Consistent, Elastic and Fault-Tolerant Management of Big Data in the Cloud", respectively, in the Mastodons International Workshop on "Big Data Management and Crowd Sourcing towards Scientific Data" in Montpellier in June.

Bettina Kemme (McGill Univ., Canada) gave a seminar on "Multiplayer Games: a complex application in need for scalable replica management" in december.

Sihem Amer-Yahia (LIG) gave a seminar on "Task Assignment Optimization in Crowdsourci" in December.

8.5.2. Visits to International Teams

Patrick Valduriez visited the Inria-Chile center in Santiago in october, where he gave several talks.

Mohamed Reda Bouadjenek visited UCSB in november-december, in the context of the Bigdatanet associated team.

ALICE Project-Team

7. Partnerships and Cooperations

7.1. Regional Initiatives

Meshing and PDEs, Regional Council of Lorraine, 25 KEuros for initiating the cooperation between Xavier Antoine (Prof. in Math., Nancy who joined ALICE for a short-term 1 year period) and Bruno Lévy;

7.2. National Initiatives

7.2.1. ANR BECASIM (2013 – 2016)

890 K€. X. Antoine heads the second partner, which includes Bruno Lévy. Budget for Nancy: 170 K€ of which 100 K€ are for IECL (team CORIDA). This project is managed by Inria. Becasim is a thematic "Numerical Models" ANR project granted by the French Agence Nationale de la Recherche for years 2013-2016. The acronym Becasim is related to Bose-Einstein Condensates: Advanced SIMulation Deterministic and Stochastic Computational Models, HPC Implementation, Simulation of Experiments. The members of the ANR Project Becasim belong to 10 different laboratories.

7.2.2. ANR Bond (2013 – 2017)

X. Antoine is a member of the ("projet blanc") ANR BOND (Boundaries, Numerics and Dispersion).

7.2.3. ANR TECSER (2014 – 2017)

X. Antoine is a member of ANR TECSER that stemmed from the ASTRID program (DGA). The consortium gathers Inria (S. Lantéri, Nice-Sophia, ÉPI CORIDA (X. Antoine) and HIEPACS), EADS, and Nuclétudes.

Total budget: 300 K€ of which 54 K€ are for CORIDA.

7.2.4. ANR Morpho (2010 – 2014

Dobrina Boltcheva and Bruno Lévy are involved in the ANR project Morpho. Morpho is aimed at designing new technologies for the measure and for the analysis of dynamic surface evolutions using visual data.

7.3. European Initiatives

7.3.1. FP7 & H2020 Projects

7.3.1.1. SHAPEFORGE

Type: FP7

Defi: NC

Instrument: ERC Starting Grant

Objectif: NC

Duration: December 2012 - November 2017

Coordinator: Sylvain Lefebvre

Inria contact: Sylvain Lefebvre

Abstract: Project Shapeforge aims at developing new methods for creating objects from examples, with 3D printers. The main challenge with this project is combining approaches that are very different in nature: algorithms from computer graphics which are used to build forms and textures using examples are combined with digital optimization methods which make sure that the real object complies with the function it is assigned. Thus, to produce a Louis XV bench, on the basis of a Louis XV chair, you need to not only capture the appearance of the example but also formalize the characteristics of a bench as well as its mechanical properties to ensure that it is solid enough. You then need to find, from among all the shapes that can be produced from a single example, the one that best complies with the various criteria.

7.3.1.2. VORPALINE

Type: FP7

Defi: NC

Instrument: ERC Proof of Concept

Objectif: NC

Duration: July 2013 - June 2014

Coordinator: Bruno Lévy

Inria contact: Bruno Lévy

Abstract: The Vorpaline software takes a new approach to 3D mesh generation, based on the theory of numerical optimization. The optimal mesh generation algorithm developed in the frame of the European Research Council GOODSHAPE project globally and automatically optimizes the mesh elements with respect to geometric constraints (two patents) . The mathematical foundations of this algorithm, i.e. the minimization of a smooth energy function, result in practice in a faster algorithm, and - more importantly - in a higher flexibility. For instance, it will allow automatic generation of the aforementioned "hex-dominant" meshes. It is now proposed (since 2014) to the sponsors of the Gocad consortium, as an extension package of the Gocad software.

7.4. International Initiatives

7.4.1. Inria Associate Teams

7.4.1.1. PREPRINT3D

Title: Model Preparation for 3D Printing

International Partner (Institution - Laboratory - Researcher):

HKU (HONG KONG)

Duration: Delayed for administrative reasons

We seek to develop novel ways to prepare objects for 3D printing which better take into account limitations of the fabrication processes as well as real-world properties such as the mechanical strength of the printed object. This is especially important when targeting an audience which is not familiar with the intricacies of industrial design. We target complex, intricate shapes such as models of vegetation and highly detailed meshes, as well as models with thin walls such as architectural models. Our methods will modify the object geometry and topology while remaining as close as possible to its initial appearance.

7.4.2. Inria International Partners

7.4.2.1. Informal International Partners

- We have a long-term cooperation with the Gocad Consortium (Nancy school of Geology), with co-advised students. This resulted in some applications of our result to oil exploration, listed in the *numerical simulation* item above (Ph.D. theses of Arnaud Botella, Nicolas Cherpeau, Jeanne Pellerin);

- We cooperate since 2008 with Wenping Wang's group (Hong-Kong University), on centroidal Voronoi tesselation. The last results of this cooperation on *Sampling and Remeshing* are published in : [22] Siam J. on Scientific Computing and [30] (SIGGRAPH 2013)

- Cooperation with Pierre Poulin and Gilles-Philippe Paillé on volumetric distance minimization [26] (SGP 2009)

- Cooperation with Tsinghua University (Jean-Claude Paul was Professor there from 2004 to 2013).

- We started a research project with "Ateliers Cini", "Institut Jean Lamour" (IJL) and the "Ecole de Chirurgie de Nancy", to develop new 3D printers using novel types of materials developed by IJL. This project is funded by the "Region Lorraine" under the "Pacte Lorraine" program.

7.5. International Research Visitors

7.5.1. *Visits to International Teams*

7.5.1.1. *Research stays abroad*

Jérémie Dumas (PhD student) stayed in Hong Kong for 1 month as a visiting student (12-04-2014 to 10-05-2014). This visit was done in the context of the Equipe Associée PrePrint3D.

<h1 style="text-align:center; color:red">AVIZ Project-Team</h1>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR FITOC: From Individual To Collaborative Visual Analytics

Participants: Petra Isenberg [correspondant], Jean-Daniel Fekete, Pierre Dragicevic, Wesley Willett.

The project addresses fundamental problems of technological infrastructure and the design of data representation and interaction to build a bridge between individual and team work for visual data analysis. In collaboration with the University of Magdeburg we have begun to tackle this challenge through the design of tangible widgets that help to bridge the gap between individual and collaborative information seeking.

8.1.2. ANR EASEA-Cloud

Participants: Evelyne Lutton [correspondant], Waldo Cancino, Hugo Gilbert, Pierre Collet.

The aim of the EASEA-CLOUD project is to exploit the massively parallel resources that are offered by clusters or a grid of modern GPU-equipped machines in order to find solutions to inverse problems whose evaluation function can be intrinsically sequential. Massive parallelization of generic sequential problems can be achieved by evolutionary computation, that can efficiently exploit the parallel evaluation of thousands of potential solutions (a population) for optimization or machine-learning purposes. The project consists in turning the existing EASEA (EASy Specification of Evolutionary Algorithms, http://easea.unistra.fr/) research platform into an industrial-grade platform that could be exploited by running in "cloud" mode, on a large grid of computers (ISC-PIF/CREA is the current manager of the French National Grid). The necessary steps are to develop:

- a professional-grade API, development environment and human-computer interface for the existing academic EASEA platform,
- cloud-management tools (in order to launch an experiment on a grid of computers, monitor the experiment and bill the laboratories or companies that will be using EASEA-CLOUD for intensive computation,
- novel visualisation tools, in order to monitor an evolutionary run, potentially launched on several hundred heterogeneous GPU machines.

The consortium is made of thee partners: LSIIT/UDS (which is developing the EASEA platform), ISCPIR/CREA (for its experience in grid and cloud computing), AVIZ/Inria (for its experience in visualization tools for evolutionary computation) and two subcontractors: LogXLabs (a software development company in order to create industrial-grade code and interfaces) an BIOEMERGENCE-IMAGIF, the "valorisation" department of CNRS Gif s/Yvette. Valorisation will take place in strong collaboration with UNISTRA VALO, the valorisation structure of Université de Strasbourg. The project started on October 1st, 2012, for 2 years. AVIZ is in charge of developing new visualisation tools adapted to the monitoring of the optimization process.

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. CENDARI

Program: Infrastructures

Project acronym: **CENDARI**

Project title: Collaborative EuropeaN Digital/Archival Infrastructure

Duration: 01/2012 - 12/2015

Coordinator: Trinity College, Dublin (IE),

Other partners: Freie Universitaet Berlin (DE), Matematicki Institut Sanu u Beogradu (Serbia), University of Birmingham (UK), King's College London (UK), Georg-August-Universitaet Goettingen Stiftung Oeffentlichen Rechts (DE), Narodni Knihovna Ceske Republiky (Czech Republic), Societa Internazionale per lo Studio del Medioevo Latino-S.I.S.M.E.L. Associazione (IT), Fondazione Ezio Franceschini Onlus (IT), Ministerium fur Wissenschaft, Forschung und Kunst Baden-Wurttemberg (DE), Consortium of European Research Libraries (UK), Koninklijke Bibliotheek (NL), UNIVERSITA DEGLI STUDI DI CASSINO (IT).

Abstract:

The Collaborative EuropeaN Digital Archive Infrastructure (CENDARI) will provide and facilitate access to existing archives and resources in Europe for the study of medieval and modern European history through the development of an 'enquiry environment'. This environment will increase access to records of historic importance across the European Research Area, creating a powerful new platform for accessing and investigating historical data in a transnational fashion overcoming the national and institutional data silos that now exist. It will leverage the power of the European infrastructure for Digital Humanities (DARIAH) bringing these technical experts together with leading historians and existing research infrastructures (archives, libraries and individual digital projects) within a programme of technical research informed by cutting edge reflection on the impact of the digital age on scholarly practice.

The enquiry environment that is at the heart of this proposal will create new ways to discover meaning, a methodology not just of scale but of kind. It will create tools and workspaces that allow researchers to engage with large data sets via federated multilingual searches across heterogeneous resources while defining workflows enabling the creation of personalized research environments, shared research and teaching spaces, and annotation trails, amongst other features. This will be facilitated by multilingual authority lists of named entities (people, places, events) that will harness user involvement to add intelligence to the system. Moreover, it will develop new visual paradigms for the exploration of patterns generated by the system, from knowledge transfer and dissemination, to language usage and shifts, to the advancement and diffusion of ideas.

See more at http://cendari.eu/ and http://www.aviz.fr/Research/CENDARI.

8.2.2. Collaborations with Major European Organizations

Fraunhofer Institute, IGD (DE)

We are collaborating on visual analytics, setting up European projects and coordinating European initiatives on the subject.

University of Dresden, (DE)

We have been collaborating with Raimund Dachselt on stackable tangible devices for faceted browsing [55], [54].

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Declared Inria International Partners

AVIZ researchers collaborate with a number of international partners, including:

- Google, Mountain View, USA
- Microsoft Research, Redmond, USA
- New York University, USA
- University of Toronto, Canada
- University of Calgary, Canada
- University of British Columbia, Canada
- University of Kent, UK
- University of Konstanz, Germany
- University of Magdeburg, Germany

8.3.1.2. Informal International Partners

- Arizona State University, USA
- University of Vienna, Austria
- University of Groningen, the Netherlands
- University of Granada, Spain

8.3.2. Inria International Labs

- *Massive Data team*, Inria Chile.

8.3.3. Collaboration with Google

AVIZ collaborates with Google on several projects, related to the Google Research Grant and to evaluation methodology in information visualization.

8.3.4. Collaboration with Microsoft Research

AVIZ collaborates with several researchers from Microsoft Research Redmond, in particular on the topic of new interactions for information visualization and brain connectivity visualization.

8.3.5. Collaboration with New-York University

Jean-Daniel Fekete collaborates with Claudio Silva and Juliana Freire from NYU-Poly on the VisTrails workflow system for visual analytics (http://www.vistrails.org). Rémi Rampin, intern from the Univ. Paris-Sud Master in HCI, has spent one month at Orsay and 5 months at NYU-Poly to allow VisTrails to run Java-based applications and Toolkits. Rémi successfully connected the traditional Python-C implementation of VisTrails to the Java virtual machine using the JPype package. Jean-Daniel Fekete is now porting the Obvious Toolkit [47] in this environment to integrate all its components [50].

8.4. International Research Visitors

8.4.1. Visits to International Teams

8.4.1.1. Sabbatical programme

Jean-Daniel Fekete

Date: Jan 2015 - Dec 2015

Institution: University of New-York (USA)

<p align="center" style="color:red">HYBRID Project-Team</p>

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. Labex S3PM

Participants: Bruno Arnaldi [contact], Valérie Gouranton [contact], Guillaume Claude.

S3PM is a 3-year project (2013-2016) funded by Labex CominLabs. It involves 3 academic research teams: Medicis (LTSI/Inserm), S4 and Hybrid (IRISA/Inria). S3PM aims at providing specific models, tools and software to create a collaborative virtual environment dedicated to neurosurgery processes using observations of real processes.

8.1.2. Labex HEMISFER

Participant: Anatole Lécuyer [contact].

HEMISFER is a 3-year project (2013-2016) funded by Labex CominLabs. It involves 4 Inria/IRISA teams (Hybrid, Visages (lead), Panama, Athena) and 2 medical centers: the Rennes Psychiatric Hospital (CHGR) and the Reeducation Department of Rennes Hospital (CHU Pontchaillou). The goal of HEMISFER is to make full use of neurofeedback paradigm in the context of rehabilitation and psychiatric disorders. The major breakthrough will come from the use of a coupling model associating functional and metabolic information from Magnetic Resonance Imaging (fMRI) to Electro-encephalography (EEG) to "enhance" the neurofeedback protocol. Clinical applications concern motor, neurological and psychiatric disorders (stroke, attention-deficit disorder, treatment-resistant mood disorders, etc).

8.1.3. Labex SABRE

Participants: Anatole Lécuyer [contact], Jussi Lindgren.

SABRE is a 3-year project (2014-2017) funded by Labex CominLabs. It involves 1 Inria/IRISA team (Hybrid) and 2 groups from TELECOM BREST engineering school. The goal of SABRE is to improve computational functionnalities and power of current real-time EEG processing pipelines. The project will investigate innovative EEG solution methods empowered and speeded-up by ad-hoc, transistor-level, implementations of their key algorithmic operations. A completely new family of fully-hardware-integrated, new computational EEG imaging methods will be developed that are expected to speed up the imaging process of an EEG device of several orders of magnitude in real case scenarios.

8.1.4. CNPAO Project

Participants: Valérie Gouranton [contact], Jean-Baptiste Barreau, Quentin Petit.

CNPAO ("Conservatoire Numérique du Patrimoine Archéologique de l'Ouest") is an on-going research project partially funded by the Université Européenne de Bretagne (UEB). It involves IRISA/Hybrid and CReAAH. The main objectives are: (i) a sustainable and centralized archiving of 2D/3D data produced by the archaeological community, (ii) a free access to metadata, (iii) a secure access to data for the different actors involved in scientific projects, and (iv) the support and advice for these actors in the 3D data production and exploration through the latest digital technologies, modeling tools and virtual reality systems.

8.1.5. IRT b<>com

Participants: Bruno Arnaldi [contact], Valérie Gouranton, Maud Marchal.

b<>com is a French Institute of Research and Technology (IRT). The main goal of this IRT is to fasten the development and marketing of tools, products and services in the field of digital technologies. Our team collaborate with b<>com within two 3-year projects: ImData (on "Immersive Interaction") and GestChir (on "Augmented Healthcare").

8.2. National Initiatives

8.2.1. ANR CORVETTE

Participants: Bruno Arnaldi [contact], Valérie Gouranton [contact], Florian Nouviale, Thomas Lopez, Rozenn Bouville Berthelot, Thomas Boggini, Quentin Petit.

CORVETTE (COllaboRative Virtual Environment Technical Training and Experiment) is a 4-year ANR project (2011-2014) led by Bruno Arnaldi. It involves 3 Academic partners (INSA Rennes, ENIB, CEA-List) and 4 Industrial partners (AFPA, Nexter Training, Virtualys, Golaem). CORVETTE aims at designing novel approaches for industrial training (maintenance, complex procedures, security, diagnosis, etc) exploiting virtual reality technologies. The project has three main research axes: collaborative work, virtual human, communication and evaluation. The project seeks to put in synergy: 1) Virtual Human for its ability to embody the user as an avatar and acting as a collaborator during trainingj; 2) Natural communication between users and virtual humans for task-oriented dialogues; and 3) Methodologies in cognitive psychology for the assessment of the effectiveness of the collaboration of users and virtual humans to perform complex cooperative tasks in VR. All these components have been integrated into a unified environment based on an industrial scenario. Several evaluations regarding the different technologies developed in the project have also been achieved.

8.2.2. ANR MANDARIN

Participants: Merwan Achibet, Adrien Girard, Anatole Lécuyer, Maud Marchal [contact].

MANDARIN ("MANipulation Dextre hAptique pour opéRations INdustrielles en RV") is a 4-year ANR project (2012-2015). MANDARIN partners are CEA-List (coordinator), Inria/Hybrid, UTC, Haption and Renault. It aims at designing new hardware and software solutions to achieve natural and intuitive mono and bi-manual dextrous interactions, suitable for virtual environments. The objective of Hybrid in MANDARIN is to design novel multimodal 3D interaction techniques and metaphors allowing to deal with haptic gloves limitations (portability, under-actuation) and to assist the user in virtual reality applications requiring dexterous manipulation. The results will be evaluated with a representative industrial application which is not feasible with currently existing technologies: the bi-manual manipulation of complex rigid objects and cables bundles.

8.2.3. ANR HOMO-TEXTILUS

Participants: Anatole Lécuyer [contact], Maud Marchal, Jonathan Mercier-Ganady.

HOMO-TEXTILUS is a 4-year ANR project (2012-2015). Partners of the project are : Inria/Hybrid, CHART, LIP6, TOMORROW LAND, RCP and potential end-user is Hussein Chalayan fashion designer. The objective of HOMO TEXTILUS is to study what could be the next generation of smart and augmented clothes, and their influence and potential impact on behavior and habits of their users. The project is strongly oriented towards human science, with both user studies and sociological studies. The involvement of Hybrid team in the project consists in studying the design of next-gen prototypes of clothes embedding novel kinds of sensors and actuators. Envisionned sensors relate to physiological measurements such as with EEG (electroencephalograpohy and Brain-Computer Interfaces), EMG (muscular activity), GSR (galvanic skin response) or Heart Rate (HR). Envisionned actuators relate to new sensory stimulations such as vibrotactile displays or novel visual (eg LED) displays. These prototypes will thus be used in the various experiments planned in the project.

8.2.4. FUI SIFORAS

Participants: Bruno Arnaldi [contact], Valérie Gouranton [contact], Thomas Lopez.

SIFORAS (Simulation for training and assistance) is a 3-year project (2011-2014) funded by the competitive cluster "Images et Réseaux". SIFORAS involves 4 academic partners (INSA Rennes, ENIB, CEA-List, ENISE) and 9 Industrial partners (Nexter Training, Delta CAD, Virtualys, DAF Conseils, Nexter Systems, DCNS, Renault, SNCF, Alstom). This project consists in developing a pedagogical system for technical training in industrial procedures. It aims at proposing Instructional Systems Design to answer the new objectives of training (Intelligent Tutorial System, mobility, augmented reality, high productivity). The Hybrid implication in the project shares some common means and goals with the Corvette project, in particular concerning its global architecture based on STORM and LORA models, and exploiting GVT software.

8.2.5. FUI Previz

Participants: Bruno Arnaldi [contact], Valérie Gouranton [contact], Rozenn Bouville Berthelot, Emmanuel Badier, Thomas Boggini.

Previz is a 3-year project (2013-2016) funded by the competitive cluster "Images et Réseaux". Previz involves 4 Academic partners (Hybrid/INSA Rennes, ENS Louis-Lumière, LIRIS, Gipsa-Lab) and 9 Industrial partners (Technicolor, Ubisoft, SolidAnim, loumasystem, Polymorph). Previz aims at proposing new previsualization tools for movie directors. The goal of Hybrid in Previz is to introduce new interactions between real and virtual actors so that the actor's actions, no matter his/her real or virtual nature, impact both the real and the virtual environment. The project will end up with a new production pipeline in order to automatically adapt and synchronize the visual effects (VFX), in space and time, to the real performance of an actor.

8.2.6. ADT MAN-IP

Participant: Valérie Gouranton [contact].

The ADT MAN-IP is a 2-year project (2013-2015) funded by Inria for software support and development. MAN-IP involves two Inria teams: Hybrid and MimeTIC. MAN-IP aims at proposing a common software pipeline for both teams to facilitate the production of populated virtual environments. The resulting software should include functionalities for motion capture, automatic aquisition and modification, and high-level authoring tools.

8.2.7. ADT OpenViBE-NT

Participants: Anatole Lécuyer [contact], Jussi Lindgren [contact], Jozef Legény.

The ADT OpenViBE-NT is a 3-year project (2012-2015) funded by Inria for support and development of the OpenViBE software (section 5.1). OpenViBE-NT involves four Inria teams: Hybrid, Potioc, Athena, Neurosys - all being extensive users of OpenViBE. OpenViBE-NT aims at improving the current functionalities of OpenViBE platform, and helping in supporting its active and ever growing community of users.

8.3. European Initiatives

8.3.1. FP7 & H2020 Projects

8.3.1.1. FP7 VISIONAIR

Participants: Valérie Gouranton, Thierry Duval.

- Program: FP7-INFRA
- Project acronym: VISIONAIR
- Project title: VISION Advanced Infrastructure for Research
- Duration: Feb 2011 - Feb 2015
- Coordinator: INPG
- Other partners: INPG France, University Patras Greece, Cranfield University United Kingdom, Universiteit Twente Netherlands, Universitaet Stuttgart Germany, ICBPP Poland, Univ. Méditerranée France, CNR Italy, Inria France, KTH Sweden, Technion Israel, RWTH Germany, PUT Poland, AMPT France, TUK Germany, University Salford United Kingdom, Fraunhofer Germany, I2CAT Spain, University Essex United Kingdom, MTASEAKI Hungary, ECN France, UCL United Kingdom, Polimi Italy, European Manufacturing and Innovation Research Association
- Abstract: Visionair calls for the creation of a European infrastructure for high level visualisation facilities that are open to research communities across Europe and around the world. By integrating existing facilities, Visionair aims to create a world-class research infrastructure for conducting state-of-the-art research in visualisation, thus significantly enhancing the attractiveness and visibility of the European Research Area. Hybrid team is mainly involved in Work Package 9 (Advanced methods for interaction and collaboration) led and supervised by Prof. Georges Dumont (MimeTIC Inria team).

8.4. International Initiatives

8.4.1. Inria Associate Teams

8.4.1.1. Associate Team SIMS

Participant: Maud Marchal [contact].

SIMS is an Inria Associate Team involving Mimetic and Hybrid Inria teams in Rennes and the GAMMA Research Group of the University of North Carolina in the United States. SIMS focuses on realistic and effective simulation of highly complex systems based on human movement and interaction. The Associate Team has three main axes of research: crowd simulation, movement planning for autonomous virtual humans and real-time physical simulation for interactive environments. The latter axis is supervised by Maud Marchal. In this context, one Master student spent 8 months in the GAMMA Research Group, starting in November 2013.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

- Dr. Gerd Bruder, Postdoc at the Universität Hamburg, Germany, spent a half month stay in our group in Rennes in February 2014 to work on locomotion and distance perception in virtual environments, in the frame of EU FP7 "VISIONAIR" project.
- Mr. Michael Pereira, PhD student at EPFL, Switzerland, spent a half month stay in our group in Rennes in October 2014 to work on BCI and virtual environments, in the frame of EU FP7 "VISIONAIR" project.

8.5.2. Visits to International Teams

8.5.2.1. Explorer programme

Merwan Achibet

> Date: Sep 2014 - Dec 2014

> Institution: School of Electro-Communication Tokyo, (UEC), Pr. Kajimoto, Japan

<p style="text-align:center">**IMAGINE Project-Team**</p>

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. *Scenoptique (12/2012 - 03/2014)*

Participant: Rémi Ronfard.

In October 2011, we started a collaboration with Theatre des Celestins in Lyon on the topic of interactive editing of rehearsals. This research program is funded by the Region Rhone Alpes as part of their CIBLE project, with a budget for a doctoral thesis (Vineet Gandhi) and three large sensor video cameras. Theatre des Celestins is interested in novel tools for capturing, editing and browsing video recordings of their rehearsals, with applications in reviewing and simulating staging decisions. We are interested in building such tools as a direct application and test of our computational model of film editing, and also for building the world's first publicly available video resource on the creative process of theatre rehearsal. Using state-of-the-art video analysis methods, this corpus is expected to be useful in our future work on procedural animation of virtual actors and narrative design. The corpus is also expected to be shared with the LEAR team as a test bed for video-based action recognition.

8.1.2. *Labex Persyval*

Participants: Rémi Ronfard, Olivier Palombi, Armelle Bauer.

We received a doctoral grant from LABEX PERSYVAL, as part of the research program on authoring augmented reality (AAR) for PhD student Adela Barbelescu. Her thesis is entitled *directing virtual actors by imitation and mutual interaction - technological and cognitive challenges*. Her advisors are Rémi Ronfard and Gérard Bailly (GIPSA-LAB).

Additionally, this project funds the PhD thesis of Armelle Bauer which has started in October, co-advised by François Faure, Olivier Palombi, and Jocelyne Troccaz from TIMC-GMCAO. The goal is to tackle the scientific challenges of visualizing one's self anatomy in motion using Augmented Reality techniques.

8.1.3. *TAPIOCA, Persyval Grant (11/2013 - 11/2015)*

Participants: Damien Rohmer, Jean-Claude Léon, Marie-Paule Cani.

Tapioca (Tangibilité Physiologique Instrumentée: Outil mixte redimensionnable pour la conception d'artefact) is a *projet exploratoire* of the Persyval Grant. This project aim to study the use of resizable interactive interface to ease the generation of virtual models. This project is in collaboration with LIG, Gipsa-lab and GSCOP.

8.2. National Initiatives

8.2.1. *ANR SOHUSIM (10/2010-09/2014)*

Participants: Ali Hamadi Dicko, François Faure.

Sohusim (Soft Human Simulation) is a ANR Project which started on October 1st 2010. It is done in collaboration between: EVASION (Inria), Fatronik France (TECNALIA), DEMAR (Inria), HPC PROJECT and the CHU de Montpellier.

This project deals with the problem of modeling and simulation of soft interactions between humans and objects. At the moment, there is no software capable of modeling the physical behavior of human soft tissues (muscles, fat, skin) in mechanical interaction with the environment. The existing software such as LifeMod or OpenSim, models muscles as links of variable length and applying a force to an articulated stiff skeleton. The management of soft tissues is not taken into account and does not constitute the main objective of this software.

A first axis of this project aims at the simple modeling and simulation of a passive human manipulated by a mecatronics device with for objective the study and the systems design of patient's manipulation with very low mobility (clinic bed). The second axis concentrates on the detailed modeling and the simulation of the interaction of an active lower limb with objects like orthesis, exoskeleton, clothes or shoes. The objective being there also to obtain a tool for design of devices in permanent contact with the human who allows determining the adequate ergonomics in terms of forms, location, materials, according to the aimed use.

8.2.2. ANR CORPUS SPECTABLE EN LIGNES (01/2013-01/2015)

Participant: Rémi Ronfard.

Spectacle En Ligne(s) amplifies our collaboration with the Theatre des Celetins in Lyon, which was started with the Scenoptique project in 2011. Scenoptique investigates novel techniques for recording ultra-high definition video, reframing them and editing them into interactive movies. Spectacle En Ligne(s), is targeted on the creation and diffusion of an original data set of integral vídeo recordings of theatre and opera rehearsals. The data set is naturally suited to researchers interested in the creation process and the genetic analysis of dramatic art and mise en scene. To support research in this area, we are extending the audio and visual analysis tools developed in the Scenoptique project.

8.2.3. FUI Dynam'it (01/2012 - 02/2014)

Participant: Francois Faure.

2-year contract with two industrial partners: TeamTo (production of animated series for television) and Artefacts Studio (video games). The goal is to adapt some technologies created in SOFA, and especially the frame-based deformable objects [43], [42] to practical animation tools. This contract provides us with the funding of two engineers and one graphical artist during two years.

8.2.4. FUI Collodi (October 2013 - October 2016)

Participants: Francois Faure, Romain Testylier.

This 3-year contract with two industrial partners: TeamTo and Mercenaries Engineering (software for production rendering), is a follow-up and a generalization of Dynamit. The goal is to propose an integrated software for the animation and final rendering of high-quality movies, as an alternative to the ever-ageing Maya. It will include dynamics similarly to Dynamit, as well as innovative sketch-based kinematic animation techniques invented a Imagine by Martin Guay and Rémi Ronfard. This contract, started in October, funds 2 engineers for 3 years.

8.2.5. ANR CHROME (01/2012 - 08/2015)

Participant: Rémi Ronfard.

Chrome is a national project funded by the French Research Agency (ANR). The project is coordinated by Julien Pettré, member of MimeTIC. Partners are: Inria-Grenoble IMAGINE team (Remi Ronfard), Golaem SAS (Stephane Donikian), and Archivideo (Francois Gruson). The project has been launched in september 2012. The Chrome project develops new and original techniques to massively populate huge environments. The key idea is to base our approach on the crowd patch paradigm that enables populating environments from sets of pre-computed portions of crowd animation. These portions undergo specific conditions to be assembled into large scenes. The question of visual exploration of these complex scenes is also raised in the project. We develop original camera control techniques to explore the most relevant part of the animations without suffering occlusions due to the constantly moving content. A long-term goal of the project is to enable populating a large digital mockup of the whole France (Territoire 3D, provided by Archivideo). Dedicated efficient human animation techniques are required (Golaem). A strong originality of the project is to address the problem of crowded scene visualisation through the scope of virtual camera control, as task which is coordinated by Imagine team-member Rémi Ronfard.

Three phd students are funded by the project. Kevin Jordao is working on interactive design and animation of digital populations and crowds for very large environments. His advisors are Julien Pettré and Marie-Paule Cani. Quentin Galvanne is working on automatic creation of virtual animation in crowded environments. His advisors are Rémi Ronfard and March Christie (Mimetic team, Inria Bretagne). Julien Pettre. Chen-Kin Lim is working on crowd simulation and rendering of the behaviours of various populations using crowd patches. Her advisors are Rémi Ronfard and March Christie (Mimetic team, Inria Bretagne). Julien Pettre.

8.2.6. Action3DS (Caisse des dépôts) (10/2011 - 09/2014)

Participant: Rémi Ronfard.

Action3DS is a national project funded by Caisse des Dépots, as part of the *projet Investissements d'avenir AC-TION3DS* research program entitled *Technologies de numérisation et de valorisation des contenus culturels, scientifiques et éducatifs*.

The project is coordinated by Thales Angénieux (Patrick Defay). Partners are Inria (Rémi Ronfard), Lutin Userlab (Charles Tijus), LIP6 (Bernadette Bouchon-Meunier), GREYC (David Tschumperlé), École nationale supérieure Louis Lumière (Pascal Martin), Binocle (Yves Pupulin), E2V Semiconductors and Device-Alab.

The goal of the project is the developpement of a compact professional stereoscopic camera for 3D broadcast and associated software. Rémi Ronfard is leading a work-package on real-time stereoscopic previsualization, gaze-based camera control and stereoscopic image quality.

The project is funding our new postdoc researcher Christophe Lino who is working on learning-based camera control for stereoscopic 3D cinematography with Rémi Ronfard.

8.2.7. AEN MorphoGenetics (10/2012 - 09/2015)

Participant: François Faure.

3-year collaboration with Inria teams Virtual Plants and Demar, as well as INRA (Agricultural research) and the Physics department of ENS Lyon. The goal is to better understand the coupling of genes and mechanical constraints in the morphogenesis (creation of shape) of plants. Our contribution is to create mechanical models of vegetal cells based on microscopy images. This project funds the Ph.D. thesis of Richard Malgat, who started in October, co-advised by François Faure (IMAGINE) and Arezki Boudaoud (ENS Lyon).

8.2.8. PEPS SEMYO (10/2012 - 09/2014)

Participant: François Faure.

2-year collaboration with Inria team DEMAR (Montpellier) and Institut de Myologie (Paris) to simulate 3D models of pathological muscles, for which no standard model exist. The main idea is to use our mesh-less frame-based model to easily create mechanical models based on segmented MRI images.

8.3. European & International Initiatives

8.3.1. ERC Grant Expressive (04/2012-03/2017)

Participants: Marie-Paule Cani, Stefanie Hahmann, Jean-Claude Léon.

To make expressive and creative design possible in virtual environments, the goal is to totally move away from conventional 3D techniques, where sophisticated interfaces are used to edit the degrees of freedom of pre-existing geometric or physical models: this paradigm has failed, since even trained digital artists still create on traditional media and only use the computer to reproduce already designed content. To allow creative design in virtual environments, from early draft to progressive refinement and finalization of an idea, both interaction tools and models for shape and motion need to be revisited from a user-centred perspective. The challenge is to develop reactive 3D shapes – a new paradigm for high-level, animated 3D content – that will take form, refine, move and deform based on user intent, expressed through intuitive interaction gestures inserted in a user-knowledge context. Anchored in Computer Graphics, this work reaches the frontier of other domains, from Geometry, Conceptual Design and Simulation to Human Computer Interaction.

8.3.2. Piper (2013-2017)

The main objective of this European FP7 project is to develop new tools to position and personalize advanced human body models for injury prediction in car crashes. Our partners are automobile constructors and biomechanics research labs. Our main task is to provide tools for the interactive positioning of the models in the cockpits prior to the crash simulation, using our real-time simulation software SOFA. This 42-month contract funds one engineer in Imagine, and we plan to hire post-doc students next year.

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- Bob Sumner: Character depiction, posing and synthesis, Disney Research (Zurich) (13/11/2014).

- Tamy Boubekeur: Spatial, Statistical and Morphological Analysis for 3D Shape Modeling, Telecom ParisTech (23/10/2014)

- Jacob Wenzel: Capturing and simulating the interaction of light with the world around us, ETH Zurich (09/10/2014)

- Mariët Theune: Nicolas Szilas, Ulrike Spierling, Paolo Petta, Remi Ronfard. Storytelling seminar (21/07/2014)

- Mark Finlayson: Learning Narrative Structure from Annotated Stories, MIT (03/07/2014)

- Matthias Teschner: Particle-based Fluid Simulation, University of Freiburg (17/06/2014)

- Melina Skouras. Design and Fabrication of Deformable Objects, ETH Zurich (05/06/2014)

- Boris Thibert. Flat torus and smooth fractals, LJK Grenoble (15/05/2014)

- Olga Sorkine. Reality-inspired constraints for shape modeling and editing, ETH Zurich (28/03/2014)

- Jernej Barbic: Model reduction for elasticity problems in computer graphics and animation, University of Southern California (02/27/2014)

- Chris Wojtan: Compensating for Defects in Geometric Models and Liquid Surfaces, IST Austria (02/20/2014)

IN-SITU Project-Team

7. Partnerships and Cooperations

7.1. Regional Initiatives

DigiPods - Remote Collaborative Interaction mong Heterogeneos Visualization Platforms, Région Île-de-France (2012-2015), Coordinator: Stéphane Huot. Partners: Digiteo/FCS Campus Paris-Saclay, Univ. Paris-Sud, Inria, CNRS, CEA, Telecom ParisTech.

The goal of DIGIPODS is to design new interactive equipments and devices for collaborative interaction in immersive and high-resolution visualization platforms, connected through a high-end telepresence infrastructure. Beyond the usual interactive devices of such platforms (motion capture, interactive surfaces, haptic devices, audio and video systems), all the platforms will be augmented with new devices to facilitate co-located or remote interaction and collaboration: telepresence robots and the Digicarts, a new kind of interaction devices specifically designed for these needs. These equipments will be used by researchers in Human-Computer Interaction to explore the visualization and manipulation of large datasets, interaction in virtual reality, remote collaboration among heterogeneous platforms; but also by researchers from other fields and by professionals in order to explore and manipulate their complex data.

DigiCarts - Post-doctoral fellow position funded by Digiteo, Coordinator: Stéphane Huot. Partners: Univ. Paris-Sud, Inria, CNRS, CEA, Telecom ParisTech.

Complements the DigiPods project with funding for a 18 months post-doctoral position focused on the design, implementation and evaluation of the Digicart devices.

DigiZoom - Funding by DIGICOSME Labex, Coordinator: Olivier Chapuis. Partners: U. Paris-Sud, Inria, Institut Mines-Telecom.

Design, modeling and empirical evaluation of multi-scale navigation techniques depending on the input channels and output characteristics of the devices, in particular their size, in single-user and collaborative contexts. This project funds a joint PhD student between InSitu and the VIA group at Institut Mines-Telecom.

MultiVis - Funding by DIGICOSME Labex, Coordinator: James Eagan (Institut Mines Telecom). Partners: U. Paris-Sud, Inria, Institut Mines-Telecom.

Design, evaluate, and implement novel interaction models to help users appropriate multiple computational surfaces in the sense-making process. Our initial approach is to operationalize and extend the instrumental interaction model to specifically accommodate the specific needs of the sense-making process for information visualization. This project funds a joint PhD student between the VIA group at Institut Mines-Telecom and InSitu.

7.2. National Initiatives

Digiscope - Collaborative Interaction with Complex Data and Computation (2011-2020) http://digiscope.fr. "Equipment of Excellence" project funded by the "Invesissements d'Avenir" program of the French government. 10 academic partners: FCS Paris-Saclay (coordinator), Université Paris-Sud, CNRS, CEA, Inria, Institut Telecom ParisTech, Ecole Centrale Paris, Université Versailles - Saint-Quentin, ENS Cachan, Maison de la Simulation. Overall budget: 22.5 Meuros, including 6.7 Meuros public funding from ANR. Michel Beaudouin-Lafon: coordinator and principal investigator for the whole project.

The goal of Digiscope is to create nine high-end interactive rooms interconnected by high-speed networks and audio-video facilities to study remote collaboration across interactive visualization environments. The equipment will be open to outside users and targets four main application areas: scientific discovery, product lifetime management, decision support for crisis management, and education and training. In Situ contributes the existing WILD room, a second room called WILDER funded by the project, and its expertise in the design and evaluation of advanced interaction techniques and the development of distributed software architectures for interactive systems.

MDGest - Interacting with Multi-Dimensional Gestures (2011-2014). InSitu is the only academic partner. Funded by the French National Research Agency (ANR), Programme JCJC (Junior researchers): 88 Keuros. Caroline Appert (coordinator) and Theophanis Tsandilas.

This project investigates new interactions for small devices equipped with a touchscreen. Complementing the standard point-and-click interaction paradigm, the MDGest project explores an alternative way of interacting with a user interface: tracing gestures with the finger. According to previous work, this form of interaction has several benefits, as it is faster and more natural for certain contexts of use. The originality of the approach lies in considering new gesture characteristics (dimensions) to avoid complex shapes that can be hard for users to memorize and activate. Dimensions of interest include drawing speed (local or global), movement direction, device orientation or inclination, and distinctive drawing patterns in a movement.

DRAO – Adrien Bousseau (Inria, Sophia Antipolis) submitted a successful ANR grant with InSitu members Theophanis Tsandilas and Wendy Mackay, and Prof. Maneesh Agrawala (Berkeley).

The goal of the project is to create interactive graphics tools to support sketching. The kickoff meeting was held in Nov. 2012 and included interviews with designers from Toyota.

7.3. European Initiatives

7.3.1. CREATIV

Type: IDEAS
Instrument: ERC Advanced Grant
Duration: June 2013 - May 2018
Coordinator: Wendy Mackay
Partner: Inria (France)
Inria contact: Wendy Mackay
Abstract: CREATIV explores how the concept of co-adaptation can revolutionize the design and use of interactive software. Co-adaptation is the parallel phenomenon in which users both adapt their behavior to the system's constraints, learning its power and idiosyncrasies, and appropriate the system for their own needs, often using it in ways unintended by the system designer. The initial goal of the CREATIV project is to fundamentally improve the learning and expressive capabilities of advanced users of creative software, offering significantly enhanced methods for expressing and exploring their ideas. The ultimate goal is to radically transform interactive systems for everyone by creating a powerful and flexible partnership between human users and interactive technology.

7.3.2. Social Privacy

Type: PEOPLE
Instrument: Marie Curie International Outgoing Fellowships for Career Development
Duration: September 2012 - August 2015
Coordinator: Wendy Mackay
Partner: Inria (France) and Massachusets Institute of Technology (USA)
Inria contact: Ilaria Liccardi
Abstract: Although users' right to privacy has long been protected, the rapid adoption of social media has surpassed society's ability to effectively regulate it. Today's users lack informed consent: they must make all-or-nothing decisions about on-line privacy regardless of context. The Social Privacy project will first diagnose the problem, exploring privacy issues associated with social media at the level of the individual, the enterprise and society, and then generate effective solutions, from providing users with technical safeguards and informed consent, to establishing corporate guidelines for protecting privacy, to developing and testing recommendations for public policy.

7.3.3. Collaborations in European Programs, except FP7 & H2020

EIT ICT Labs Master School, European Institute of Technology. Coordinator: M. Beaudouin-Lafon. Partners: KTH (Sweden), U. Paris-Sud (France), U. Aalto (Finland), Technical University Berlin (Germany), Technical University Delft (Netherlands), U. College London (UK), U. Trento (Italy).

InSitu participates in the Human-Computer Interaction and Design (HCID) major of the EIT ICT Labs European Master School. Paris-Sud is one the sites for the first year of this Master Program, and host one of the specialties for second-year students. Students in this program receive a double degree after studying in two countries. https://www.dep-informatique.u-psud.fr/en/formation/lmd/M1_HCID.

7.3.4. Collaborations with Major European Organizations

VCoRE - Next-Generation Visual Computing Platform (ADT Inria, 2011-2014), Coordinator for InSitu: Stéphane Huot. Partners: Inria (Grenoble, Lille, Rennes, Saclay, Sophia Antipolis), IGD Fraunhofer Institute.

Collaboration between Inria and IGD Fraunhofer Institute for the specification and development of a software framework dedicated to mixed/augmented/virtual reality and advanced visualization platforms (distributed computer graphics, simulation and interaction).

7.4. International Initiatives

7.4.1. Inria International Labs

7.4.1.1. Massive Data

A former member of InSitu, Emmanuel Pietriga, has spent two years at the Inria Chile/CIRIC lab as head of the Massive Data team. The team focuses on the design, development and empirical evaluation of novel interactive visualization techniques that help users understand and manipulate massive amounts of data on different types of platforms: mobile devices, workstations, control rooms (ALMA radio-telescope), ultra-high-resolution wall-sized displays such as ANDES, the lab's wall-sized display similar to InSitu's WILD and WILDER rooms. During his stay, he continued to collaborate with InSitu members.

- ALMA: http://almaobservatory.org
- ANDES: http://www.inria.cl/?page_id=2727&lang=en

7.4.2. Inria Associate Teams

7.4.2.1. MIDWAY

Title: Musical Interaction Design Workbench And technologY

International Partner:

McGill University & CIRMMT, Montréal (CA), Marcelo Wanderley

Duration: 2014 -

See also: http://insitu.lri.fr/MIDWAY

The MIDWAY associated team involves two partners: the InSitu group, and the Input Devices and Music Interaction Laboratory (IDMIL) from the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT) – McGill University. Our goal is to design and implement MIDWAY, a musical interaction design workbench, to facilitate the exploration and design of new interactive technologies for both musical creation and performance. Each laboratory has extensive experience developing new interactive technologies and studying interactive phenomena from complementary points of view. The two groups share multiple, complementary research interests that the MIDWAY joint team will help them to explore together: In|Situ|'s experience working with composers to develop novel tools, toolkits and interaction models will complement IDMIL/CIRMMT's knowledge and experience designing new musical instruments and their studies of the musical creative process. Both partners have organized workshops to initiate and to plan the research program for the upcoming months (joint developments, publication and visits/exchanges).

7.4.3. Inria International Partners

7.4.3.1. Informal International Partners

- Stu Card and Sara Goldhaber-Fiebert, Stanford University, on improving the use of emergency manuals in operating rooms.

- Wendy Ju, Stanford University, and Steven Dow, Carnegie Mellon University, on the issues of Research Through Design.
- James Hollan, U.C. San Diego, on video analysis tools.
- Bjorn Hartmann, U.C. Berkeley, on multi-surface interaction.
- Shumin Zhai, Google Mountain View, on gesture-based interaction.
- Clemens Klokmose, University of Aarhus (Denmark), on ubiquitous instrumental interaction.

7.5. International Research Visitors

7.5.1. Visits of International Scientists

- Marcelo Wanderlay, Professor at McGill University, Canada, May 2014.
- Shumin Zhai, Senior Staff Research Scientist at Google, USA, July 2014.
- Chat Wacharamanotham, Ph.D. candidate at RWTH Aachen, Germany, June 2014.

7.5.1.1. Internships

- Ignacio Avellino Martinez, Master Student from Univ. Trento and Univ. Aachen, was an intern at InSitu from Apr 2014 until Sep 2014 to work on telepresence systems for large interactive spaces. He was then granted an Inria CORDI grant pursue a Ph.D. at InSitu.

MANAO Project-Team

7. Partnerships and Cooperations

7.1. Regional Initiatives

7.1.1. Carer xD: "Caractérisation et restitution du réel xD"

Currently, the characterization and display of the real world are limited to techniques focusing on a subset of the necessary physical phenomena. A lot of work has been done to acquire geometric properties. However, the acquisition of a geometry on an object with complex reflection property or dynamic behavior is still a challenge. Similarly, the characterization of a material is limited to a uniform object for complex material or a diffuse material when one is interested in its spatial variations.

To reach full interaction between real and virtual worlds (augmented reality, mixed reality), it is necessary to acquire the real world in all its aspects (spatial, spectral, temporal) and to return it as in all these dimensions. To achieve this goal, a number of theoretical and practical tools will be developed around the development of mixed reality solutions and the development of some theoretical framework that supports the entire project.

7.2. National Initiatives

7.2.1. ANR

7.2.1.1. "Young Researcher" RichShape (2014-2018):

MANAO
Leader: G. Guennebaud
This project aims at the development of novel representations for the efficient rendering and manipulation of highly detailed shapes in a multi-resolution context.

7.2.1.2. ALTA (2011-2015):

MAVERICK, REVES
Leader: N. Holzschuch (MAVERICK)
The project ALTA aims at analyzing the light transport equations and at using the resulting representations and algorithms for more efficient computation. We target lighting simulations, either off-line, high-quality simulations or interactive simulations.

7.2.1.3. "Young Researcher" IM&M (2011-2015):

IRIT
Leader: L. Barthe (IRIT)
This project aims at the definition of simple and robust tools for the modeling of 3D objects. To this end, the proposed approach consists in combining the nice mathematical properties of implicit surfaces with classical meshes.

7.2.2. Competitivity Clusters

7.2.2.1. LabEx CPU:

IMB (UPR 5251), LABRI (UMR 5800), Inria (CENTRE BORDEAUX SUD-OUEST), I2M (NEW UMR FROM 2011), IMS (UMR 5218), CEA/DAM
Some members of *MANAO* participate in the local initiative CPU. As it includes many thematics, from fluid mechanics computation to structure safety but also management of timetable, safety of networks and protocols, management of energy consumption, etc., numerical technology can impact a whole industrial sector. In order to address problems in the domain of certification or qualification, we want to develop numerical sciences at such a level that it can be used as a certification tool.

7.3. European Initiatives

7.3.1. FP7 & H2020 Projects

7.3.1.1. FP7 NoE - V-MusT.net (2011-2015):

Participants: cf. http://www.v-must.net/participants

Leader: S. Pescarin (CNR - Italy)

V-MusT.net is a European Network of Excellence dedicated to Virtual Museums. A Virtual Museum is a personalized, immersive, interactive experience that aims to enhance our understanding of the past in museums or on the Internet. The V-Must.net network enables heritage professionals around the world to connect, collaborate and advance the development and use of virtual museums.

7.3.1.2. FP7 ITN - PRISM "Perceptual Representations for Illumination, Shape and Materials" (2013-2016):

Participants: Giessen University, Université Paris-Descartes, Bilkent University, Université de Leuven, Delft University, Birmingham University, Philips and NextLimit

Leader: R. Fleming (Giessen University)

The goal of this project is to better understand how the human visual system understands images in terms of meaningful components: How is shape perceived consistently in varying illumination conditions and for different materials? To which extent are humans able to guess the main illumination directions in a scene? What visual properties do we make use of to estimate the material an object is made of without touching it? Answering these questions will require inter-disciplinary research and collaborations.

7.3.2. Foreign grants

7.3.2.1. DFG Emmy-Noether grant "Plenoptic Acquisition and Projection - Theoretical Developments and Applications" (2012-2017)

Leader: I. Ihrke

This project aims to develop a comprehensive theory of the imaging process in optical-computational devices as developed in the newly emerging field of Computational Optics. The theory will be validated by a number of practical applications.

It will allow for the modeling of image formation processes in measurement systems employing novel computational imaging and projection devices. This makes it possible to optimize these systems with respect to particular imaging tasks, which is currently impossible due to limited models. A further interesting aspect of the project is that computational imaging devices will become comparable with respect to parameters such as their resolution and noise characteristics which is hardly possible at the moment.

7.4. International Research Visitors

7.4.1. Visits of International Scientists

7.4.1.1. From University of Montréal

Since the summer 2014, we are welcoming in our team Dr. Laurent BELCOUR, a post-doc from the University of Montréal. We are working together on the development of theoretical and practical tools for the analysis and the modeling of light transport operators such as BRDFs [15], [23].

7.4.1.2. From Beijing Normal University

We have long-standing exchanges with the Beijing Normal University. This university is in charge of some virtual reconstruction of the Chinese Cultural Heritage (such as the terracota warrios and the old Beijing). In this context, we received Dr. SHUI Wuyang for a one month visit in February to work on the use of our results to help the reconstruction and the visualization of ancient artefacts.

<p style="text-align:center; color:red">**MAVERICK Project-Team**</p>

6. Partnerships and Cooperations

6.1. National Initiatives

6.1.1. ANR BLANC: ALTA

Participants: Nicolas Holzschuch [contact], Cyril Soler.

We are funded by the ANR research program "Blanc" for a joint research project with two other Inria research teams, REVES in Sophia-Antipolis and iPARLA in Bordeaux. The goal of this project is studying light transport operators for global illumination, both in terms of frequency analysis and dimensional analysis. The grant started in October 2011, for 48 months.

6.1.2. ANR CONTINT: Galaxy/veRTIGE

Participants: Jean-Dominique Gascuel, Nicolas Holzschuch, Fabrice Neyret [contact].

RTIGE stands for Real-Time and Interactive Galaxy for Edutainment. This is an ANR CONTINT (Contents and Interactions) research program, for a joint research project with the EVASION Inria project-team, the GEPI and LERMA research teams at Paris Observatory, and the RSA Cosmos company. The goal of this project is to simulate the quality multi-spectral real-time exploration of the Galaxy with Hubble-like images, based on simulation data, statistical data coming from observation, star catalogs, and procedural amplification for stars and dust clouds distributions. RSA-Cosmos aims at integrating the results in digital planetariums. The grant started in December 2010, for 48 months.

6.1.3. ANR COSINUS: ROMMA

Participants: Georges-Pierre Bonneau [contact], François Jourdes.

The ANR project ROMMA has been accepted in 2009. It started in january 2010 for a duration of 4 years. The partners of this project are academic and industry experts in mechanical engineering, numerical simulation, geometric modeling and computer graphics. The aim of the project is to efficiently and robustly model very complex mechanical assemblies. We work on the interactive computation of contacts between mechanical parts using GPU techniques. We also investigate the Visualization of data with uncertainty, applied in the context of the project.

6.1.4. ANR CONTINT: MAPSTYLE

Participants: Joëlle Thollot [contact], Hugo Loi.

The MAPSTYLE project aims at exploring the possibilities offered by cartography and expressive rendering to propose original and new cartographic representations. Through this project, we target two types of needs. On the one hand, mapping agencies produce series paper maps with some renderings that are still derived from drawings made by hand 50 years ago: for example, rocky areas in the series TOP25 (to 1/25000) of the French Institut Géographique National (IGN). The rendering of these rocky areas must be automated and its effectiveness retained to meet the requirements of hikers safety. On the other hand, Internet mapping tools allow any user to become a cartographer. However, they provide default styles that cannot be changed (GeoPortal, Google Maps) or they are editable but without any assistance or expertise (CloudMade). In such cases, as in the case of mobile applications, we identify the need to offer users means to design map styles more personalised and more attractive to meet their expectations (decision-making, recreation, etc.) and their tastes. The grant started on October 2012, for 48 months.

6.2. International Initiatives

6.2.1. Inria International Partners

6.2.1.1. Informal International Partners

We have a continuing collaboration with Professor Kavita Bala, from Cornell University, USA, on the subject of global illumination and simulation of light scattering in participating media. Our work has been accepted at ACM transaction on graphics in 2014.

We currently have a very fruitful collaboration with Derek Nowrouzhezarai, from University of Montreal, Canada, dealing with isotropic filter decomposition in the spherical domain, based on zonal harmonic basis.

We also have frequent exchanges and on-going collaborations with Cyril Crassin from nVIDIA-Research.

6.3. International Research Visitors

6.3.1. Visits to International Teams

6.3.1.1. Research stays abroad

Fabrice Neyret has been visiting WETA Digital (New-Zeland) from July to August 2014.

<p style="text-align:center">**MIMETIC Project-Team**</p>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR

8.1.1.1. ANR iSpace&Time
Participants: Fabrice Lamarche [contact], Carl Jorgensen, Julien Pettré, Marc Christie.

The iSpace&Time project is founded by the ANR and gathers six partners: IGN, Lamea, University of Rennes 1, LICIT (IFSSTAR), Telecom ParisTech and the SENSE laboratory (Orange). The goal of this project is the establishment of a demonstrator of a 4D Geographic Information System of the city on the web. This portal will integrate technologies such as web2.0, sensor networks, immersive visualization, animation and simulation. It will provide solutions ranging from simple 4D city visualization to tools for urban development. Main aspects of this project are:

- Creation of an immersive visualization based on panoramic acquired by a scanning vehicle using hybrid scanning (laser and image).
- Fusion of heterogeneous data issued by a network of sensor enabling to measure flows of pedestrians, vehicles and other mobile objects.
- Use of video cameras to measure, in real time, flows of pedestrians and vehicles.
- Study of the impact of a urban development on mobility by simulating vehicles and pedestrians.
- Integration of temporal information into the information system for visualization, data mining and simulation purpose.

The mimetic team is involved in the pedestrian simulation part of this project. This project started in 2011 and ended in november 2014.

8.1.1.2. ANR TecSan RePLiCA
Participants: Armel Crétual [contact], Anthony Sorel, Richard Kulpa.

The goal of RePLiCA project is to build and test a new rehabilitation program for facial praxia in children with cerebral palsy using an interactive device.

In a classical rehabilitation program, the child tries to reproduce the motion of his/her therapist. The feedback he/she has lays on the comparison of different modalities: the gesture of the therapist he/she has seen few seconds ago (visual space) and his/her own motion (proprioceptive space). Unfortunately, besides motor troubles these children often have some cognitive troubles and among them a difficulty to convert the information from a mental space to another one.

The principle of our tool is that during a rehabilitation session the child will observe simultaneously on the same screen an avatar, the virtual therapist's one, performing the gesture to be done, and a second avatar animated from the motion he actually performs. To avoid the use of a too complex motion capture system, the child will be filmed by a simple video camera. One first challenge is thus to be able to capture the child's facial motion with enough accuracy. A second one is to be able to provide him/her an additional feedback upon the gesture quality comparing it to a database of healthy children of the same age.

RePLiCA did start in january 2012 and will end in July 2015.

8.1.1.3. ANR JCJC Cinecitta
Participants: Marc Christie [contact], Cunka Sanokho.

Cinecitta is a 3-year young researcher project funded by the French Research Agency (ANR) lead by Marc Christie. The project started in October 2012 and will end in October 2015.

The main objective of Cinecitta is to propose and evaluate a novel workflow which mixes user interaction using motion-tracked cameras and automated computation aspects for interactive virtual cinematography that will better support user creativity. We propose a novel cinematographic workflow that features a dynamic collaboration of a creative human filmmaker with an automated virtual camera planner. We expect the process to enhance the filmmaker's creative potential by enabling very rapid exploration of a wide range of viewpoint suggestions. The process has the potential to enhance the quality and utility of the automated planner's suggestions by adapting and reacting to the creative choices made by the filmmaker. This requires three advances in the field. First, the ability to generate relevant viewpoint suggestions following classical cinematic conventions. The formalization of these conventions in a computationally efficient and expressive model is a challenging task in order to select and propose the user with a relevant subset of viewpoints among millions of possibilities. Second, the ability to analyze data from real movies in order to formalize some elements of cinematographic style and genre. Third, the integration of motion-tracked cameras in the workflow. Motion-tracked cameras represent a great potential for cinematographic content creation. However given that tracking spaces are of limited size, there is a need to provide novel interaction metaphors to ease the process of content creation with tracked cameras. Finally we will gather feedback on our prototype by involving professionals (during dedicated workshops) and will perform user evaluations with students from cinema schools.

8.1.1.4. ANR Contint Entracte
Participants: Charles Pontonnier, Georges Dumont, Steve Tonneau, Franck Multon, Julien Pettré [contact], Ana Lucia Cruz Ruiz, Antoine Muller, Anthony Sorel, Nicolas Bideau, Richard Kulpa.

The ANR project ENTRACTE is a collaboration between the Gepetto team in LAAS, Toulouse (head of the project) and the Inria/MimeTIC team. The project started in November 2013 and will end in August 2017. The purpose of the ENTRACTE project is to address the action planning problem, crucial for robots as well as for virtual human avatars, in analyzing human motion at a biomechanical level and by defining from this analysis bio-inspired motor control laws and bio-inspired paradigms for action planning. The project is launched since november 2013 and Ana-Lucia Cruz-Ruiz has been recruited as a PhD student since this date to begin to work on musculoskeletal-based methods for avatar animation. Moreover, Steve Tonneau, a PhD student currently in third year is also developing bio-inspired posture generators for avatar navigation in encumbered environments.

8.1.2. ADT

8.1.2.1. ADT Man IP
Participants: Franck Multon [contact], Julian Joseph.

The ADT-MAN-IP aims at proposing a common production pipeline for both MimeTIC and Hybrid teams. This pipeline intends to facilitate the production of populated virtual reality environments.

The pipeline starts with the motion capture of an actor, using motion capture devices such as a Vicon (product of Oxford Metrics) system. To do so, we need to design new methods to automatically adapt all motion captures data to an internal skeleton that can be reused to retarget the motion to various types of skeletons and characters. The purpose is then to play this motion capture data on any type of virtual characters used in the demos, regardless their individual skeletons and morphology. The key point here is to make this process be as automatic as possible. During the first year, a software toolbox has been developed in Motion Builder (product of Autodesk) to automate this process. We also developed automatic following methods to make virtual humans locomote along a given path in the environment in Unity 3D.

The second step in the pipeline is to design a high level scenario framework to describe a virtual scene and the possible user's interactions with this scene so that he/she can interact with the story directly. This work will be performed in 2015.

In this ADT we also will have to connect these two opposite parts into a unique framework that can be used by non-experts in computer animation to design new immersive experiments involving autonomous virtual humans. The resulting framework could consequently be used in the Immersia immersive room for various types of application.

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. VISIONAIR

Participants: Georges Dumont [contact], Charles Pontonnier, Thierry Duval, Valérie Gouranton, Ronan Gaugne.

Our actual Virtual Reality systems allowed us to be a key partner within the European Project VISIONAIR (http://www.infra-visionair.eu/) that began in February 2011 in the infrastructure call of FP7. Our Immersia (http://www.irisa.fr/immersia) Virtual Reality room is, in Europe, a key place for virtual reality. We are leading the Work Package 9 on Advanced methods for interaction and collaboration of this project and are deeply involved in the directory board and in the scientific piloting committee. The VISIONAIR project's goal is to create a European infrastructure that should be a unique, visible and attractive entry towards high level visualization facilities. These facilities will be open to the access of a wide set of research communities. By integrating our existing facilities, we will create a world-class research infrastructure enabling to conduct frontier research. This integration will provide a significant attractiveness and visibility of the European Research Area. The partners of this project have proposed to build a common infrastructure that would grant access to high level visualization and interaction facilities and resources to researchers. Indeed, researchers from Europe and from around the world will be welcome to carry out research projects using the visualization facilities provided by the infrastructure. Visibility and attractiveness will be increased by the invitation of external projects.

This project is built with the participation of 26 partners, INPG ENTREPRISE SA IESA France , Institut Polytechnique de Grenoble France, University of Patras LMS Greece, Cranfield University United Kingdom, Universiteit Twente Utwente Netherlands, Universitaet Stuttgart Germany, Instytut Chemii Bioorganicznej Pan Psnc Poland, Université De La Méditerranée D'aix-Marseille II France, Consiglio Nazionale Delle Ricerche CNR Italy, Institut National de Recherche en Informatique et en Automatique Inria France, Kungliga Tekniska Hoegskolan Sweden, Technion - Israel Institute of Technology Israel, Rheinisch-Westfaelische Technische Hochschule Aachen RWTH Germany, Poznan University of Technology Poland, Arts et Métiers ParisTech AMPT France, Technische Universitaet Kaiserslautern Germany, The University of Salford United Kingdom, Fraunhofer-gesellschaft zur foerderung der Angewandten Forschung Germany, fundacio privada I2CAT Spain, University of Essex United Kingdom, Magyar Tudomanyos Akademia Szamitastechnikai Es Automatizalasi Kutato Intezet Hungary, École Centrale de Nantes France, University College of London United Kingdom, Politecnico di Milano Polimi Italy, European Manufacturing and Innovation Research Association (cluster leading excellence).

We organized the General Assembly of VISIONAIR, in Rennes Bretagne Atlantique Inria Research centre from 2014, dec. second to dec. fourth. We hosted 60 participants and had very interesting scientific presentations.

8.3. International Initiatives

8.3.1. Inria Associate Teams

8.3.1.1. FORMOSA

Title: Fostering Research on Models for Storytelling Applications

International Partner (Institution - Laboratory - Researcher):

National Cheng Chi University (TAIWAN)

Duration: 2013 - 2015

See also: http://www.irisa.fr/mimetic/GENS/mchristi/EA-FORMOSA/

The application context targeted by this proposal is Interactive Virtual Storytelling. The growing importance of this form of media reveals the necessity to re-think and re-assess the way narratives are traditionally structured and authored. In turn, this requires from the research community to address complex scientific and technical challenges at the intersection of literature, robotics, artificial intelligence, and computer graphics. This joint collaboration addresses three key issues in virtual storytelling: (i) delivering better authoring tools for designing interactive narratives based on literary-founded narrative structures, (ii) establishing a bridge between the semantic level of the narrative and the geometric level of the final environment to enable the simulation of complex and realistic interactive scenarios in 3D, and (iii) providing a full integration of the cinematographic dimension through the control of high-level elements of filmic style (pacing, preferred viewpoints, camera motion). The project is founded on a past solid collaboration and will rely on the team's complementarity to achieve the tasks through the development of a joint research prototype.

8.3.1.2. SIMS

Title: Toward realistic and efficient simulation of highly complex systems

International Partner (Institution - Laboratory - Researcher):

   University of North Carolina at Chapel Hill (ÉTATS-UNIS)

Duration: 2012 - 2014

See also: http://www.irisa.fr/mimetic/GENS/jpettre/EASIMS/easims.html

The general goal of SIMS is to make significant progress toward realistic and efficient simulation of highly complex systems which raise combinatory explosive problems. This proposal is focused on human motion and interaction, and covers 3 active topics with wide application range: 1. Crowd simulation: virtual human interacting with other virtual humans, 2. Autonomous virtual humans: who interact with their environment, 3. Physical Simulation: real humans interacting with virtual environments. SIMS is orthogonally structured by transversal questions: the evaluation of the level of realism reached by a simulation (which is a problem by itself in the considered topics), considering complex systems at various scales (micro, meso and macroscopic ones), and facing combinatory explosion of simulation algorithms.

<p style="text-align:center">**MINT Project-Team**</p>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. TurboTouch (ANR, Oct 2014-2018)
Participants: Géry Casiez [correspondant], Nicolas Roussel, Thomas Pietrzak.

Touch-based interactions with computing systems are greatly affected by two interrelated factors: the transfer functions applied on finger movements, and latency. Little is actually known on these functions, and latency only recently received attention in this context. This project aims at transforming the design of touch transfer functions from black art to science to support high-performance interactions. We will precisely characterize the functions used and the latency observed in current touch systems. We will develop a testbed environment to support multidisciplinary research on touch transfer functions. We will use this testbed to design latency reduction and compensation techniques, and new transfer functions.

Partners: Inria Lille's NON-A team and the "Perceptual-motor behavior group" from the Institute of Movement Sciences.

8.1.2. Touchit (13th FUI, May 2012-2015)
Participants: Michel Amberg, Géry Casiez, Frédéric Giraud, Thomas Pietrzak, Nicolas Roussel [correspondant], Betty Lemaire-Semail [correspondant].

The purpose of this project is twofold. It aims at designing and implementing hardware solutions for tactile feedback based on programmable friction. It also aims at developing the knowledge and software tools required to use these new technologies for human-computer interaction. Grant for MINT is balanced on 272 keuro handled at University for L2EP, and 220 Keuros for Inria.

Partners: STMicroelectronics, CEA/LETI, Orange Labs, CNRS, EASii IC, MENAPIC and ALPHAUI.

Competitive clusters involved: Minalogic, Cap Digital and MAUD.

8.1.3. Smart-Store (12th FUI, 2011-2014, extended to 2015)
Participants: Samuel Degrande [correspondant], Laurent Grisoni, Fabrice Aubert.

The aim of this project is to set up, in the context of retail, some middleware and hardware setup for retail interactive terminal, that allows customer to connect with their own smart-phone on a system that includes a large screen, and allows to browse some store offer, as well as pre-order and/or link to further reconsulting. SME Idées-3com leads this FUI, which also includes Immochan, Oxylane, and VisioNord. Grant for MINT is 301 Keuros. This project started on September 2012 (start of this project has been delayed due to administrative problems), for a duration of 36 months.

Associated competitivity cluster: PICOM (retail)

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. Happiness (H2020-ICT-2014-1/ICT-03-2014/RIA, Jan 2015 - Jan 2018)
Participants: Thomas Pietrzak, Nicolas Roussel [correspondant].

The main objective of this project is to develop and evaluate new types of haptic actuators based on Advanced Thin, Organic and Large Area Electronics (TOLAE) technologies for use in car dashboards.

Partners: CEA (coordinator), Inria Rennes' HYBRID team, Arkema, Bosch, Glasgow University, ISD, Walter Pack, Fundacion Gaiker.

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Declared Inria International Partners

Inria Northern lab with LUCID group (Liege, P. Leclercq). We initiated this year a joint work on collaborative tools for architects. One of the goal of this collaboration is to initiate discussions and early results for a H2020 proposal.

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- Marcelo Wanderley (McGill, dec. 2014)
- Masaya Takasaki (Profesor at Saitama Univerity), one month (july 2014)

<div align="center">

POTIOC Project-Team

</div>

8. Partnerships and Cooperations

8.1. Regional Initiatives

Cap Sciences:

- Potioc has strong relationships with the Cap Sciences museum (http://www.cap-sciences.net/), especially through its Living Lab.

Immersion:

- Potioc has strong relationships with Immersion. In 2014, Immersion and Potioc notably co-supervised a Master student (Dennis Wobrock) on the topic "Using brain and physiological signals to assess 3D User Interfaces".

8.2. National Initiatives

ANR Project ISAR:

- duration: 2014-2017
- coordinator: Martin Hachet
- partners: LIG-CNRS (Grenoble), Diotasoft (Paris)
- acronym: Interaction en Réalité Augmentée Spatiale / Interacting with Spatial Augmented Reality
- The ISAR project (Interaction with Spatial Augmented Reality) focuses on the design, implementation, and evaluation of new paradigms to improve interaction with the digital world when digital content is directly projected onto physical objects (e.g. a ball on the figure). It opens new perspectives for exciting tomorrow's applications, beyond traditional screen-based applications.
- website: http://isar.imag.fr/

Inria ADT OpenViBE-NT:

- duration: 2012-2014
- partners: Inria teams Hybrid, Neurosys and Athena
- coordinator: Anatole Lécuyer (Inria Rennes Bretagne Atlantique)
- funded by Inria (Technological Development Project)
- The aim of this project is to further develop OpenViBE, notably in order to (1) make the software evolve towards a new version that fits better current and future needs from its users, (2) to offer new and original functionalities and (3) to keep ensuring OpenViBE support and dissemination. The final objective is to further increase OpenViBE usability and appeal, in order to strengthen the users' community surrounding the software and enable us to make it as viable and useful as possible, on the long term. The developments will also enable the Inria teams involved (Potioc, Hybrid, Neurosys and Athena) to explore new research directions on BCI, such as adaptive BCI, hybrid BCI, that combines EEG with other physiological sensors (e.g., heart rate, galvanic skin response, gaze, etc.), or new coupling between BCI and virtual reality in order to improve human training for BCI, thanks to new immersive feedback types.
- website: http://openvibe.inria.fr

Inria ADT OpenViBE-X:

- duration: 2014-2016
- partners: Inria teams Hybrid and Athena
- coordinator: Maureen Clerc (Inria Sophia Antipolis)
- This is the follow-up project of OpenViBE-NT
- website: http://openvibe.inria.fr

Inria Project Lab BCI-LIFT:

- partners: Inria team Athena (Inria Sophia-Antipolis), Inria team Hybrid (Inria Rennes), Inria team Neurosys (Inria Nancy), LITIS (Université de Rouen), Inria team DEMAR (Inria Sophia-Antipolis), Inria team MINT (Inria Lille), DyCOG (INSERM Lyon)
- coordinator: Maureen Clerc (Inria Sophia Antipolis)
- Project around BCI in the evaluation process, first meeting with all the partners was in October 2013
- The aim is to reach a next generation of non-invasive Brain-Computer Interfaces (BCI), more specifically BCI that are easier to appropriate, more efficient, and suit a larger number of people. With this concern of usability as our driving objective, we will build non-invasive systems that benefit from advanced signal processing and machine learning methods, from smart interface design, and where the user immediately receives supportive feedback. What drives this project is the concern that a substantial proportion of human participants is currently categorized "BCI-illiterate" because of their apparent inability to communicate through BCI. Through this project we aim at making it easier for people to learn to use the BCI, by implementing appropriate machine learning methods and developping user training scenarios.
- website: http://bci-lift.inria.fr/

AIBLE-Helios:

- duration: 2014-2015
- partners: SATT Nancy Grand Est, Université de Lorraine
- coordinator: Stṕhanie Fleck (Université de Lorraine)
- The AIBLE project (Augmented, Inquiry-Based, Learning, Environment) aims to provide a methodology and innovative media for the improvement of learning of basic astronomical phenomena for school groups (8-11 years). As part of this project, Potioc will focus on the development of the final application for augmented reality based and 3D manipulation, for providing a high-fidelity prototype.

PIA ville numérique "Villes transparentes":

- duration: 2012-2014
- partners: Pages Jaunes/Mappy, Vectuel/Virtuelcity
- In the context of the call for proposal Ville numérique (Digital city) by the Investissement d'Avenir Program, the Potioc team was selected for the project "Villes transparentes" (Transparent city) in collaboration with Mappy (Pages Jaunes group) and Vectuel. In this project of a duration of two years, the Potioc team focused on the development of innovative interaction techniques for the navigation in urban 3D environments.

DRAO:

- duration: 2012-2014
- partners: Inria teams Reves, manao, In-Situ
- ANR Young Researcher Program (Adrien Bousseau, Reves team)
- DRAO is a research project dedicated to the creation of drawing. Its first focus is on the understanding of how people draw through studies and interviews with professionals.The second goal is the automation of some parts of the drawing process. Finally, the third goal is the creation of tools to teach drawing with digital tools.
- website: https://www-sop.inria.fr/members/Adrien.Bousseau/drao/index.html

Interco3D:

- partners: IRIT Toulouse
- Recognized as official working group by AFIHM
- The objective of this working group is to unite a community of actors involved in the design and use of interaction techniques for 3D spaces, ie perceive, understand, manipulate and move within virtual 3D spaces.
- website: http://www.irit.fr/INTERCO3D/

8.3. European Initiatives

8.3.1. Collaborations in European Programs, except FP7 & H2020

Program: DGA-DSTL Project

Project title: Assessing and Optimising Human-Machine Symbiosis through Neural signals for Big Data Analytics

Duration: 2014-2018

Coordinators: Ulster University (Nothern Ireland, UK), Inria Bordeaux Sud-Ouest (France)

Abstract: This project's objective is to design new tools for Big Data analysis, and in particular visual analytics tools that tap onto human cognitive skills as well as on Brain-Computer Interfaces. The goal is to enable the user to identify and select relevant information much faster than what can be achieved by using automatic tools or traditional human-computer interfaces. More specifically, this project will aim at identifying in a passive way various mental states (e.g., different kinds of attention, mental workload, relevant stimulus perception, etc.) in order to optimize the display, the arrangement or the selection of relevant information.

8.3.2. Collaborations with Major European Organizations

Collaboration with the University of Bristol, BIG (UK), Bristol Interaction and Graphics (BIG) group, UK (Head: Pr. Sriram Subramanian)

We have strong relationships with Sriram Subramanian. This has led to joint paper publications, numerous visits and a co-supervision of a PhD thesis (Camille Jeunet)

Bordeaux Idex project "Conception de Système d'interfaces cerveau-ordinateur prenant en compte les facteurs humains afin d'optimiser l'apprentissage de l'utilisateur" for international PhD project

partners: Bordeaux Segalen University (Handicap & Système nerveux team), Bristol University (BIG team)

duration: October 2013 - September 2016

LIRA Stress and Relaxation project: LIfe-style Research Association, Lifestyle Management: Stress and Relaxation

Accord cadre Européen

Coordinator: Frederic Alexandre

Other partners: Philips (Netherlands), Fraunhofer (Germany), Inria teams Hybrid and Mimetic

Abstract: The Stress and Relaxation project aims at offering services to a user, at home or at work, to help this user evaluate and control his level of stress

duration: 2011 - 2021

8.4. International Initiatives

8.4.1. Inria International Partners

8.4.1.1. Informal International Partners

- Pr. Roger N'KAMBOU, department of Computer Sciences at the UQAM (Université du Québec à Montréal) who is a specialist of Intelligent Tutoring Systems (ITS). We are setting up a collaboration with him to develop such a system in order to optimise human learning in Brain-Computer Interfaces (BCI), and thus improve the performances with such systems. We visited Pr. N'Kambou and UQAM in May in Montreal, and he visited us at Inria in December, where we organized a Workshop on human learning and computer sciences.

- We are collaborating with Dr. Cuntai Guan (I2R, Singapore), Pr. Jonathan Bromberg (Kansas University, USA) and Pr. Gerwin Schalk (Wadsworth center, USA) on ElectroCorticoGraphic (ECoG) signal analysis.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

8.5.1.1. Internships

This year, the Potioc team has hosted two international PhD students :

- Flavio Bertini, University of Bologna, Italy (December 2013-February 2014)
- Nicholaos Katzakis, Osaka University, Japan (September 2014 until November 2014)

Potioc has also hosted an international Master student :

- Julia Schumacher, Technische Universitaet Berlin, Germany (April 2014 - October 2014)

8.5.2. Visits to International Teams

8.5.2.1. Research stays abroad

Camille Jeunet was working at the University of Bristol, UK, in the BIG (Bristol Interaction and Graphics) groups of Pr. Sriram Subramanian, from July to September 2014.

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR ALTA

Participants: Emmanuelle Chapoulie, Stefan Popov, George Drettakis.

The ANR ALTA project started in October 2011, and focuses on the development of novel algorithms for realistic and efficient global illumination. The project is coordinated by the Grenoble Inria group ARTIS (N.Holzschuch), and the Bordeaux Inria group MANAO (X. Granier) is also a partner. Our participation is the study of error bounds for these algorithms and the development of interactive global illumination, and the development of the new global illumination algorithm described in Sec. 6.2.5 .

8.1.2. ANR DRAO

Participants: Emmanuel Iarussi, Adrien Bousseau.

https://www-sop.inria.fr/members/Adrien.Bousseau/drao/

The ANR DRAO is a young researcher project coordinated by Adrien Bousseau, in collaboration with the InSitu project team at Inria Saclay - Ile de France (W. Mackay and T. Tsandilas) and the MANAO project team (P. Barla and G. Guennebaud) and POTIOC project team (M. Hachet) at Inria Bordeaux - Sud Ouest. The goal of this collaboration is to develop novel drawing tools for amateurs as well as for expert designers and illustrators, combining expertise in Computer Graphics (REVES and MANAO) and Human-Computer Interaction (InSitu, POTIOC). This ANR project funds the PhD of Emmanuel Iarussi.

The first part of the project will be to observe how people draw with existing tools. To do so we will conduct observational studies where we will interview designers and illustrators and collect data by videotaping drawing sessions and by recording drawings with digital pens. In the second part of the project we will deduce from our observations new user interfaces and rendering algorithms that automate part of the drawing process and enrich 2D drawings with realistic rendering capabilities. We will combine computer vision and computer graphics techniques to estimate geometric information from sketches. We will then use this information to guide rendering algorithms that generate plausible depictions of material and lighting over the drawing. In the third part of the project, we plan to develop computer-assisted drawing lessons to teach amateurs how to draw from photographs and 3D models. We will apply image analysis algorithms to estimate the structure of a photograph and use that structure as guidance for drawing. To summarize, the goal of the ANR DRAO project is to make amateurs more confident in their drawing skills and to allow expert designers to produce complex illustrations more effectively.

The ANR DRAO has resulted in two publications this year on 3D modeling from sketches [17] and on vectorization of photographs [16].

8.1.3. ANR SEMAPOLIS

Participant: George Drettakis.

This ANR project started in October 2013. The goal is to use semantic information to improve urban reconstruction and rendering. The consortium is led by ENPC (R. Marlet) and includes the Inria Willow team and the GREY-C laboratory on image processing. Our contribution will be in the rendering part.

8.2. European Initiatives

8.2.1. VERVE

Title: VERVE

Type: COOPERATION (ICT)

Defi: Services to promote E-inclusion using socially realistic virtual environments

Instrument: Integrated Project (IP)

Duration: October 2011 - September 2014

Coordinator: Trinity College - Dublin (Ireland)

Others partners: DFKI (Germany), CNRS-ParisTech (France), CNRS-IRCAM (France), U. of Zaragoza (Spain), Testaluna (IT), KAINOS (UK)

See also: http://www.verveconsortium.eu/

Abstract

Social exclusion has many causes, but major factors are the fear and apathy that often accompany a disability. The European e-Inclusion policy stresses the importance of ICT in improving the quality of life in potentially disadvantaged groups, including older people and persons with disabilities. In this project, we will develop ICT tools to support the treatment of people who are at risk of social exclusion due to fear and/or apathy associated with a disability. These tools will be in the form of personalised VR scenarios and serious games specifically designed for therapeutic targets and made broadly available via a novel integration of interactive 3D environments directly into Web browsers. We will perform cutting edge research into rendering and simulating personalised and populated VR environments, 3D web graphics, and serious games. These technical efforts will be underpinned by our clinical/laboratory and industry partners, who will be fully involved throughout in the requirements, design and evaluation of VERVE, and liaison with the stakeholders (i.e., participants, carers/family, and health professionals). They will implement the VERVE interventions in three use-cases, each targeting a different group of participants: fear of falling, apathy related to cognitive decline and behavioural disturbances, and other emotional disturbances linked to anxiety. While developing clinical assessment methods and interventions for the first two patient groups is our primary focus, our results will be applicable to a much wider range of potentially disadvantaged individuals.

8.2.2. CR-PLAY – Capture Reconstruct Play

Type: COOPERATION (ICT)

Instrument: Specific Targeted Research Project

Objectif: Creativity

Duration: November 2013 - October 2016

Coordinator: Testaluna SA (IT)

Partner: TU Darmstadt (DE), UC London (UK), U. Patras (GR), Miniclip UK, Cursor Oy (FI)

Inria contact: George Drettakis

Abstract: The goal of this project is to use image- and video-based rendering and relighting techniques in the context of games and in particular mobile or casual games. The computer graphics and vision partners (UCL, TUD) are leaders in their fields, and have developed algorithms allowing easy capture of scenes using images and video, and reconstruction using vision algorithms. UCL and Inria have developed image- and video-based rendering algorithms which can be useful for games. These tools need to be perfected, reducing artifacts and difficulty of use so that they can be useful and productive for games companies. For evaluation, the HCI lab of the University of Patras will provide cutting-edge methodologies to make the resulting systems useable. The consortium is led by the games company Testaluna, based in Genova Italy, with whom we have a solid working

relationship from our previous VERVE project (see above). Other industrial partners include Cursor Oy (a regional group of games companies in Finland, which is a leader in Europe in Casual games) and Miniclip, which is one of the major players in the online game market.

We have started specific scientific collaborations with TUD on capture guidance and UCL on video-based rendering, which will continue in 2015.

8.3. International Initiatives

8.3.1. Inria Associate Teams

8.3.1.1. CRISP2

Title: Creating and Rendering Images based on the Study of Perception

International Partner (Institution - Laboratory - Researcher):

University of California Berkeley

Duration: 2011 - Present

See also: http://www-sop.inria.fr/reves/crisp/

The CRISP collaboration aims at developing novel techniques to create and manipulate effective numerical imagery. We adopt a multidisciplinary approach, focusing on understanding how people create and perceive images, on developing new rendering algorithms based on this understanding, and on building interactive tools that enable users to efficiently produce the images they have in mind. The participants of CRISP share complementary expertise in computer graphics, human computer interaction and human visual perception.

After a very productive year in 2013, we continued our work on drawing and manipulating materials in vector graphics in 2014. This work was published in the Computer Graphics Forum journal and presented at the Eurographics Symposium on Rendering (EGSR) [16]. We are currently working on two collaborative projects in the context of CRISP. One project is on light transport simulation (with Ravi Ramamoorthi, now at UC San Diego), the other project is on appearance transfer between photographs (with Alyosha Efros, who recently joined UC Berkeley). We also have several project ideas to start with Martin S. Banks (Human Vision Science).

8.3.2. Informal International Partners

8.3.2.1. France-USA
Participants: Gaurav Chaurasia, Emmanuel Iarussi, Adrien Bousseau, George Drettakis.

Beyond the CRISP associate team, we have an ongoing collaboration with Adobe Research (Sylvain Paris) and MIT (Fredo Durand) on parallel image-proccessing languages and global illumination (Fredo Durand). We also have another collaboration with Adobe Research (Wilmot Li) on jewelry design. Emmanuel Iarussi did a 3-months visit at Adobe in the context of this collaboration.

8.3.2.2. France-Canada
Participant: Adrien Bousseau.

We collaborate with K. Singh (University of Toronto) and Alla Scheffer (U. British Columbia, Vancouver), on sketching techniques for designers (see Sec. 6.4.4).

8.3.2.3. France-Greece
Participant: George Drettakis.

We are collaborating with the Technical University of Crete on visual attention, in the context of the Ph.D. of George Koulieris, supervised by Prof. Katerina Mania and the Un. of Cottburg (D. Cunningham) (see Sec. 6.3.2 and 6.3.1).

8.4. International Research Visitors

8.4.1. Visits of International Scientists

8.4.1.1. Visitors

We hosted several researchers this year:

- Gordon Wetzstein (MIT), in January
- Wendy McKay and Theophanis Tsandilas in February
- Kenneth Vanhoey (Univ. de Strasbourg), in February
- Fredo Durand (MIT), in February
- Jean Ponce (ENS), in February
- Marcus Magnor (TU Braunschweig), in February
- Christian Theobalt (Max Planck Institut), in February
- Markus Gross (ETH Zurich), in April
- Abdelaziz Djelouah (Inria Grenoble), in May
- Indira Thouvenin (UT Compiegne), in June
- Josef Sivic (Inria and ENS), in July
- Wenzel Jakob (ETH Zurick), in September
- Marty Banks (Berkeley part of EA CRISP), in June and November
- Gaurav Chaurasia (MIT), in November

8.4.1.2. Internships

Arora Rahul

Date: May 2014 - July 2014

Institution: IITK (India)

Ayush Tewari

Date: June 2014 - Aug 2014

Institution: IIIT

Uditha Kasthuriarachchi

Date: April 2014 - Sept 2014

Institution: UNSA

TITANE Project-Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. Grand Emprunt

Culture 3D Clouds (started in October 2012, duration 3 years) is a national project aimed at devising a cloud computing platform for 3D scanning, documentation, preservation and dissemination of cultural heritage.

Information and communication technologies in the world offer new possibilities for cultural exchange, creation, education and shared knowledge to greatly expand the access to culture and heritage. Culture 3D Cloud is part of a process that aims to create a technical rupture approach in the field of digitization of heritage artifacts to allow the emergence of new viable business models. Today the field of 3D scanning artifacts heritage evolves slowly and only provides resources for researchers and specialists and the technology and equipment used for 3D scanning are sophisticated and require highly specialized skills. The cost is significant and limits the widespread practice. Culture 3D Clouds project aims to give back the caption to the photographers and the distribution to the agencies and image banks that will develop a value chain to commercialize 3D reproductions demand for their customers and expand the market valuation of business assets (commercial publishers, public).

Partners: IGN, CMN , RMN, Inria, EISTI, CNRS-MAP, UCP-ETIS, CEA, HPC Project, ValEISTI, BeIngenious.

Web site: http://c3dc.fr/.

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. IRON - Robust Geometry Processing

Type: IDEAS

Instrument: ERC Starting Grant

Duration: January 2011 - December 2015

Coordinator: Pierre Alliez

Inria contact: Pierre Alliez

Abstract: The purpose of this project is to bring forth the full scientific and technological potential of Digital Geometry Processing by consolidating its most foundational aspects. Our methodology will draw from and bridge the two main communities (computer graphics and computational geometry) involved in discrete geometry to derive algorithmic and theoretical contributions that provide both robustness to noisy, unprocessed inputs, and strong guarantees on the outputs. The intended impact is to make the digital geometry pipeline as generic and ironclad as its Digital Signal Processing counterpart.

8.3. International Research Visitors

8.3.1. Visits of International Scientists

Prof. Mathieu Desbrun, head of the Information Sciences and Mathematics Department of Caltech, obtained an Inria international Chair. We are collaborating on robust surface reconstruction, optimal transport and variational meshing.

<p style="text-align:center; color:red;">**ALPAGE Project-Team**</p>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. *LabEx EFL (Empirical Foundations of Linguistics) (2011 – 2021)*

Participants: Laurence Danlos, Benoît Sagot, Chloé Braud, Marie-Hélène Candito, Benoit Crabbé, Pierre Magistry, Djamé Seddah, Sarah Beniamine, Maximin Coavoux, Éric Villemonte de La Clergerie.

Linguistics and related disciplines addressing language have achieved much progress in the last two decades but improved interdisciplinary communication and interaction can significantly boost this positive trend. The LabEx (excellency cluster) EFL (Empirical Foundations of Linguistics), launched in 2011 and headed by Jacqueline Vaissière, opens new perspectives by adopting an integrative approach. It groups together some of the French leading research teams in theoretical and applied linguistics, in computational linguistics, and in psycholinguistics. Through collaborations with prestigious multidisciplinary institutions (CSLI, MIT, Max Planck Institute, SOAS...) the project aims at contributing to the creation of a Paris School of Linguistics, a novel and innovative interdisciplinary site where dialog among the language sciences can be fostered, with a special focus on empirical foundations and experimental methods and a valuable expertise on technology transfer and applications.

Alpage is a very active member of the LabEx EFL together with other linguistic teams we have been increasingly collaborating with: LLF (University Paris 7 & CNRS) for formal linguistics, LIPN (University Paris 13 & CNRS) for NLP, LPNCog (University Paris 5 & CNRS) LSCP (ENS, EHESS & CNRS) for psycholinguistics, MII (University Paris 4 & CNRS) for Iranian and Indian studies. Alpage resources and tools have already proven relevant for research at the junction of all these areas of linguistics, thus drawing a preview of what the LabEx is about: experimental linguistics (see Section 4.6). Moreover, the LabEx provides Alpage with opportunities for collaborating with new teams, e.g., on language resource development with descriptive linguists.

Benoît Sagot is the head one of the 7 autonomous scientific "strands" of the LabEx EFL, namely the strand 6 on "Language Resources". Marie-Hélène Candito and Benoit Crabbé are respectively deputy-head of strands 5 on "Computational semantic analysis" and 2 on "Experimental grammar from a cross-linguistic perspective". Several project members are in charge of research operations within these 3 strands.

8.1.2. *ANR*

8.1.2.1. *ANR project ASFALDA (2012 – 2015)*

Participants: Marie-Hélène Candito [principal investigator], Marianne Djemaa, Benoît Sagot, Éric Villemonte de La Clergerie, Laurence Danlos, Virginie Mouilleron, Vanessa Combet.

Alpage is principal investigator team for the ANR project ASFALDA, lead by Marie-Hélène Candito. The other partners are the Laboratoire d'Informatique Fondamentale de Marseille (LIF), the CEA-List, the MELODI team (IRIT, Toulouse), the Laboratoire de Linguistique Formelle (LLF, Paris Diderot) and the Ant'inno society.

The project aims to provide both a French corpus with semantic annotations and automatic tools for shallow semantic analysis, using machine learning techniques to train analyzers on this corpus. The target semantic annotations are structured following the FrameNet framework [57] and can be characterized roughly as an explicitation of "who does what when and where", that abstracts away from word order / syntactic variation, and to some of the lexical variation found in natural language.

The project relies on an existing standard for semantic annotation of predicates and roles (FrameNet), and on existing previous effort of linguistic annotation for French (the French Treebank). The original FrameNet project provides a structured set of prototypical situations, called frames, along with a semantic characterization of the participants of these situations (called *roles*). We propose to take advantage of this semantic database, which has proved largely portable across languages, to build a French FrameNet, meaning both a lexicon listing which French lexemes can express which frames, and an annotated corpus in which occurrences of frames and roles played by participants are made explicit. The addition of semantic annotations to the French Treebank, which already contains morphological and syntactic annotations, will boost its usefulness both for linguistic studies and for machine-learning-based Natural Language Processing applications for French, such as content semantic annotation, text mining or information extraction.

To cope with the intrinsic coverage difficulty of such a project, we adopt a hybrid strategy to obtain both exhaustive annotation for some specific selected concepts (commercial transaction, communication, causality, sentiment and emotion, time), and exhaustive annotation for some highly frequent verbs. Pre-annotation of roles will be tested, using linking information between deep grammatical functions and semantic roles.

The project is structured as follows:

- Task 1 concerns the delimitation of the focused FrameNet substructure, and its coherence verification, in order to make the resulting structure more easily usable for inference and for automatic enrichment (with compatibility with the original model);
- Task 2 concerns all the lexical aspects: which lexemes can express the selected frames, how they map to external resources, and how their semantic argument can be syntactically expressed, an information usable for automatic pre-annotation on the corpus;
- Task 3 is devoted to the manual annotation of corpus occurrences (we target 20000 annotated occurrences);
- In Task 4 we will design a semantic analyzer, able to automatically make explicit the semantic annotation (frames and roles) on new sentences, using machine learning on the annotated corpus;
- Task 5 consists in testing the integration of the semantic analysis in an industrial search engine, and to measure its usefulness in terms of user satisfaction.

The scientific key aspects of the project are:

- an emphasis on the diversity of ways to express the same frame, including expression (such as discourse connectors) that cross sentence boundaries;
- an emphasis on semi-supervised techniques for semantic analysis, to generalize over the available annotated data.

8.1.2.2. ANR project Polymnie (2012-2016)
Participants: Laurence Danlos, Éric Villemonte de La Clergerie, Julie Hunter.

Polymnie is an ANR research project headed by Sylvain Pogodolla (Sémagramme, Inria Lorraine) with Melodi (INRIT, CNRS), Signes (LABRI, CNRS) and Alpage as partners. This project relies on the grammatical framework of Abstract Categorial Grammars (ACG). A feature of this formalism is to provide the same mathematical perspective both on the surface forms and on the more abstract forms the latter correspond to. ACG allows for the encoding of a large variety of grammatical formalisms, in particular Tree Adjoining grammars (TAG).

The role of Alpage in this project is to develop sentential or discursive grammars written in TAG and to participate in their conversion in ACG. Results were first achieved in 2014 concerning text generation: GTAG formalism created by Laurence Danlos in the 90's has been rewritten in ACG [25], [26], [27]. As regards discursive analysis, D-STAG formalism created by Laurence Danlos in the 00's is currently been rewritten in ACG and enhanced to cover attributions with some preliminary linguistic work on attributions [33].

8.1.3. Other national initiatives

8.1.3.1. "Investissements d'Avenir" project PACTE (2012 – 2015)
Participants: Benoît Sagot, Kata Gábor, Pierre Magistry.

PACTE (*Projet d'Amélioration de la Capture TExtuelle*) is an "Investissements d'Avenir" project sumbitted within the call "Technologies de numérisation et de valorisation des contenus culturels, scientifiques et éducatifs". It started in November 2012, although the associated fundings only arrived at Alpage in July 2013.

PACTE aims at improving the performance of textual capture processes (OCR, manual script recognition, manual capture, direct typing), using NLP tools relying on both statistical (n-gram-based, with scalability issues) and hybrid techniques (involving lexical knowledge and POS-tagging models). It addresses specifically the application domain of written heritage. The project takes place in a multilingual context, and therefore aims at developing as language-independant techniques as possible.

PACTE involves 3 companies (Numen, formerly Diadeis, main partner, as well as A2IA and Isako) as well as Alpage and the LIUM (University of Le Mans). It brings together business specialists, large-scale corpora, lexical resources, as well as the scientific and technical expertise required.

The results obtained at Alpage in 2014 within PACTE are described in 6.3

8.1.3.2. FUI project COMBI (2014-2016)
Participants: Laurence Danlos, Vanessa Combet, Jacques Steinlin.

COMBI is is an "FUI 16" project. It started in February 2014 for a two year duration. It groups 5 industrial partners (Temis, Isthma, Kwaga, Yseop and Qunb) and Alpage. Temis and Istma work on data mining from texts and big data. Kwaga works on the interpretation and inferences that can be drawn from the data retrieved in the analysis module. Alpage and Qunb work, under the supervision of Yseop, on the production of respectively texts and graphics describing the results of the interpretation module. Currently, COMBI aims at creating the full chain for a user case concerning the weekly activity of an on-line service.

Alpage works on text generation, with the adaptation of TextElaborator, a generation system developed in the 10's by WatchAssistance and based on G-TAG. Alpage also works on the opportunity to describe pieces of information by texts, graphics or both.

8.1.3.3. Consortium Corpus Écrits within the TGIR Huma-Num
Participants: Benoît Sagot, Djamé Seddah.

Huma-Num is a TGIR (Very Large Research Infrastructure) dedicated to digital humanities. Among Huma-Num initiatives are a dozen of consortia, which bring together most members of various research communities. Among them is the *Corpus Écrits* consortium, which is dedicated to all aspects related to written corpora, from NLP to corpus development, corpus specification, standardization, and others. All types of written corpora are covered (French, other languages, contemprorary language, medieval language, specialized text, non-standard text, etc.). The consortium Corpus Écrits is managed by the Institut de Linguistique Française, a CNRS federation of which Alpage is a member since June 2013, under the supervision of Franck Neveu.

Alpage is involved in various projects within this consortium, and especially in the development of corpora for CMC texts (blogs, forum posts, SMSs, textchat...) and shallow corpus annotation, especially with MElt.

8.2. European Initiatives

8.2.1. Collaborations in European Programs, except FP7 & H2020

> Program: **IC1207 COST**
>
> Project acronym: PARSEME
>
> Project title: PARSing and Multi-word Expressions
>
> Duration: March 2013 - March 2017
>
> Coordinator: Agata Savary
>
> Other partners: interdisciplinary experts (linguists, computational linguists, computer scientists, psycholinguists, and industrials) from 30 countries

Abstract: The general aim of PARSEME is increasing and enhancing the ICT support of the European multilingual heritage. This aim is pursued via more detailed objectives: (1) to put multilingualism in focus of linguistic and technological studies; (2) to establish a long-lasting cross-lingual, cross-theoretical and cross-methodological research network in natural language processing (NLP); (3) to bridge the gap between linguistic precision and computational efficiency in NLP applications.

Program: **ISCH COST Action IS1312**

Project acronym: TextLink

Project title: Structuring Discourse in Multilingual Europe

Duration: April 2014 - April 2018

Coordinator: Liesbeth Degand

Other partners: experts in computational linguistics and discourse from 24 countries

France MC members: Laurence Danlos and Philippe Muller (IRIT)

Abstract: With partners from across Europe, TextLink will unify numerous but scattered linguistic resources on discourse structure. With its resources searchable by form and/or meaning and a source of valuable correspondences, TextLink will enhance the experience and performance of human translators, lexicographers, language technology and language learners alike.

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Informal International Partners

Alpage has active collaborations with several international teams. The most active in 2014 have been:

- collaboration with Columbia University (United States), in particular on discourse modeling (Laurence Danlos, with Owen Rambow) and on computational morphology (Benoît Sagot, with Owen Rambow)
- collaboration with the Emory University (USA) on broad coverage parsing of unlabeled and noisy Korean data set (Djamé Seddah, with Jinho D. Choi).
- collaboration with the Indiana University (United States) on parsing morphologically rich languages (Djamé Seddah, with Sandra Kubler)
- collaboration with the University of Ljubljana (Slovenia) on wordnet development (Benoît Sagot, with Darja Fišer)
- collaboration with the Uppsala University (Sweden) on statistical parsing (Marie-Hélène Candito and sDjamé Seddah, with Joakim Nivre)
- collaboration with the Weizmann Institute of Science (Israel) on parsing morphologically rich languages (Djamé Seddah, with Reut Tsarfaty)

8.4. International Research Visitors

8.4.1. Visits of International Scientists

James Pustejovsky from Brandeis University (Boston, USA) was invited Professor at Alpage in April 2014. His stay was funded by Inria, his travel by Alpage. He is specialist in computational semantics and the creator of the "Generative Lexicon". During his stay in Paris, he gave two lectures with a large audience. The topic was on the computational model of events. The notion of event has long been central for both modeling the semantics of natural language as well as reasoning in goal-driven tasks in artificial intelligence. James outlined a unified theory of event structure. James has also been working with Alpage members. First on the French lexical resources developed at Alpage, namely Framenet (Marie Candito) and Verbenet (Laurence Danlos). Second on the role of attributions in discourse structure within the linguistic work made at Alpage for the ANR Polymnie (Laurence Danlos and Julie Hunter).

8.4.1.1. Internships

Kristina Gulordava is a visiting research student from the University of Geneva (LATL) supervised by Paola Merlo, visting ALPAGE from September 2014 to January 2015. Her Phd thesis is dedicated to the study of generic cross linguistic constraints across languages. Her goal is to investigate the connection between the quantitative aspects of word order variation across languages and the quantitative aspects of word order variation within a language. She explores to which extent a computational corpus-based analysis can provide new evidence not only for empirical, but also for theoretical linguistic research.

<p style="text-align:center">**MULTISPEECH Team**</p>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. Equipex ORTOLANG

Project acronym: ORTOLANG [0]

Project title: Open Resources and TOols for LANGuage

Duration: September 2012 - May 2016 (phase I, signed in January 2013)

Coordinator: Jean-Marie Pierrel, ATILF (Nancy)

Other partners: LPL (Aix en Provence), LORIA (Nancy), Modyco (Paris), LLL (Orléans), INIST (Nancy)

Abstract: The aim of ORTOLANG (Open Resources and TOols for LANGuage) is to propose a network infrastructure offering a repository of language data (corpora, lexicons, dictionaries, etc.) and tools and their treatment that are readily available and well-documented which will:

- enable a real mutualization of analysis research, of modeling and automatic treatment of the French language;
- facilitate the use and transfer of resources and tools set up within public laboratories towards industrial partners, in particular towards SME which often cannot develop such resources and tools for language treatment due to the costs of their realization;
- promote the French language and local languages of France by sharing knowledge which has been acquired by public laboratories.

Several teams of the LORIA laboratory contribute to this Equipex, mainly with respect to providing tools for speech and language processing. MULTISPEECH contributes text-speech alignment and speech visualization tools.

8.1.2. ANR ORFEO

Project acronym: ORFEO [0]

Project title: Outils et Ressources pour le Français Ecrit et Oral

Duration: February 2013 - February 2016

Coordinator: Jeanne-Marie DEBAISIEUX (Université Paris 3)

Other partners: ATILF, CLLE-ERSS, ICAR, LIF, LORIA, LATTICE, MoDyCo

Abstract: The main objective of the ORFEO project is the constitution of a Corpus for the Study of Contemporary French.

In this project, we have provided so far an automatic alignment at the word and phoneme levels for audio files from the corpus TCOF (Traitement de Corpus Oraux en Français). This corpus contains mainly spontaneous speech, recorded under various conditions with a large SNR range and a lot of overlapping speech. We tested different acoustic models and different adaptation methods for the forced speech-text alignment. Other corpora are currently being processed.

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[0] http://www.ortolang.fr

[0] http://www.agence-nationale-recherche.fr/en/anr-funded-project/?tx_lwmsuivibilan_pi2[CODE]=ANR-12-CORP-0005

8.1.3. ANR-DFG IFCASL

Project acronym: IFCASL

Project title: Individualized feedback in computer-assisted spoken language learning

Duration: March 2013 - February 2016

Coordinator: Jürgen Trouvain (Saarland University)

Other partners: Saarland University (COLI department)

Abstract: The main objective of IFCASL is to investigate learning of oral French by German speakers, and oral German by French speakers at the phonetic level.

The work has mainly focused on the design of a corpus of French sentences and text that has been recorded by German speakers learning French, recording a corpus of German sentences read by French speakers, and tools for annotating French and German corpora. Beforehand, two preliminary small corpora have been designed and recorded in order to bring to the fore the most interesting phonetic issues to be investigated in the project. In addition this preliminary work was used to test the recording devices so as to guarantee the same quality of recording in Saarbrücken and in Nancy, and to design and develop recording software.

In this project, we also provided an automatic alignment procedure at the word and phoneme levels for 4 corpora: French sentences uttered by French speakers, French sentences uttered by German speakers, German sentences uttered by French speakers, German sentences uttered by German speakers.

8.1.4. ANR ContNomina

Project acronym: ContNomina

Project title: Exploitation of context for proper names recognition in diachronic audio documents

Duration: February 2013 - July 2016

Coordinator: Irina Illina (Loria)

Other partners: LIA, Synalp

Abstract: the project ContNomina focuses on the problem of proper names in automatic audio processing systems by exploiting in the most efficient way the context of the processed documents. To do this, the project addresses:

- the statistical modeling of contexts and of relationships between contexts and proper names;
- the contextualization of the recognition module through the dynamic adjustment of the lexicon and of the language model in order to make them more accurate and certainly more relevant in terms of lexical coverage, particularly with respect to proper names;
- the detection of proper names, on the one hand, in text documents for building lists of proper names, and on the other hand, in the output of the recognition system to identify spoken proper names in the audio/video data.

8.1.5. FUI RAPSODIE

Project acronym: RAPSODIE [0]

Project title: Automatic Speech Recognition for Hard of Hearing or Handicapped People

Duration: March 2012 - February 2016 (signed in December 2012)

Coordinator: eRocca (Mieussy, Haute-Savoie)

Other partners: CEA (Grenoble), Inria (Nancy), CASTORAMA (France)

Abstract: The goal of the project is to realize a portable device that will help a hard of hearing person to communicate with other people. To achieve this goal the portable device will embed a speech recognition system, adapted to this task. Another application of the device will be environment vocal control for handicapped persons.

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[0]http://erocca.com/rapsodie

In this project, MULTISPEECH is involved for optimizing the speech recognition models for the envisaged task, and contributes also to finding the best way of presenting the speech recognition results in order to maximize the communication efficiency between the hard of hearing person and the speaking person.

8.1.6. ADT FASST

The Action de Développement Technologique Inria (ADT) FASST (2012–2014) was conducted by PAROLE in collaboration with the teams PANAMA and TEXMEX of Inria Rennes. It reimplemented into efficient C++ code the Flexible Audio Source Separation Toolbox (FASST) originally developed in Matlab by the METISS team of Inria Rennes. This enabled the application of FASST on larger data sets, and its use by a larger audience. The new C++ version was released in January 2014. Two modules were also developed for HTK and Kaldi in order to perform noise robust speech recognition by uncertainty decoding.

8.1.7. ADT VisArtico

The technological Development Action (ADT) Inria Visartico (2013–2015) aims at developing and improving VisArtico, an articulatory vizualisation software. In addition to improving the basic functionalities, several articulatory analysis and processing tools are being integrated. We will also work on the integration of multimodal data.

8.2. European Initiatives

8.2.1. Collaborations in European Programs, except FP7 & H2020

E. Vincent was responsible for his former team (PANAMA) of the following project.

> Program: Eureka - Eurostars
>
> Project acronym: i3DMusic
>
> Project title: Real-time Interactive 3D Rendering of Musical Recordings
>
> Duration: October 2010 to March 2014
>
> Coordinator: Audionamix (FR)
>
> Other partners: EPFL (CH), Sonic Emotion (CH)
>
> Abstract: The i3DMusic project aims to enable real-time interactive respatialization of mono or stereo music content. This is achieved through the combination of source separation and 3D audio rendering techniques. PANAMA is responsible for the source separation work package, more precisely for designing scalable online source separation algorithms and estimating advanced spatial parameters from the available mixture.

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Informal International Partners

E. Vincent is involved as an associate member in the national Japanese JSPS Grant-in-Aid for Scientific Research project on distributed microphone arrays led by Nobutaka Ono from the National Institute of Informatics together with other partners from the University of Tsukuba and Tokyo Institute of Technology.

A. Liutkus is involved in a national project in Ireland, still at the proposal stage, on the topic of Audio Forensics, led by Derry Fitzgerald (Cork Institute of Technology). He is an associate researcher on some workpackages of this project, notably those focusing on the theory of audio source separation.

A. Liutkus is co-advisor for the Ph.D. of Donal O'Donovan (Cork Institute of Technology, Ireland), whose Ph.D. topic lies in the applications of the Kernel Additive Modelling framework to image processing.

8.3.2. Participation in other International Programs

A. Liutkus is an associate researcher in a national project in the USA, funded by the National Science Fundation (NSF) on the program "Cyber-Human Systems" (CHS) under the name "CHS:Small: Robust Interactive Audio Source Separation" and led by Bryan Pardo (Northwestern University, Chicago).

8.4. International Research Visitors

8.4.1. Visits of International Scientists

RIBAS Dayana

> Date: Sep 2014 - Dec 2014

> Institution: CENATAV Advanced Technologies Application Center, La Habana (Cuba)

BANDINI Andrea

> Date: Oct 2014 - Mar 2015

> Institution: University of Bologna, Bologna, Italy.

8.4.2. Visits to International Teams

8.4.2.1. Explorer program

VINCENT Emmanuel

> Date: Jun 2014 - Aug 2014

> Institution: Mitsubishi Electric Research Labs (USA)

LIUTKUS Antoine

> Date: Oct 2014 - Dec 2014

> Institution: BU (Turkey)

> Description: This Explorer program had several objectives. First, it aims at studying several ambitious scientific problems, such as the analysis of multimodal and multirate data and also to extend Nonnegative Matrix Factorization to alpha-stable models, significantly generalizing the classical Gaussian model for audio signals. Second, this program is the occasion to build an international academic network involving researchers of the Bogazici University. It is planned to submit an ambitious proposal for a Marie-Curie International Training Network (ITN) in 2015.

<div align="center">

PANAMA Project-Team

</div>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. Labex Comin Labs projetcs

CominLabs is a Laboratoire d'Excellence funded by the PIA (Programme Investissements d'Avenir) in the broad area of telecommunications.

8.1.1.1. HEMISFER
Participant: Rémi Gribonval.

> *http://www.hemisfer.cominlabs.ueb.eu/*
>
> *Research axis: 3.1*
>
> *CominLabs partners : EPI VISAGES; EPI HYBRID; EPI PANAMA*
>
> *External partners : EA 4712 team from University of Rennes I; EPI ATHENA, Sophia-Antipolis;*
>
> *Coordinator: Christian Barillot, EPI VISAGES*
>
> *Description: The goal of HEMISFER is to make full use of neurofeedback paradigm in the context of rehabilitation and psychiatric disorders. The major breakthrough will come from the use of a coupling model associating functional and metabolic information from Magnetic Resonance Imaging (fMRI) to Electro-encephalography (EEG) to "enhance" the neurofeedback protocol. We propose to combine advanced instrumental devices (Hybrid EEG and MRI platforms), with new man-machine interface paradigms (Brain computer interface and serious gaming) and new computational models (source separation, sparse representations and machine learning) to provide novel therapeutic and neuro-rehabilitation paradigms in some of the major neurological and psychiatric disorders of the developmental and the aging brain (stroke, attention-deficit disorder, language disorders, treatment-resistant mood disorders, . . .).*
>
> *Contribution of PANAMA: PANAMA, in close cooperation with the VISAGES team, contributes to a coupling model between EEG and fMRI considered as a joint inverse problem addressed with sparse regularization. By combining both modalities, one expects to achieve a good reconstruction both in time and space. This new imaging technique will then be used for improving neurofeedback paradigms in the context of rehabilitation and psychiatric disorders, which is the final purpose of the HEMISFER project.*

Hybrid Eeg-MrI and Simultaneous neuro-feedback for brain Rehabilitation

8.1.1.2. TEPN
Participant: Rémi Gribonval.

> *http://www.tepn.cominlabs.ueb.eu/*
>
> *Research axis: 3.1*
>
> *CominLabs partners : IRISA OCIF - Telecom Bretagne; IETR SCN; IETR SCEE; EPI PANAMA*
>
> *Coordinator: Nicolas Montavont, IRISA OCIF - Telecom Bretagne*

Description: As in almost all areas of engineering in the past several decades, the design of computer and network systems has been aimed at delivering maximal performance without regarding to the energy efficiency or the percentage of resource utilization. The only places where this tendency was questioned were battery-operated devices (such as laptops and smartphones) for which the users accept limited (but reasonable) performance in exchange for longer use periods. Even though the end users make such decisions on a daily basis by checking their own devices, they have no way of minimizing their energy footprint (or conversely, optimize the network resource usage) in the supporting infrastructure. Thus, the current way of dimensioning and operating the infrastructure supporting the user services, such as cellular networks and data centers, is to dimension for peak usage. The problem with this approach is that usage is rarely at its peak. The overprovisioned systems are also aimed at delivering maximal performance, with energy efficiency being considered as something desired, but non-essential. This project aims at making the network energy consumption proportional to the actual charge of this network (in terms of number of served users, or requested bandwidth). An energy proportional network can be designed by taking intelligent decisions (based on various constraints and metrics) into the network such as switching on and off network components in order to adapt the energy consumption to the user needs. This concept can be summarized under the general term of Green Cognitive Network Approach.

Contribution of PANAMA: PANAMA, in close cooperation with the SCEE team at IETR (thesis of Marwa Chafii), focuses on the design of new waveforms for multi carrier systems with reduced Peak to Average Power Ratio (PAPR).

Toward Energy Proportional Networks

8.1.2. OSEO-FUI: S-POD: *"Assistance à personnes en danger potentiel"*
Participants: Frédéric Bimbot, Romain Lebarbenchon, Ewen Camberlein.

Duration: August 2012-November 2016

Research axis: 3.2

Partners: ERYMA, CAPT/FOTON, CASSIDIAN, KAPTALIA, KERLINK, le LOUSTIC and Telecom Bretagne

Coordinator: ERYMA

Description: S-POD gathers research teams and industrial partners to that aim at setting up a framework to process and fuse audio, physiological and contextual data. The goal is to design an embedded autonomous system able to detect situations of potential danger arising in the immediate environment of a person (military, police, CIT, fire, etc.)

Contribution of PANAMA: PANAMA is in charge of R&I activities related to the qualitative and quantitative analysis of information from the acoustic environment (intensity, direction of arrival, nature of noise sounds, properties of voices, etc.) as well as to the exploitation of these analyses. The need for real-time embedded processing induces specific constraints.

8.1.3. *Action de Développement Technologique: FASST*
Participants: Nancy Bertin, Frédéric Bimbot, Jules Espiau de Lamaestre, Nathan Souviraà -Labastie.

Duration: 2 years (2012–2014).

Research axis: 3.2.2

Partners: Inria Teams Parole (Nancy) and Texmex (Rennes)

Description: This Inria ADT aims to develop a new version of our FASST audio source separation toolbox in order to facilitate its large-scale dissemination in the source separation community and in the various application communities. A specific effort will be made towards the speech processing community by developing an interface with existing speech recognition software. The software was publicly released in January 2014.

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. ERC-StG: PLEASE (Projections, Learning, and Sparsity for Efficient Data Processing)
Participants: Rémi Gribonval, Srdan Kitic, Pierre Machart, Cagdas Bilen, Luc Le Magoarou, Nancy Bertin, Nicolas Keriven, Yann Traonmilin, Laurent Albera, Gilles Puy.

> *Duration: January 2012 - December 2016*
>
> *Research axis: 3.1*
>
> *Principal investigator: Rémi Gribonval*
>
> *Program: ERC Starting Grant*
>
> *Project acronym: PLEASE*
>
> *Project title: Projections, Learning and Sparsity for Efficient data processing*
>
> *Abstract: The Please ERC is focused on the extension of the sparse representation paradigm towards that of sparse modeling, with the challenge of establishing, strengthening and clarifying connections between sparse representations and machine learning*
>
> *Web site: https://team.inria.fr/panama/projects/please/*

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Informal International Partners

PANAMA has strong recurrent collaborations with the LTS2 lab at EPFL, the Center for Digital Music at Queen Mary University of London, the Institute for Digital Communications at the University of Edimburgh.

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- Mike Davies, in November, Professor of Signal and Image Processing, University of Edinburgh
- Pierre Vandergheynst, in November, Professor of Signal and Image Processing, EPFL
- Karin Schnass, in July, University of Innsbruck Department of Mathematics
- Gilles Blanchard, in May, Professor, University of Postdam
- Ivan Dokmanic, in January, Assistant Professor, EPFL, Lausanne

8.4.1.1. Internships

- Thomas Aubert, from April until June, University of Rennes1
- Theo Dabreteau, from June until August, Insa of Rennes
- Melanie Ducoffe, from February until June, ENS Rennes
- Anh-tho Le, from April until June, University of Hanoi
- Maxime Lecoq, from April until July, University of Rennes 1

<p align="center">**SEMAGRAMME Project-Team**</p>

7. Partnerships and Cooperations

7.1. Regional Initiatives

7.1.1. *SLAM: Schizophrenia and Language, Analysis and Modeling*
Participants: Maxime Amblard [coordinator], Philippe de Groote, Sylvain Pogodalla, Karën Fort.

Schizophrenia is well-known among mental illnesses for the strength of the thought disorders it involves, and for their widespread and spectacular manifestations: from deviant social behavior to delusion, not to speak about affective and sensitive distortions. It aims at exploring a specific manifestation, namely disorders in conversational speech. This is an interdisciplinary research, both empirical and theoretical from several domains, namely psychology, philosophy, linguistic and computer science.

The SLAMproject starts for three years at the Maison des Sciences de l'Homme de Lorraine (MSH–Lorraine, USR 3261). While this year work was dedicated to the test protocol definition, the coming years will be devoted to building an open-access corpus of pathological uses of language.

The first transcriptions of pathological interviews are analyses. The management chain was implemented for disfluences and POS.

Other participants are: Denis Apotheloz (ATILF, Université de Lorraine),Valérie Aucouturier (Centre Léo Apostel, Université Libre de Bruxelles), Katarina Bartkova (ATILF, Université de Lorraine), Fethi Bretel (CHS Le Rouvray, Rouen), Michel Musiol (InterPSY, Université de Lorraine), Manuel Rebuschi (Archives Poincaré, Université de Lorraine).

The SLAM project was supported by the MSH–Lorraine, USR 3261, and won a PEPS project HuMaIn (mission pour l'interdisciplinarité du CNRS). The CNRS part of the budget allowed the organization of the second workshop which gather linguists, psychologists and computer scientists in december : http://discours. loria.fr

7.2. National Initiatives

7.2.1. *ANR*

7.2.1.1. *Polymnie: Parsing and synthesis with abstract categorial grammars. From lexicon to discourse*
Participants: Maxime Amblard, Philippe de Groote, Aleksandre Maskharashvili, Sylvain Pogodalla [coordinator], Sai Qian.

POLYMNIE[0] is a research project funded by the French national research agency (ANR). It relies on the grammatical framework of Abstract Categorial Grammars (ACG). A feature of this formalism is to provide the same mathematical perspective both on the surface forms and on the more abstract forms the latter correspond to. As a consequence:

- ACG allows for the encoding of a large variety of grammatical formalisms such as context-free grammars, Tree Adjoining grammars (TAG), etc.
- ACG defines two languages: an abstract language for the abstract forms, and an object language for the surface forms.

Importantly, the notions of object language and abstract language are relative to each other. If we can naturally see surface forms as strings for instance and abstract forms as the associated syntactic trees, we can also consider to associate this abstract form to a first order logical formula as surface (object) form. This property is central in our project as it offers a unified approach to text analysis and text generation, in particular considering the underlying algorithms and their complexity.

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[0]http://semagramme.loria.fr/doku.php?id=projects:polymnie

ACG definition uses type-theory and lambda-calculus. From this point of view, they smoothly integrate formal semantics models issuing from Montague's proposal. Theories that extend to the discourse level such as Discourse Representation Theory (DRT) and Dynamic Predicate Logic (DPL) were not initially formulated using lambda-calculus. But such formulations have been proposed. In particular, a formulation based on continuation semantics allows them to be expressed quite naturally in the ACG architecture. Dynamic effects of discourse, in particular those related to anaphora resultion or rhetorical relation inference, have then to be expressed by lexical semantics or computed from the syntactic rules as studied in the Inria Collaborative Research Project (ARC) CAuLD [0].

It has been shown that the discourse structure of texts plays a key role in their understanding. This is the case for both human readers and automatic processing systems. For instance, it can enhance text transformation systems such as the ones performing automatic summarization.

POLYMNIE focuses on studying and implementing the modelling of sentences and discourses in a compositional paradigm that takes into account their dynamics and their structures, both in parsing and in generation. To that end, we rely on the ACG framework. The kind of processing we are interested in relate to the automatic construction of summaries or to text simplification. This has to be considered in the limits of the modelling of the linguistic processes (as opposed to inferential processes for instance) these tasks involve.

The complexity of the phenomena, of their formal description, and of their interactions, require to set up a testing and development environment for linguistic modelling. It will consist in extending and stabilizing a software implementing the functionalities of the ACG framework. It will provide a tool for experimentation and validation of the approach.

Partners:

- Sémagramme people,
- Alpage (Paris 7 university & Inria Paris-Rocquencourt): Laurence Danlos (local coordinator), C. Braud, C. Roze, Éric Villemonte de la Clergerie,
- MELODI (IRIT, CNRS): Stergos Afantenos, Nicholas Asher (local coordinator), Juliette Conrath, Philippe Muller,
- Signes (LaBRI, CNRS): Jérôme Kirman, Richard Moot, Christian Retoré (local coordinator), Sylvain Salvati, Noémie-Fleur Sandillon-Rezer.

7.3. International Research Visitors

7.3.1. *Visits of International Scientists*

On the occasion of the workshop in honor of Hans KAMP we have invited in Nancy:

- Nicholas ASHER, Université Paul Sabatier, France
- Paul DEKKER, Universiteit van Amsterdam, the Netherlands
- Bart GEURTS, Universiteit van Nijmegen, the Netherlands
- Irène HEIM, Massachusetts Institute of Technology, USA
- Klaus von HEUSINGER, Universität zu Köln, Germany
- Hans KAMP, Universität zu Stuttgart, Germany

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[0]http://www.loria.fr/~pogodall/cauld/

7.3.2. Visits to International Teams

7.3.2.1. Sabbatical programme

Sylvain Pogodalla

Date: Aug 2014 - Jul 2015

Institution: Computational Linguistic Department of the University of Düsseldorf (Germany).

The objective of the research project deals with studying the syntax-semantics interface. It relies on two alternative approaches of this interface for mCSG: a unification based approach for Lexicalized Tree Adjoining Grammars (LTAG) [60], [61] as proposed in [57], [62], and a type-theoretic approach using Abstract Categorial Grammars (ACG) [80], [73], [74]. These two approaches provide the core mechanisms of structure mapping for the syntax-semantics interface. Because they both provide a perspective on the syntax-semantics interface for the same grammatical formalism, they offer an interesting meeting place for exchanges on the strength of each of the approaches. In the project, we focus on two of them: the role of lexical semantics and its interaction with the syntax-semantics design, and the integration of discourse related phenomena to the syntax-semantics interface. With that respect, the formal semantics expertise of the department in the modeling of tense and aspects plays is essential in enriching the approach.

<p style="text-align:center;color:red;font-weight:bold;">E-MOTION Project-Team</p>

7. Partnerships and Cooperations

7.1. European Initiatives

7.1.1. FP7 Projects

European Project (Strep) Bambi (Bottom-up Approaches to Machines dedicated to Bayesian Inference). The Bambi project started January 1st 2014 for a period of three years. The participant to this project are CNRS, HUJI (ISRAEL), ULG (Belgique), ISR(Portugal) ProbaYes(France). We propose a theory and a hardware implementation of probabilistic computation inspired by biochemical cell signaling. We will study probabilistic computation following three axes: algebra, biology, and hardware. In each case, we will develop a bottom-up hierarchical approach starting from the elementary components, and study how to combine them to build more complex systems. We propose Bayesian gates operating on probability distributions on binary variables as the building blocks of our probabilistic algebra. These Bayesian gates can be seen as a generalization of logical operators in Boolean algebra. We propose to interpret elementary cell signalling pathways as biological implementation of these probabilistic gates. In turn, the key features of biochemical processes give new insights for new probabilistic hardware implementation. We propose to associate conventional electronics and novel stochastic nano-devices to build the required hardware elements. Combining them will lead to new artificial information processing systems, which could, in the future, outperform classical computers in tasks involving a direct interaction with the physical world. For this purpose, this project associates research in Bayesian probability theory, molecular biology, nanophysics, computer science and electronics. The e-motion team is mainly concerned by : The development of Stochastic temporal coding of probabilistic information and the adaptation and learning in probabilisitc machines

7.1.2. Collaborations with Major European Organizations

Department of Electrical & Computer Engineering: University of Thrace, Xanthi (GREECE)

Subject: 3D coverage based on Stochastic Optimization algorithms

BlueBotics: BlueBotics Company, Lausanne (Switzerland)

Subject: Implementation of self-calibration strategies for wheeled robots and SLAM algorithms for industrial purposes

Autonomous System laboratory: ETHZ, Zurich (Switzerland)

Subject: Vision and IMU data Fusion for 3D navigation in GPS denied environment.

Robotics and Perception Group: University of Zurich (Switzerland)

Subject: Vision and IMU data Fusion for 3D navigation in GPS denied environment.

Universidade de Aveiro (Portugal)

Subject: Leader following. Co-directed phD.

Centro De Automatica y Robotica, UPM-CSIC, Madrid (Spain)

Subject: Target interception.

Social Robotics Laboratory, Freiburg (Germany)

Subject: Human behavior understanding.

7.2. International Initiatives

7.2.1. "PRETIV"

[November 2011- October 2014]

Multimodal Perception and REasoning for Transnational Intelligent Vehicles" (PRETIV) is a three-year ANR project accepted in the framework of the Blanc International II Programme with participants from France (e-Motion of Inria, Heudiasyc of CNRS, PSA Peugeot Citroen DRIA in Velizy) and China (Peking University, PSA Peugeot Citroen Technical Center in Shanghai). The project aims at developing of an online multimodal perception system for a vehicle and offline reasoning methods, dealing with incompleteness and uncertainties in the models and sensor data, as well as at conducting experiments in typical traffic scenarios in France and China to create an open comparative dataset for traffic scene understanding. The perception system will incorporate vehicle localization, mapping of static environmental objects, detecting and tracking of dynamic objects in probabilistic frameworks through multimodal sensing data and knowledge fusion. The reasoning methods are based on sensor data to learn semantics, activity and interaction patterns (vehicle - other objects, vehicle - infrastructure) to be used as a priori information to devise effective online perception algorithms toward situation awareness. The comparative dataset will contain experimental data of typical traffic scenarios with ground-truth, which will be used to learn country-specific traffic semantics and it will be open to the public.

7.2.1.1. SAMPEN

Title: self adaptive mobile perception and navigation

International Partner (Institution - Laboratory - Researcher):

NTU (TAIWAN)

Duration: 2014 - 2016

See also: http://emotion.inrialpes.fr/people/spalanzani/HomeSAMPEN.html

The associate team project is a Robotic project. The aim of the project is to propose a self-adaptive system of perception combined with a system of autonomous navigation. Usually, systems of perception rely on a set of specific sensors and a calibration is done in a specific environment. We propose to develop some methods to make perception systems adaptive to the environmental context and to the set of sensors used. This perception, that can be embedded on the mobile robot as well as on home structures (wall, ceiling, floor), will be helpful to localize agents (people, robot) present in the scene. Moreover, it will give information to better understand social scenes. All information will be used by the navigation system to move with a behavior that fit the context.

7.3. International Research Visitors

7.3.1. Visits of International Scientists

Mario Garzon, PhD student at Universidade de Madrid was in our team from February 2014 until April 2014.
Yufeng Yu, PhD student at Peking University was in our team until February 2014.
Suryansh Kumar, IIIT-Hyderabad, was in our team from September 2013 to March 2014.

7.3.2. Visits to International Teams

7.3.2.1. Research stays abroad

Chiara Troiani

Date: 2013

Institution: University of Zürich (Switzerland)

<div align="center" style="color:red">**FLOWERS Project-Team**</div>

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. *Comacina Capsule Creative*

The artist community is a rich source of inspiration and can provide new perspectives to scientific and technological questions. This complementarity is a great opportunity that we want to enforce in the Poppy project by making the robot accessible to non-robotic-expert users. The first experimentation of the use of Poppy in an art project was an artist residency entitled "Étres et Numérique". Led by the artists [0] Amandine Braconnier (mixed media artist) and Marie-Aline Villard (dancer-researcher), supported by the Fabrik Pola and the Aquitaine Region, this contemporary art project focused on the way to express emotions through robotic body movement in physical interaction with a human dancer. This work took the form of a seven day art-science residency involving members of the Poppy project and the artists. During the residency, the ease of programming through the pypot library permitted to design a simple interface allowing the dancer to physically sculpt novel movements, which softness could be dynamically controlled. This residency took part in a French high school (Lycée Saintonge, Bordeaux) and was also an educational experiment where young students participated to workshops where they explored Poppy movements and physical interaction with the robot. The residency restitution was a contemporary art dance performance involving poetic choreography, alternating phases of autonomous robot movements and passive robot movements provoked by the dancer. A description of this experiment is available at: https://forum.poppy-project.org/t/artist-residency-etres-et-numerique/72.

8.1.2. *Poppy at Saintonge Sainte-Famille highschool (Bordeaux)*

After the artistic residency that took place in the chapel at the Saintonge Sainte Famille high school, some teachers have become interested in the educational potential of the Poppy project and would like to integrate it as a common thread into the school year.

Poppy was initially designed for research purposes and seems to be also adapted for higher education. Yet using Poppy in secondary education seems excessive as it is expensive and the use of high quality servo-actuators is not really justified. However, the experience with high-school students is still interesting and we accepted this opportunity to do a pilot experiment.

For the teachers, the main goal was to gain experience of using such tools in a project context and evaluate the potential and limitations for educational purposes. For us, we were interested in the reaction of young students to Poppy and in getting an opinion on the relevance of Poppy for education at this level. Also, it was a real crash test of our design (hardware and software) in non-experienced hands and outside the laboratory.

The experiment took place in the Saintonge Sainte Famille high school on May 26th & 27th, and involved near 40 *première STI2D* students (equivalent to UK Year 12) preparing a professional baccalaureate and three teachers (*"Energy and environment"*, *"Architecture and construction"*, and *"Digital information systems"*). It was organized as a workshop in three 4-hour sessions. The last two hours were dedicated to oral presentations in the lecture hall allowing students to share their experiences and work.

For this first pilot experiment, we decided to reduce the cost by using only a sub-part of the whole Poppy. For us the most relevant part for high-school students was the upper body (thorax, head and the two arms), because it avoids to work on complex sensory-motor behaviours such as balancing and walking while keeping the expressive potential of Poppy. The total cost of Robotis Dynamixel motors, electronics and 3D printing service was about €2500 (20 % tax included).

The student team managed to assemble a fully functional Poppy. Groups working on control were able to make a live demo of Poppy moving at the end of the workshop.

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[0] Comacina Capsule Creative, http://www.comacina.org/

This experience was very instructive on several aspects relative to the usage of Poppy for education purpose. In particular, it raises some problems we would have never thought about without a "real world" experimentation in a school environement.

8.1.3. ENSAM

The orientation of a (high school) student, choosing a career, is often based on an imagined representation of a discipline, sector of activity or training. Moreover, higher education is sometimes for a college student or a student a self centered universe, with inaccessible teaching methodologies and level of competence.

The Arts and Métiers campus at Bordeaux-Talence in partnership with Inria wishes to contribute with its educational and scientific expertise to the development of new teaching methods and tools. The objective is to develop teaching sequences based on a project approach relying on an attractive multidisciplinary technological system: the humanoid Inria Poppy robot. These teaching sequences will be built and tailored to different levels of training, from high schools to Engineer schools.

The new formation "Bachelor of Technology", started in September 2014 at Ensam Bordeaux, is resolutely turned towards a project based pedagogy, outlining concepts from concrete situations. The humanoid Inria Poppy robot offers an open platform capable of providing an unifying thread for the different subjects covered during the 3-years of the Bachelor formation: mechanics, manufacturing (3D printing), electrical, mechatronics, computer sciences, design. . .

For the 1st and 2nd year of the ENSAM Engineer cursus, the Poppy robot can again be an interesting thread to support the teaching and to conduct further investigation.

8.1.4. DIGITEO

Alexander Gepperth is participating in two projects (PhD and PostDoc) financed by the local "Digiteo" initiative of the Plateau de Saclay.

8.2. National Initiatives

8.2.1. Hackathon at Universcience

On march 22th & 23th 2014, UniverSciences [0] organized a hackathon for the general public around the assembly of a Poppy robot. It involved 15 robotic enthusiasts, from children to adults. Participants were dispatched around several workshops during the two days. While a group was dedicated to the actual assembly of the different Poppy parts, others were exploring how to program the robot with the Python software or working on designing and 3D printing hardware improvements. Aside the workshops around Poppy, several presentations and conferences about robotics were set-up. In this context, participants are not only spectators of a scientific mediation act but also actors.

In two days, this group of new users, self-trained using online documentation have been able to build from scratch the whole robot and make it move using the Pypot library. They even designed a new original semipassive solution for the ankle joint, as well as a robot helmet which was 3D printed and assembled within the time of the workshop. This experiment did not only show that the platform was easily usable in an educational context with users of all ages, and was rebuildable in two days by a little group, but it also showed high educational value as testified by users and educators (see https://forum.poppy-project.org/t/poppy-project-at-la-cite-des-sciences-et-de-lindustrie/)

8.3. European Initiatives

8.3.1. FP7 & H2020 Projects

8.3.1.1. 3rd HAND

Type: FP7

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[0]Paris museum of sciences and technologies

Defi: Cognitive Systems and Robotics

Instrument: Specific Targeted Research Project

Objectif: Robotics, Cognitive Systems and Smart Spaces, Symbiotic Interaction

Duration: October 2013 - September 2016

Coordinator: Manuel Lopes

Partner: Universitaet Darmstadt, Germany

Partner: Stuttgart University, Germany

Partner: University of Innsbruck, Austria

Inria contact: Manuel Lopes

Abstract: Robots have been essential for keeping industrial manufacturing in Europe. Most factories have large numbers of robots in a fixed setup and few programs that produce the exact same product hundreds of thousands times. The only common interaction between the robot and the human worker has become the so-called "emergency stop button". As a result, re-programming robots for new or personalized products has become a key bottleneck for keeping manufacturing jobs in Europe. The core requirement to date has been the production in large numbers or at a high price. Robot-based small series production requires a major breakthrough in robotics: the development of a new class of semi-autonomous robots that can decrease this cost substantially. Such robots need to be aware of the human worker, alleviating him from the monotonous repetitive tasks while keeping him in the loop where his intelligence makes a substantial difference.

In this project, we pursue this breakthrough by developing a semi-autonomous robot assistant that acts as a third hand of a human worker. It will be straightforward to instruct even by an untrained layman worker, allow for efficient knowledge transfer between tasks and enable a effective collaboration between a human worker with a robot third hand. The main contributions of this project will be the scientific principles of semi-autonomous human-robot collaboration, a new semi-autonomous robotic system that is able to: i) learn cooperative tasks from demonstration; ii) learn from instruction; and iii) transfer knowledge between tasks and environments.

8.3.1.2. EXPLORERS

Type: FP7

Defi: NC

Instrument: ERC Starting Grant

Objectif: NC

Duration: December 2009 - November 2014

Coordinator: Pierre-Yves Oudeyer

Abstract: In spite of considerable and impressive work in artificial intelligence, machine learning, and pattern recognition in the past 50 years, we have no machine capable of adapting to the physical and social environment with the flexibility, robustness and versatility of a 6-months old human child. Instead of trying to simulate directly the adult's intelligence, EXPLORERS proposes to focus on the developmental processes that give rise to intelligence in infants by re-implementing them in machines. Framed in the developmental/epigenetic robotics research agenda, and grounded in research in human developmental psychology, its main target is to build robotic machines capable of autonomously learning and re-using a variety of skills and know-how that were not specified at design time, and with initially limited knowledge of the body and of the environment in which it will operate. This implies several fundamental issues: How can a robot discover its body and its relationships with the physical and social environment? How can it learn new skills without the intervention of an engineer? What internal motivations shall guide its exploration of vast spaces of skills? Can it learn through natural social interactions with humans? How to represent the learnt skills and how can they be re-used? EXPLORERS attacks directly those questions by proposing a

series of scientific and technological advances: 1) we will formalize and implement sophisticated systems of intrinsic motivation, responsible of organized spontaneous exploration in humans, for the regulation of the growth of complexity of learning situations; 2) intrinsic motivation systems will be used to drive the learning of forward/anticipative sensorimotor models in high-dimensional multimodal spaces, as well as the building of reusable behavioural macros; 3) intrinsically motivated exploration will be coupled with social guidance from non-engineer humans; 4) an information-theoretic framework will complement intrinsically motivated exploration to allow for the inference of body maps; 5) we will show how learnt basic sensorimotor skills can be re-used to learn the meaning of early concrete words, pushing forward human-robot mutual understanding. Furthermore, we will setup large scale experiments, in order to show how these advances can allow a high-dimensional multimodal robot to learn collections of skills continuously in a weeks-to-months time scale. This project not only addresses fundamental scientific questions, but also relates to important societal issues: personal home robots are bound to become part of everyday life in the 21st century, in particular as helpful social companions in an aging society. EXPLORERS' objectives converge to the challenges implied by this vision: robots will have to be able to adapt and learn new skills in the unknown homes of users who are not engineers.

8.4. International Initiatives

8.4.1. Inria Associate Teams

8.4.1.1. NEUROCURIOSITY

Title: NeuroCuriosity

International Partner (Institution - Laboratory - Researcher):

Columbia Neuroscience (ÉTATS-UNIS)

Duration: 2013 - 2015

One of the most striking aspects of human behavior is our enormous curiosity, drive for exploration. From a child feverishly examining a new toy with its hands and its eyes, to a tourist exploring a new city, to a scientist studying the brain, humans incessantly want to know. This exuberant curiosity shapes our private and social lives, and is arguably a key cognitive feature that allows our species to understand, control and alter our world. We aim to develop a novel unified biological and computational theory, which explains curiosity in the domain of visual exploration and attention as a deliberate decision motivated by learning progress. This theory will build and improve upon pioneer computational models of intrinsic motivation elaborated in developmental robotics, and be empirically evaluated in the context of visual exploration in monkeys through behavioral and brain imaging techniques. This will be the first attempt at a biological-computational framework of intrinsic motivation and perceptual exploration and their underlying cognitive mechanisms.

8.4.2. Inria International Partners

8.4.2.1. Informal International Partners

Jonathan Grizou, Manuel Lopes, and Pierre-Yves Oudeyer collaborated with Inaki Itturate (EPFL) and Luis Montesano (Zaragoza University) on Calibration-Free Brain-Computer Interaction. This collaboration leaded to the following publications [45], [44] . Since then, more experiments have been performed and a journal paper will be submitted in January 2015.

Jonathan Grizou and Manuel Lopes collaborated with Sammuel Barret and Peter Stone (LARG groupd, University of Texas at Austin) on extending our work on adaptive interaction to the multi-agent domain in the adhoc team framework. Their collaboration is still active and a joint paper is in preparation for beginning of 2015.

Anna-Lisa Vollmer, Jonathan Grizou, Manuel Lopes, and Pierre-Yves Oudeyer collaborated with Katharina Rohlfing (Bielefeld University) for studying the co-construction of interaction protocol in collaborative tasks with humans. We develloped a new experimental setup to investigate the processes used by humans to negotiate a protocol of interaction when they do not already share one. This collaboration leaded to the following publication [66].

Pierre-Yves Oudeyer worked with Linda Smith (Psychological and brain sciences department, Indiana Univ., Bloomington, US) on computational modeling of cognitive development, in particular on the role of curiosity driven processes on the evolution of language (see http://www.pyoudeyer.com/OudeyerSmithTopicsCogSci14.pdf).

Thibaut Munzer and Manuel Lopes worked with Bilal Piot (Supelec), Mathieu Geist (Supelec) and Olivier Pietquin (Lille University) to develop an Inverse Reinforcement Learning algorithm for Relational Domains.

Thibaut Munzer and Freek Stulp worked with Olivier Sigaud (ISIR, UPMC) to study regression algorithm for DMP and their impact on DMP optimization. From this collaboration resulted the publication [61].

Freek Stulp has started a cooperation with Michael Mistry at the University of Birmingham on learning inverse dynamics models. This has lead to a joint publication at the 2014 IEEE International Conference on Humanoid Robotics, where Freek Stulp and Michael Mistry presented a poster.

A cooperation with Laura Herlant of Carnegie Mellon University on discovering skill options lead to a joint publication at the 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems, where Laura Herlant gave a presentation.

Gennaro Raiola and Freek Stulp presented a poster titled "Libraries of Motion Primitives as Active Virtual Fixtures for Co-manipulation" at the Forum STIC Paris-Saclay http://www.digiteo.fr/forum-stic-paris-saclay.

Egor Sattarov and Alexander Gepperth presented a poster entitled "MODALSENSE-multimodal perception architecture for intelligent vehicles" at the Forum STIC Paris-Saclay http://www.digiteo.fr/forum-stic-paris-saclay.

Alexander Gepperth and Mathieu Lefort are collaborating with the university of applied sciences of Bottrop (Germany) on the subject of multimodal hand gesture recognition. In the context of this collaboration, Alexander Gepperth supervises a PhD student, Thomas Kopinski.

Gennaro Raiola has started partially working at CEA LIST to integrate his work on virtual mechanism on the Alfred robot at CEA. This is done under the joint supervision of Freek Stulp and Xavier Lamy (CEA LIST), in the context of the DIGITEO-funded project "PrActIx"

8.5. International Research Visitors

8.5.1. Visits of International Scientists

- Luis Montesano, University of Zaragoza, Spain
- Jacqueline Gottlieb, Columbia University, USA
- Thomas Kopinski, University of Applied Sciences Bottrop, Germany
- Thomas Schultz, McGill University, Canada
- Gary Cottrell, Univ. California San Diego
- Minoru Asada, Osaka University, Japan.
- Anne Warlaumont, Univ. California at Merced, US.

8.5.2. Visits to International Teams

- Manuel Lopes visited Jan Peters at Technical University of Darmstadt
- Manuel Lopes visited Zachary Pardos at University of Berkeley
- Pierre-Yves Oudeyer visited the Center for Brain and Cognitive Development, Birbeck College, London

8.5.2.1. Explorer programme

Jonathan Grizou

Date: Aug 2014 - Sep 2014

Institution: University of Texas at Austin (USA)

Jonathan Grizou received a Inria explorer fellowship to visit the LARG groupd headed by Peter Stone at the university of Texas at Austin. He visited their lab for a month in September 2014 and worked on adhoc team problems with Sammuel Barret and Peter Stone.

HEPHAISTOS Team

7. Partnerships and Cooperations

7.1. Regional Initiatives

7.1.1. SyRreMuse project: recommender for museum and exhibit visitors
Participant: Bernard Senach [correspondant].

The goal of the SyReMuse Project is to design and implement a recommender system for Museum and exhibits visitors. The project brings together a cluster of research labs from Inria and from University of Avignon mixing computer scientists and Human Science researchers (Laboratoire d'informatique d'Avignon, -Centre Norbert Elias, Wimmics, Hephaistos, ICT usage labs) . The project has been submitted to an ANR Call and, though not successful is still going on with a restricted objective focusing on modeling visitor's expectations and experience (individual and group).

7.1.2. Gnothi Seauton project : Evaluation of communicating objects
Participants: Yves Papegay, Bernard Senach [correspondant], Jean-Pierre Merlet.

In collaboration with a rehabilitation center, we are setting up an experiment of self-quantification devices based on actimetrics (measurement and analysis of motor activities of a subject). The goal of the study is to assess utility and usability of these devices in the context of mobility rehabilitation. The study will take place at Vallauris' Centre Heliomarin with physical therapists and patients with mobility impairments.

7.2. European Initiatives

7.2.1. FP7 & H2020 Projects

7.2.1.1. CABLEBOT

- Type: COOPERATION
- Instrument: Specific Targeted Research Project
- Objective: to develop a new generation of modular and reconfigurable robots able to perform many different steps in the post-production of large-scale structures.
- Duration: November 2011 - October 2014
- Coordinator: Ms. Mariola Rodríguez (TECNALIA, Spain)
- Partner: TECNALIA (Spain), CNRS-LIRMM, FRAUNHOFFER-IPA, UDE, Inria, EADS, AC-CIONA, VICINAY
- Inria contact: Jean-Pierre Merlet
- Abstract: The CABLEBOT project [0] deals with a novel methodology for designing, developing and evaluating cable robots customized for the automation in large-scale auxiliary processes. Parallel cable robots extend the payloads and workspace of conventional industrial robots by more than two orders of magnitude. The main objective is to develop a new generation of modular and reconfigurable robots able to perform many different steps in the post-production of large-scale structures. Three key technologies will be developed: a) Design of Cable Robot: Software tools to design the layout and geometry of cable robots, b) Industrial Process Planning: Simulation of cable robots to verify the operation of cable robots in environments with large-scale structures c) Control Algorithms and Systems: Distributed control and kinematic transformation to operate modular cable

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[0] http://www.cablebot.eu/

robots. Two application examples are targeted in close cooperation to industry: aeronautical applications of maintenance and the handling of construction beams. In both cases existing automation can hardly be used due to maneuverability of heavy and big parts and the risk associated. The results are feasible for many other fields including large-workspace movements of products, with impact in logistics, transport, and warehousing. The exploitation and commercialization of CABLEBOT are driven by VICINAY CEMVISA, the application of industrial scenarios, two end-users of different sectors - EADS and ACCIONA - will automate their currently manual post-production. TECNALIA provides the technology for simulation in terms of productivity, cost, safety and robustness, whereas the design of the robots is in charge of LIRMM and Inria. IPA and UDE are in charge of the control algorithms, on distributed and force control of redundant systems. Benefits include an increase of production efficiency, a wider range of products, light and reconfigurable structure mechanisms and adaptable and more flexible operator assistance systems.

7.2.1.2. RAPP

Type: COOPERATION

Instrument: Specific Targeted Research Project

Objective: Robotic Applications for Delivering Smart User Empowering Applications

Duration: December 2013-December 2016

Coordinator: CERTH/ITI

Partner: CERTH/ITI(Greece), Inria, WUT (Poland), ORTELIO (UK), ORMYLIA (Greece), IN-GEMA (Spain)

Inria contact: David Daney, Jean-Pierre Merlet, Manuel Serrano

Abstract: s our societies are affected by a dramatic demographic change, in the near future elderly and people requiring support in their daily life will increase and caregivers will not be enough to assist and support them. Socially interactive robots can help to confront this situation not only by physically assisting people but also functioning as a companion. The increasing sales figures of robots are pointing that we are in front of a trend break for robotics. To lower the cost for developers and to increase their interest on developing robotic applications, the RAPP introduces the idea of robots as platforms. RAPP (Robotic Applications for Delivering Smart User Empowering Applications) will provide a software platform in order to support the creation and delivery of robotics applications (RAPPs) targeted to people at risk of exclusion, especially older people. The open-source software platform will provide an API that contains the functionalities for implementing RAPPs and accessing the robot's sensors and actuators using higher level commands, by adding a middleware stack with added functionalities suitable for different kinds of robots. RAPP will expand the computational and storage capabilities of robots and enable machine learning operations, distributed data collection and processing, and knowledge sharing among robots in order to provide personalized applications based on adaptation to individuals. The use of a common API will assist developers is creating improved applications for different types of robots that target to people with different needs, capabilities and expectations, while at the same time respect their privacy and autonomy, thus the proposed RAPP Store will have a profound effect in the robotic application market. The results of RAPP will be evaluated through the development and benchmarking of social assistive RAPPs, which exploit the innovative features (RAPP API, RAPP Store, knowledge reuse, etc.) introduced by the proposed paradigm.

7.2.2. Collaborations with Major European Organizations
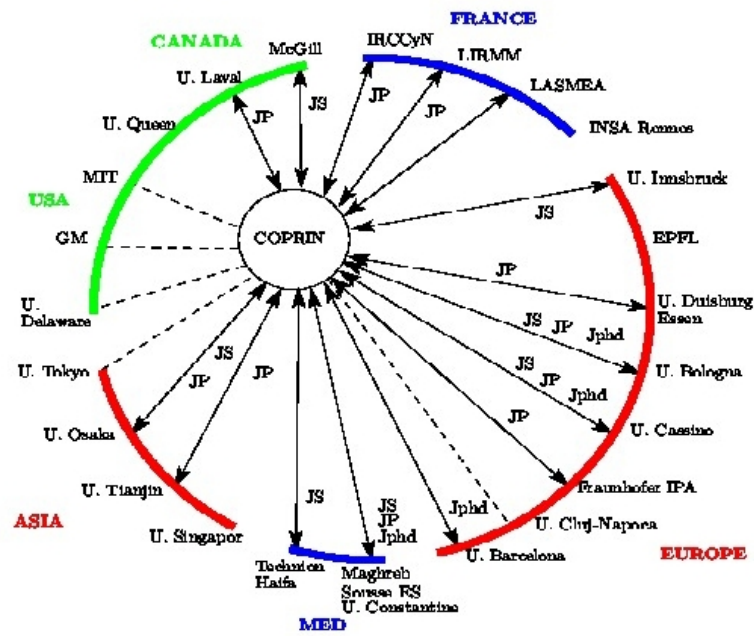
Our collaboration are described in the figure 1 .

Figure 1. COPRIN collaboration. JP:joint project, JS: joint stay, Jphd: joint PhD students

<p style="text-align:center">**LAGADIC Project-Team**</p>

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. *Oseo Apash project*

Participants: François Pasteau, Marie Babel.

no Insa Rennes 2012-230, duration: 24 months.

Started in September 2012 and finished in July 2014, the Apash project was supported by the Images & Réseaux cluster. It involved three laboratories connected to INSA Rennes, namely Irisa/Inria, IETR and LGCGM. One industrial partner took part into this project: Ergovie. This project aimed at designing a driving assistance for electrical wheelchair towards the autonomy and security of disabled people. The work realized within this project is described in Section 6.2.1 .

8.1.2. *HandiViz project - SATT Ouest Valorisation*

Participants: François Pasteau, Marie Babel.

duration: 12 months.

This project strated in June 2014. Thanks to a strong collaboration with Ergovie Company and the rehabilitation center Pôle Saint Hélier (Rennes), the semi-autonomous navigation solution designed for wheelchair systems (see Section 6.2.1) has been medically validated and tested by patients. The resulting technology is currently under transfer towards Ergovie (SATT/INSA funding). This technology, compliant with any off-the-shelf electrical wheelchair, is expected to be commercialized at mid 2015. We expect that this technology should be helpfull for many handicapped people. In particular, clinical trials have shown that such a system can lift the medical interdiction to drive wheelchairs for people who suffer from severe handicap such as hemispatial neglect or cerebral palsy.

8.1.3. *ARED NavRob*

Participants: Suman Raj Bista, Paolo Robuffo Giordano, François Chaumette.

no Inria Rennes 8033, duration: 36 months.

This project funded by the Brittany council started in October 2013. It supports in part Suman Raj Bista's Ph.D. about visual navigation of a humanoid robot (see Section 8.2.4).

8.1.4. *"Equipement mi-lourd Rennes Metropoles"*

Participant: Paolo Robuffo Giordano.

no Irisa CNRS Rennes 14C0481, duration: 36 months.

A grant from "Rennes Métropole" has been obtained in June 2014 and will support the activities related to the use of drones (quadrotor UAVs). The platform described in Section 5.4.5 has been purchased thanks to this grant.

8.2. National Initiatives

8.2.1. *ANR P2N Nanorobust*

Participants: Le Cui, Eric Marchand.

no. UR1 11FA310-06D, duration: 48 months.

This project started in November 2011. It is composed of a consortium managed by Femto-ST in Besançon with LPN and Isir in Paris, Thalès and Lagadic group through the "Université de Rennes 1". Nanorobust deals with the development of micro- and nano-manipulation within SEM (Scanning Electron Microscope). Our goal is to provide visual servoing techniques for positioning and manipulation tasks with a nanometer precision.

8.2.2. *ANR Contint Visioland*

Participants: Noël Mériaux, Patrick Rives, François Chaumette.

duration: 48 months.

This project started in November 2013. It is composed of a consortium managed by Onera in Toulouse with Airbus, Spikenet Technology, IRCCyN, and Lagadic. Its aim is to develop vision-based localization and navigation techniques for autonomous landing on a runway.

8.2.3. *PEA Decsa*

Participants: Aurélien Yol, Eric Marchand.

no Inria Rennes 6630, duration: 36 months.

This project started in November 2011. It is composed of a consortium managed by Astrium/Airbus with the Novadem, Sirehna, Spot Image and Magellium companies, and with the Inria Lagadic and Steep groups (Peter Sturm). It is devoted to the development of navigation and perception algorithms for small drones in urban environment.

8.2.4. *Oseo Romeo 2*

Participants: Nicolas Cazy, Suman Raj Bista, Fabien Spindler, Paolo Robuffo Giordano, François Chaumette.

no Inria Rennes 7114, duration: 48 months.

This project started in November 2012. It is composed of a large consortium managed by Aldebaran Robotics. It aims to develop advanced control and perception functionalities to a humanoid robot. It supports in part Suman Raj Bista's Ph.D. about visual navigation of a humanoid robot, as well as Nicolas Cazy's Ph.D. about model-based predictive control for visual servoing.

8.2.5. *Equipex Robotex*

Participants: Fabien Spindler, François Chaumette.

no Inria Rennes 6388, duration: 10 years.

Lagadic is one of the 15 French partners involved in the Equipex Robotex network. It is devoted to get significant equipments in the main robotics labs in France. In a near future, we plan to buy a humanoid robot, Romeo, by Aldebaran Robotics.

8.2.6. *Inria large scale initiative action PAL*

Participants: Panagiotis Papadakis, François Pasteau, Vishnu Karakkat Narayanan, Erwan Demairy, Marie Babel, Patrick Rives, François Chaumette.

Lagadic participates in the large-scale initiative action PAL (Personally Assisted Living) to develop technologies and services to improve the autonomy and quality of life for elderly and fragile persons. PAL started in September 2009 for 5 years. The purpose of PAL is to provide an experimental infrastructure, in order to facilitate the development of models, tools, technologies and concept demonstrations. Using the skills and objectives of the involved teams, four research themes have been defined: a) assessing the degree of frailty of the elderly, b) mobility of people, c) rehabilitation, transfer and assistance in walking, and d) social interaction. Lagadic is currently involved in the themes "mobility of people" and "assistance in walking" through collaborations with the EPI e-Motion (Grenoble), EPI Coprin (Sophia-Antipolis), and Handibio (Toulon). See Sections 6.2.1 , 6.2.2 and 6.1.4 , as well as [55].

8.3. European Initiatives

8.3.1. FP7 & H2020 Projects

8.3.1.1. FP7 Space RemoveDEBRIS
Participants: Eric Marchand, Fabien Spindler, François Chaumette.

Instrument: Specific Targeted Research Project

Duration: from October 2013 till September 2016

Coordinator: University of Surrey (United Kingdom)

Partner: Surrey Satellite Technology (United Kingdom), Astrium (Toulouse, France and Bremen, Germany), Isis (Delft, The Netherlands), CSEM (Neuchâtel, Switzerland), Stellenbosch University (South Africa).

Inria contact: François Chaumette

Abstract: The goal of this project is to validate the model-based tracking algorithms developped during Antoine Petit's Ph.D. (see Section 6.3.1) on images acquired during an actual space debris removal mission.

8.3.1.2. FP7 Regpot Across
Participant: François Chaumette.

Program: Regpot

Project acronym: Across

Project title: Center of Research Excellence for Advanced Cooperative Systems

Duration: from September 2011 till March 2015

Coordinator: Prof. Ivan Petrovic from University of Zagreb (Croatia)

Other partners: KTH (Sweden), ETHZ (Switzerland), TUM (Germany), University of Manchester (UK), Vienna University of Technology (Austria), Politecnico di Milano (Italy), University of Sevilla (Spain), Eindhoven University of Technology (The Netherlands), University of Athens (Greece), etc.

Abstract: the goal of this project is to enhance collaborations with the University of Zagreb.

8.4. International Initiatives

8.4.1. Inria Associate Teams
Participant: Marie Babel.

Sampen (Self Adaptive Mobile Perception and Navigation) is an Inria associated team with the Iceira Lab supervised by Prof Ren C. Luo at the National University of Taiwan. It has been accepted in 2014 for 2 years. The coordinator of the team for Inria is Anne Spalanzani from UPMF University at Grenoble. The other French participants are Marie Babel, Daney David (Phoenix group in Bordeaux) and Christian Laugier (e-Motion group in Grenoble).

The aim of the project is to propose a self-adaptive system of perception combined with a system of autonomous navigation. Usually, systems of perception rely on a set of specific sensors and a calibration is done in a specific environment. We propose to develop some methods to make perception systems adaptive to the environmental context and to the set of sensors used. This perception, that can be embedded on the mobile robot as well as on home structures (wall, ceiling, floor), will be helpful to localize agents (people, robot) present in the scene. Moreover, it will give information to better understand social scenes.

8.4.1.1. Informal International Partners

- As a follow up to the long term collaboration with the "Centro de Tecnologia da Informação Renato Archer" (CTI) in Campinas (Brazil), a new Ph.D. student, Renato José Martins, joined the team in Sophia Antipolis thanks to a grant from the CNPq (2013-2017). He is co-directed by Patrick Rives and Samuel Siqueira Bueno from "Divisão de Robótica e Visão Computacional" at CTI.

- Alexandre Krupa has a collaboration with Nassir Navab from the Technische Universität München concerning the joint supervision of Pierre Chatelain's Ph.D.

- Patrick Rives has a collaboration with Javier Gonzales-Jimenez from the University of Malaga (Spain). Eduardo Fernandez-Moral who received his PhD in Malaga by September 2014, is currently on a Postdoctoral position in Sophia Antipolis.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

- Hideaki Uchiyama, associate professor at Kyushu University, Japan, visited the group in Rennes for 3 weeks in December 2014 to work on augmented reality.

- Ivan Markovic, postdoctoral researcher at the University of Zagreb, spent a three-month visit in Rennes in the scope of the FP7 Regpot Across project (see Section 8.3.1.2 and 6.2.4).

8.5.2. Visits to International Teams

- Pierre Chatelain spent 2 one-week visits in Nassir Navab's lab at TUM, Germany, in the scope of his Ph.D.

<p style="text-align: center; color: red;">**RITS Team**</p>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR

8.1.1.1. COCOVEA

Title: Coopération Conducteur-Véhicule Automatisé

Instrument: ANR

Duration: November 2013 - April 2017

Coordinator: Jean-Christophe Popieul (LAMIH - University of Valenciennes)

Partners: LAMIH, IFSTTAR, Inria, University of Caen, COMETE, PSA, CONTINENTAL, Valeo, AKKA Technologies, SPIROPS

Inria contact: Fawzi Nashashibi

Abstract: CoCoVeA project aims at demonstrating the need to integrate from the design of the system, the problem of interaction with the driver in resolving the problems of sharing the driving process and the degree of freedom, authority, level of automation, prioritizing information and managing the operation of the various systems. This approach requires the ability to know at any moment the state of the driver, the driving situation in which he finds himself, the operating limits of the various assistance systems and from these data, a decision regarding activation or not the arbitration system and the level of response.

8.1.2. FUI

8.1.2.1. Sinetic

Title: Système Intégré Numérique pour les Transports Intelligents Coopératifs

Instrument: FUI

Duration: December 2014 - May 2017

Coordinator: Thomas Nguyen (Oktal)

Partners: Oktal, ALL4TEC, CIVITEC, Dynalogic, Inria, EURECOM, Renault, Armines, IFSTTAR, VeDeCoM

Inria contact: Jean-Marc Lasgouttes

Abstract: The purpose of the project SINETIC is to create a complete simulation environment for designing cooperative intelligent transport systems with two levels of granularity: the system level, integrating all the components of the system (vehicles, infrastructure management centers, etc.) and its realities (terrain, traffic, etc.) and the component-level, modeling the characteristics and behavior of the individual components (vehicles, sensors, communications and positioning systems, etc.) on limited geographical areas, but described in detail.

8.1.3. Competitivity Clusters

RITS team is a very active partner in the competitivity clusters, especially MOV'EO and System@tic. We are involved in several technical committees like the DAS SUR of MOV'EO for example. RITS is also the main Inria contributor in the VeDeCoM institute (IEED). VeDeCoM is financing the PhD theses of Pierre Merdrignac, Younes Bouchaala, Fernando Garrido Carpio and Zayed Alsayed.

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. CATS

Type: FP7

Instrument: Specific Targeted Research Project

Duration: January 2010 - December 2014

Coordinator: Lohr Industrie (France)

Partner: Inria (France), CTL (Italy), EPFL (Switzerland), TECHNION (Israel), GEA (Switzerland), ERT (France), and the cities of Formello (Italy), Strasbourg (France) and Ploiesti (Romania).

Inria contact: Michel Parent

Abstract: CATS' aim is the full development and experimentation of a new urban transport service based on a new generation of vehicle. Its major innovation is the utilization of a single type of vehicle for two different uses: individual use or semi collective transport. This new transport service is aimed at filling the gap between public mass transport and private individual vehicles.

See also: http://www.cats-project.org

8.2.1.2. FURBOT

Type: FP7

Instrument: Specific Targeted Research Project

Duration: November 2011 - February 2015

Coordinator: Genova University (Italy

Partner: Bremach (Italy), ZTS (Slovakia), Universite di Pisa (Italy), Persico (Italy), Mazel (Spain), TCB (Portugal), Inria (France).

Inria contact: Fawzi Nashashibi

Abstract: The project proposes novel concept architectures of light-duty, full-electrical vehicles for efficient sustainable urban freight transport and will develop FURBOT, a vehicle prototype, to factually demonstrate the performance expected.

8.2.1.3. CityMobil2

Type: COOPERATION (TRANSPORTS)

Instrument: Large-scale integrating project

Duration: September 2012 - August 2016

Coordinator: University of Rome La Sapienza, CTL (Italy)

Partner: Inria (France), DLR (germany), GEA Chanard (Switzerland), POLIS (Belgium), ERT (Belgium), EPFL (Switzerland),...(45 partners!)

Inria contact: Fawzi Nashashibi

Abstract: The CityMobil2 goal is to address and to remove three barriers to the deployment of automated road vehicles: the implementation framework, the legal framework and the unknown wider economic effect. CityMobil2 features 12 cities which will revise their mobility plans and adopt wherever they will prove effective automated transport systems. Then CityMobil2 will select the best 5 cases (among the 12 cities) to organize demonstrators. The project will procure two sets of automated vehicles and deliver them to the five most motivated cities for a 6 to 8 months demonstration in each city. CityMobil2 will establish a workgroup that will deliver a proposal for a European Directive to set a common legal framework to certify automated transport systems.

See also: http://www.citymobil2.eu/en/

8.2.1.4. Mobility2.0

Title: Co-operative ITS systems for enhanced electric vehicle mobility

Type: COOPERATION (TRANSPORTS)

Duration: September 2012 - February 2015

Coordinator: Broadbit (Slovakia)

Partner: ETRA (Spain), Barcelona Digital (Spain), ICCS (Greece), MRE (Italy), Armines (France), University of Twente (Netherlands), Privé (Italy), NEC (United Kingdom)

Inria contact: Jean-Marc Lasgouttes

Abstract: Mobility2.0 will develop and test an in-vehicle commuting assistant for FEV mobility, resulting in more reliable and energy-efficient electro-mobility. In order to achieve a maximum impact, Mobility2.0 takes an integrated approach of addressing the main bottlenecks of urban FEV mobility: "range anxiety" related to the limited FEV range, scarcity of parking spaces with public recharging spots, and the congestion of urban roads. Our integrated approach means the application developed by Mobility2.0 will utilize co-operative systems to simultaneously consider these bottlenecks, so that such an optimization can be achieved which still guarantees reliable transportation for each FEV owner. Mobility2.0 will focus on assisting the daily urban commute, which represents the bulk of urban mobility.

See also: http://mobility2.eu/

8.2.1.5. DESERVE

Title: DEvelopment platform for Safe and Efficient dRiVE

Duration: September 2012 - August 2015

Coordinator: VTT (Finland)

Partner: CRF (Italy), Armines (France), CONTINENTAL AUTOMOTIVE FRANCE SAS (France), FICOSA (Italy), Inria (France), TRW (Great Britain), AVL (Austria), BOSCH (Germany), DAIMLER (Germany), VOLVO (Sweden),...(26 partners)

Inria contact: Fawzi Nashashibi

Abstract: To manage the expected increase of function complexity together with the required reduction of costs (fixed and variable) DESERVE will design and build an ARTEMIS Tool Platform based on the standardization of the interfaces, software (SW) reuse, development of common non-competitive SW modules, and easy and safety-compliant integration of standardized hardware (HW) or SW from different suppliers. With innovative design space exploration (DSE) methods system design costs can be reduced by more than 15%. Hence, DESERVE will build an innovation ecosystem for European leadership in ADAS embedded systems, based on the automotive R&D actors, with possible applications in other industrial domains.

See also: http://www.artemis-ju.eu/project/index/view?project=38

8.2.1.6. AutoNet2030

Title: Co-operative Systems in Support of Networked Automated Driving by 2030

Duration: November 2013 – October 2016

Coordinator: Andras KOVACS – BROADBIT (Hungary)

Partner: BROADBIT (Hungary), BASELABS (Germany), CRF (Italy), Armines (France), VOLVO (Sueden), HITACHI EUROPE (France), EPFL (Switzerland), ICCS (Greece), TECHNISCHE UNIVERSITAET DRESDEN (Germany) (9 partners)

Inria contact: Fawzi Nashashibi

Abstract: AutoNet2030 shall develop and test a co-operative automated driving technology, based on a decentralized decision-making strategy which is enabled by mutual information sharing among nearby vehicles. The project is aiming for a 2020-2030 deployment time horizon, taking into account the expected preceding introduction of co-operative communication systems and sensor based lane-keeping/cruise-control technologies. By taking this approach, a strategy can be worked out for the gradual introduction of fully automated driving systems, which makes the best use of the widespread existence of co-operative systems in the near-term and makes the deployment of fully automated driving systems beneficial for all drivers already from its initial stages.

See also: http://www.autonet2030.eu/

8.2.2. Collaborations with Major European Organizations

- RITS is member of the **euRobotics AISBL** and the Leader of *"People transport"* Topic. This makes from Inria one of the rare French robotics representatives at the European level.

- RITS is a full partner of **VRA**: VRA – Vehicle and Road Automation is a support action funded by the European Union to create a collaboration network of experts and stakeholders working on deployment of automated vehicles and its related infrastructure. VRA project is considered as the cooperation interface between EC funded projects, international relations and national activities on the topic of vehicle and road automation. It is financed by the European Commission DG CONNECT and coordinated by ERTICO – ITS Europe.

- RITS is member of the Working Group on Automation: **iMobility**. This group has been created and is animated by ERTICO ITS Europe. The Automation Working Group was formed under the iMobility Forum, with the initial high level aims of exploring and promoting the potential of highly automated vehicles and applications and working towards the development of a roadmap for the deployment of automated systems.

8.3. International Initiatives

8.3.1. Informal International Partners

In the following we are highlighting only some selected collaborations, partners with whom there are: signed MoU's, researchers exchanges, softwares and hardwares exchanges, scientific close collaboration, etc.

- *NAIST – Japan* The RITS team has a close cooperation with NAIST (Nara institute of Science and Technology), Japan since 2009. Based on this collaboration NAIST and Inria established the MoU agreement to accelerate and strengthen future research collaborations and the exchange of researchers and students (4 Japanese researchers were hosted by IMARA/RITS since 2012).

- *University of Zaragoza – Spain* The team has strong collaborations with University of Zaragoza, Spain, especially the Intelligent Networks and Information Technologies group (INIT) directed by Prof. Francisco J. Martinez Domingues. Professor Martinez and Professor Piedad had a 3 months stay at Inria in summer 2014 during which closer collaborations and joint publications and a workshop co-organization was agreed on.

- CNIT (Consorzio Nazionale Inter-unviversitario per le Telecomunicazioni), Italy, directed by Professor Paolo Pagano, and University of Western Ontario, especially the department of the Electrical & Computer Engineering.

- *SwRI – USA*: Since 2007, a collaboration agreement exists with the Southwest Research Institute (San Antonio, Texas, USA) for the joint development of autonomous vehicle technologies, focusing on the areas of perception, intelligence, command and control, communications, platforms and safety. SwRI is one of the oldest and largest nonprofit applied research and development organizations in the U.S. The partnership conducted joint researches and exchanged intellectual properties to foster rapid technology and system advancements in vehicle autonomy. A joint vehicle demonstration took place in 2009 during the ITS World Congress in London.

- *Shanghai Jiao Tong University (SJTU) – China*: Professor Ming Yang is now leading Department of Automation in SJTU. Previously he has been a Post-doc fellow at Inria (IMARA/RITS team) from 2003 to 2005. Thus he shares RITS research areas and his main research activities are around the development of intelligent Cybercars. Several researchers and graduate students from SJTU were hired by RITS in the past. Both teams are partners of several joint French-Asian collaborative projects (e.g., CityHome, PAMM,...). Prof. Ming Yang Lab, RITS and e-Motion are currently discussing seriously the creation of an Inria International Research Lab., a common lab focusing on the topic of mobile robotics (including Intelligent Vehicles and Assistive Robotics). M. Hao Li, recently awarded PhD from Mines ParisTech under the supervision of Fawzi Nashashibi (RITS), is also a former student of Prof. Yang. He will be helping in the coordination of this new partnership project.

- *MICA LAB – Vietnam*: a growing partnership is under construction with MICA Lab under the co-direction of M. Eric Castelli. Partners in joint French-Asian projects, RITS and MICA lab have submitted an application to the Vietnamese Program 911 to support the financing of a joint PhD thesis.

- Institut du transport avancé du Québec (ITAQ) – Canada ITAQ wishes to conduct a project on the guidance of electric and hybrid semi-autonomous and autonomous applications for off-road vehicles. They want to develop this project in close collaboration with several Quebec companies and universities / colleges in Quebec (University of Sherbrooke-CRVI), France (Inria) and the United States (MIT). ITAQ holds expertise in electric vehicles but wants to develop its capacity for research in robotics, artificial intelligence, autonomous vehicles, etc. For this reason, a partnership is under construction (MoU) with Inria and especially with RITS to identify all the ways in which we could work together closely in order to transfer knowledge and expertise.

- *International Chaire "GAT"*: Inria-RITS, Mines ParisTech, EPFL, Univ. of Berkeley (PATH Program) and Shanghai Jiao Tong Univ. (SJTU) are the academic partners of the international Chaire GAT, funded and supported by: Valeo Group, SAFRAN Group and MPSA Group (Peugeot-Citroën). A recent NDA has been signed recently. This Chaire will promote and fund academic activities related to Ground Automated Transportation and autonomous driving.

- *Technical University of Sophia – Bulgaria*: RITS is conducting a close partnership with the Technical University of Sophia (Department of Mechanical Engineering). Since 2009, Professor Plamen Petrov has been a visiting professor at Inria. He contributed in conducting common advanced researches with RITS researchers in the field of dynamic modeling and adaptive motion control for vehicles and robots. Joint works have been also driven to develop and validate platooning concepts for normal speed driving of automated vehicles. This collaboration will continue with further scientific challenges to tackle especially in the field of vehicle control and motion planning.

8.3.2. Participation In other International Programs

- *STIC-Asia – French-Asian cooperation*: in the context of the Asian-French projects CityHome and PAMM, very close collaboration were driven between Inria's IMARA/RITS and E-Motion project-teams and Asian laboratories such as: NTU (Singapore), Dept. of Computer Science and Electrical Engineering Graduate School of Science and Technology Kumamoto University (Japan), Department of Automation of the Shanghai Jiao Tong University (SJTU University, China) and the Information and Communication Engineering and the Intelligent Systems Research Center at the SungKyunKwan University (SKKU), (Korea). Two cooperation projects were conducted together: CityHome (ended in 2011) and PAMM (ended in 2014). A new collaborative project has been recently accepted under the coordination of F. Nashashibi, head of RITS (SIM-Cities project [0]).

- *ECOS NORD – Simon Bolivar University (Venezuela)*: RITS and University of Simon Bolivar have started an official privileged cooperation under the framework of the ECOS Nord international Program. This program started effectively in 2014 with the expected visit of two researchers and a

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[0]Sustainable Intelligent Mobility for smart Cities

PhD student from each institute to the other institute. Collaborations between our institutions started already in 2012. Since this date, one researcher and 7 engineers (trainees) from SBU made several months stay each at RITS. They all worked in the field of intelligent control.

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- **Prof. Plamen PETROV**: professor at the Technical University of Sofia (Bulgaria). He has been an invited professor at Inria from June to September 2014. Prof. Petrov's visit is the sixth of its kind since 2009. This close collaboration in the area of automatic control has very fruitful results and outcomes. This year's joint research topic dealt with the design and implementation of saturated control for automated parking maneuvers (cf. section 6.9). In validation to 2013 activities, two articles were published in 2014: [28] and [44].

- **Dr. Maria Piedad Garrido Picazo and Dr. Francisco Jose Martinez Dominguez**: assistant professors of the University of Zaragoza, invited from June until September 2014. During their visit, they worked on routing and multicast issues in VANET.

8.4.1.1. Internships

- **Wei Lin Ku**: master student at National Chiao Tung University (Hsinchu, Taiwan). He has been an Inria intership student from April until October 2014. During this period, he studied and developed several DPM based strategies to detect and classify road obstacles (cars, pedestrians,...).

- **Mickaël Bergem, Hugues Thomas, Roxane Delpeyrat, Laurent Laflèche**: 2nd year at ENPC. They had a group project on reactive path planning using potential fields from April to June 2014.

- **Carlos Eduardo Flores Pino, Giampaolo Otero Ridolfi, Luis Guillermo Roldao Jimenez, Jean Carlos Rivera Pabon**: they worked on different methods for improving energy consumption of urban vehicles.

- **Leopoldo Gonzalez Clarembaux**: He was in master 2 at Telecom Paris-Sud (Evry). He developed perception and control strategies for autonomous docking for the electric freight vehicle Furbot. His work was implemented in simulation and on our Cybus platform.

8.4.2. Visits to International Teams

8.4.2.1. Research stays abroad

Guy Fayolle has been invited two weeks (5-19 oct. 2014) at Heriot-Watt University, Edinburgh (Prof. S. Foss, math. dept.).

AYIN Team

7. Partnerships and Cooperations

7.1. Regional Initiatives

- Seong-Gyun Jeong, Nazre Batool, Yuliya Tarabalka and Josiane Zerubia have been in contact with Didier Zugaj, image processing expert for early clinical evaluation at Garlderma R&D in Sophia Antipolis http://www.galderma.com/About-Galderma/Worldwide-presence/R-D-Locations to discuss AYIN's research on wrinkle detection.

- Zhao Liu and Josiane Zerubia discussed several times with Prof. Bahadoran from CHU Nice/Inserm (Faculty of Medicine, Dermatology department, at l'Archet 2 hospital in Nice) and Dr Queille-Roussel, CPCAD managing director at CHU Nice (Faculty of Medicine, Dermatology department, at l'Archet 2 hospital in Nice) about Ayin's research on semi-automatic acne detection.

7.2. European Initiatives

7.2.1. Collaborations with Major European Organizations

LIRA consortium

> Partners: Philips R&D (Eindhoven), CWI (Amsterdam), Fraunhofer Institutes (Berlin, Stuttgart, Darmstadt), Inria-SAM

> Skincare image and signal processing: analysis, modeling and characterization of the condition of human skin.

7.3. International Initiatives

7.3.1. Informal International Partners

Qiyin Fang and Samir Sahli.

> Subject: New optical sensors for skin imaging and their biomedical applications.

> Institution: McMaster University (Canada).

Stuart Jones and Jochen Einbeck.

> Subject: Shape modelling applied to subterranean sand bodies.

> Institution: Department of Earth Sciences and Department of Mathematical Sciences, Durham University (UK).

Zoltan Kato, Tamas Sziranyi and Csaba Benedek.

> Subjects: Multi-layer Markovian models for change detection in aerial and satellite images. Random field models of shape.

> Institution: Szeged University and MTA SZTAKI (Hungary).

Gabriele Moser and Sebastiano Serpico.

> Subject: Hierarchical Markov random fields for multi-temporal and multi-resolution classification in remote sensing.

> Institution: Genoa University (Italy).

Anuj Srivastava.

> Subject: Statistical shape analysis of functions, curves, and surfaces.

> Institution: Florida State University (USA).

7.4. International Research Visitors

7.4.1. Visits of International Scientists

- Csaba Benedek (MTA SZTAKI, Hungary, one week in January 2014).
- Qiyin Fang (McMaster University, Canada, one week in May 2014).
- Joseph Francos (Ben-Gurion University, Israel, one week in July 2014).
- Zoltan Kato (Szeged University, Hungary, one month, from mid-July till mid-August 2014).
- Vladimir Krylov (Genoa University, Italy, one week in September 2014).
- Zhao Liu (University of Manchester, one week in Dec 2014).
- Gabriele Moser (Genoa University, Italy, one week in July 2014).
- Samir Sahli (McMaster University, Canada, one week in September 2014).
- Thomai Tsiftsi (Durham University, UK, one week in March 2014).

7.4.1.1. Internships

Emmanuel Maggiori (from May until November 2014)

Subject: Optimizing partition trees for multi-class segmentation with shape prior.

Institution: Universidad Nacional del Centro de la Provincia de Buenos Aires and Inria.

Shu-Chi Yeh (from May until August 2014)

Subject: Hyperspectral skin image processing.

Institution: McMaster University, Canada.

7.4.2. Visits to International Teams

- Josiane Zerubia was invited in June to visit several laboratories in Israel: Electrical Eng. and Remote Sensing Departements at BGU in Beer Sheva, Computer Science Department at HUJI in Jerusalem, Computer Science Department at Haifa University, Multimedia Department at IDC University in Herzlyia, as well as 2 industrial research centers at Herzlyia (General Motors and Superdimension/Covidian). She also visited 2 start-up companies working in image processing: ORCAM in Jerusalem and GIVIEW in Ramat Gan. Finally she attended the Israel Computer Graphics day 2014 at Weizmann Institute in Rehovot.
- Josiane Zerubia visited in August the Computer Vision and Geometric Modeling lab at the University of Montreal, the Biophotonics lab at the Dept. of Engineering Physics of Mc Master University, as well as the Juravinski cancer research center in Hamilton, and two laboratories working in medical imaging and biological sciences at Sunnybrook Research Institute in Toronto.
- Josiane Zerubia was invited by University of Szeged and the Hungarian Academy of Sciences in December to visit the research group on visual computation at the Informatics Department, as well as the BIOMAG research group of the Synthetic and Systems Biology Unit, located both at Szeged University. She also visited 3 laboratories related to remote sensing, image processing and computer graphics in MTA SZTAKI in Budapest.

LEAR Project-Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR Project Qcompere

Participants: Guillaume Fortier, Cordelia Schmid, Jakob Verbeek.

This three-and-a-half year project started in November 2010. It is aimed at identifying people in video using both audio (using speech and speaker recognition) and visual data in challenging footage such as news broadcasts, or movies. The partners of this project are the CNRS laboratories LIMSI and LIG, the university of Caen, Inria's LEAR team, as well as two industrial partners Yacast and Vecsys Research.

8.1.2. ANR Project Physionomie

Participants: Frédéric Jurie [University of Caen], Jakob Verbeek, Shreyas Saxena.

Face recognition is nowadays an important technology in many applications ranging from tagging people in photo albums, to surveillance, and law enforcement. In this 3-year project (2013–2016) the goal is to broaden the scope of usefulness of face recognition to situations where high quality images are available in a dataset of known individuals, which have to be identified in relatively poor quality surveillance footage. To this end we will develop methods that can compare faces despite an asymmetry in the imaging conditions, as well as methods that can help searching for people based on facial attributes (old/young, male/female, etc.). The tools will be evaluated by law-enforcement professionals. The participants of this project are: Morpho, SensorIT, Université de Caen, Université de Strasbourg, Fondation pour la Recherche Stratégique, Préfecture de Police, Service des Technologies et des Systèmes d'Information de la Sécurité Intérieure, and LEAR.

8.1.3. ANR Project Macaron

Participants: Julien Mairal, Zaid Harchaoui, Laurent Jacob [CNRS, LBBE Laboratory], Michael Blum [CNRS, TIMC Laboratory], Joseph Salmon [Telecom ParisTech].

The project MACARON is an endeavor to develop new mathematical and algorithmic tools for making machine learning more scalable. Our ultimate goal is to use data for solving scientific problems and automatically converting data into scientific knowledge by using machine learning techniques. Therefore, our project has two different axes, a methodological one, and an applied one driven by explicit problems. The methodological axis addresses the limitations of current machine learning for simultaneously dealing with large-scale data and huge models. The second axis addresses open scientific problems in bioinformatics, computer vision, image processing, and neuroscience, where a massive amount of data is currently produced, and where huge-dimensional models yield similar computational problems.

This is a 3 years and half project, funded by ANR under the program "Jeunes chercheurs, jeunes chercheuses", which started in October 2014. The principal investigator is Julien Mairal.

8.1.4. PEPS CNRS BMI (Biology - Mathematics - Computer Science), Project FlipFlop

Participants: Elsa Bernard [Institut Curie, Ecoles des Mines-ParisTech], Laurent Jacob [CNRS, LBBE Laboratory], Julien Mairal, Jean-Philippe Vert [Institut Curie, Ecoles des Mines-ParisTech], Anne-Hélène Monsoro-Burq [Institut Curie].

The project is concerned with large-scale sparse estimation techniques for processing RNA-Seq data. It led to a joint publication [4] with partners from Inria Grenoble, Institut Curie in Paris, and the LBBE laboratory in Lyon. The principal investigator was Laurent Jacob (CNRS, LBBE laboratory). The project started in Jun 2012 and ended in Dec 2014.

8.1.5. MASTODONS Program CNRS - Project Gargantua

Participants: Zaid Harchaoui, Julien Mairal.

The project is concerned with machine learning and mathematical optimization for big data. The partners are from LJK (Grenoble), LIG (Grenoble), LIENS (ENS, Paris), Lab. P. Painleve (Lille). Principal investigator/leader: Zaid Harchaoui. Dates: May 2013-Dec. 2014

8.1.6. Equipe-action ADM du Labex Persyval (Grenoble) "Khronos"

Participants: Zaid Harchaoui, Massih-Reza Amini [LIG].

The partners of this project are from the laboratories LJK, LIG, GIPSA, TIMC, CEA. The principal investigators/leaders are Zaid Harchaoui (Inria and LJK), Massih-Reza Amini (LIG). The project started in Jan. 2014 and ends in Dec. 2016.

8.2. European Initiatives

8.2.1. AXES

Participants: Ramazan Cinbis, Matthijs Douze, Zaid Harchaoui, Dan Oneata, Danila Potapov, Cordelia Schmid, Jakob Verbeek, Clement Leray, Anoop Cherian.

This 4-year project started in January 2011 and ends in March 2015. Its goal is to develop and evaluate tools to analyze and navigate large video archives, eg. from broadcasting services. The partners of the project are ERCIM, Univ. of Leuven, Univ. of Oxford, LEAR, Dublin City Univ., Fraunhofer Institute, Univ. of Twente, BBC, Netherlands Institute of Sound and Vision, Deutsche Welle, Technicolor, EADS, Univ. of Rotterdam. See http://www.axes-project.eu/ for more information.

8.2.2. ERC Advanced grant Allegro

Participants: Cordelia Schmid, Karteek Alahari, Jerome Revaud, Pavel Tokmakov, Nicolas Chesneau.

The ERC advanced grant ALLEGRO started in April 2013 for a duration of five years. The aim of ALLEGRO is to automatically learn from large quantities of data with weak labels. A massive and ever growing amount of digital image and video content is available today. It often comes with additional information, such as text, audio or other meta-data, that forms a rather sparse and noisy, yet rich and diverse source of annotation, ideally suited to emerging weakly supervised and active machine learning technology. The ALLEGRO project will take visual recognition to the next level by using this largely untapped source of data to automatically learn visual models. We will develop approaches capable of autonomously exploring evolving data collections, selecting the relevant information, and determining the visual models most appropriate for different object, scene, and activity categories. An emphasis will be put on learning visual models from video, a particularly rich source of information, and on the representation of human activities, one of today's most challenging problems in computer vision.

8.3. International Initiatives

8.3.1. Inria Associate Teams

- **HYPERION: Large-scale statistical learning for visual recognition:** Zaid Harchaoui and Cordelia Schmid have an ongoing collaboration resp. with Pr. Jitendra Malik (EECS) and Pr. Nourredine El Karoui (Stat. dpt.) of UC Berkeley in the fall 2011. This collaboration has been supported by the *associated team "Hyperion"* and the *France-Berkeley Fund* (dates: June 2012-Dec. 2013). The collaboration is focusing on *large-scale statistical learning for computer vision*, ranging from the high-dimensional statistics aspects to real-world applications on large image and video datasets. Several visits of members of each institution and co-supervision of students happened in 2012, 2013, 2014. As part of the "Hyperion" associated team, two papers were published resp. in CVPR'14 and ICML'14, and one paper is currently in revision.

8.3.2. Inria International Partners

- **UC Berkeley:** This collaboration between Bin Yu, Jack Gallant, Yuval Benjamini, Adam Bloniarz (UC Berkeley), Ben Willmore (Oxford University) and Julien Mairal (Inria LEAR) aims to discover the functionalities of areas of the visual cortex. We have introduced an image representation for area V4, adapting tools from computer vision to neuroscience data. The collaboration started when Julien Mairal was a post-doctoral researcher at UC Berkeley and is still ongoing. We are planning to welcome one student from UC Berkeley during the summer 2015 to work on this project.

- **University of Edinburgh:** C. Schmid collaborates with V. Ferrari, associate professor at university of Edinburgh. Vicky Kalogeiton started a co-supervised PhD in September 2013; she is bi-localized between Uni. Edinburgh and Inria. Her subject is the automatic learning of object representations in videos.

- **MPI Tübingen:** C. Schmid collaborates with M. Black, a research director at MPI. In 2013, she spent one month at MPI and worked with a PhD student, S. Zuffi, and a postdoctoral researcher, H. Jhuang. C. Schmid has continued this collaboration in 2014 and spent also one month there.

8.3.3. Participation in Other International Programs

- **France-Berkeley fund:** The LEAR team was awarded in 2014 a grant from the France-Berkeley fund for a project between Julien Mairal and Pr. Bin Yu (statistics department, UC Berkeley) on "Invariant image representations and high dimensional sparse estimation for neurosciences". The award amounts to 10,000 USD for a period of one year, from November 2014 to November 2015. The funds are meant to support scientific and scholarly exchanges and collaboration between the two teams.

8.4. International Research Visitors

8.4.1. Visits to International Teams

- **Sabbatical program** Zaid Harchaoui is currently on sabbatical at New-York university, from October 2014 to September 2015.

<p align="center">**LINKMEDIA Project-Team**</p>

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. *CominLabs Project CominWeb*

Participants: Vincent Claveau, Sébastien Le Maguer.

Duration: 1 year
Partners: Univ. Nantes
URL: http://www.cominweb.cominlabs.ueb.eu

In the framework of the CominWeb projet, a 50kE contract was granted by the Labex CominLabs to the team to carry a preliminary study about text similarity models in different contexts: information retrieval, content based recommendation, etc.

8.1.2. *CominLabs Project Linking Media in Acceptable Hypergraphs (LIMAH)*

Participants: Rémi Bois, Sébastien Campion, Vincent Claveau, Guillaume Gravier, Patrick Gros, Pascale Sébillot.

Duration: 4 years, started in April 2014
Partners: Telecom Bretagne (IODE), Univ. Rennes II (CRPCC, PREFics), Univ. Nantes (LINA/TAL)
URL: http://limah.irisa.fr

LIMAH aims at exploring hypergraph structures for multimedia collections, instantiating actual links reflecting particular content-based proximity—similar content, thematic proximity, opinion expressed, answer to a question, etc. Exploiting and developing further techniques targeting pairwise comparison of multimedia contents from an NLP perspective, LIMAH addresses two key issues of content-based graph-oriented multimedia collection structuring: How to automatically build from a collection of documents an hypergraph, i.e., graph combining edges of different natures, which provides exploitable links in selected use cases? How collections with explicit links modify usage of multimedia data in all aspects, from a technology point of view as well as from a user point of view? LIMAH studies hypergraph authoring and acceptability taking a multidisciplinary approach mixing ICT, law, information and communication science as well as cognitive and ergonomy psychology.

8.2. National Initiatives

8.2.1. *ANR Project FIRE-ID*

Participants: Sébastien Campion, Philippe-Henri Gosselin, Patrick Gros, Hervé Jégou.

Duration: 3 years, started in May 2012
Partner: Xerox Research Center Europe

The FIRE-ID project considers the semantic annotation of visual content, such as photos or videos shared on social networks, or images captured by video surveillance devices or scanned documents. More specifically, the project considers the fine-grained recognition problem, where the number of classes is large and where classes are visually similar, for instance animals, products, vehicles or document forms. We also assumed that the amount of annotated data available per class for the learning stage is limited.

8.2.2. *ANR Project Secular*

Participants: Laurent Amsaleg, Teddy Furon, Hervé Jégou, Ewa Kijak.

Duration: 3 years, started in September 2012

Partners: Morpho, Univ. Caen GREYC, Telecom ParisTech

Content-based retrieval systems (CBRS) are becoming the main multimedia security technology to enforce copyright laws or to spot illegal contents over the Internet. However, CBRS were not designed with privacy, confidentiality and security in mind. This comes in serious conflict with their use in these new security-oriented applications. Privacy is endangered due to information leaks when correlating users, queries and the contents stored-in- the-clear in the database. This is especially the case of images containing faces which are so popular in social networks. Biometrics systems have long relied on protection techniques and anonymization processes that have never been used in the context of CBRS. The project seeks to a better understanding of how biometrics related techniques can help increasing the security levels of CBRS while not degrading their performance.

8.3. European Initiatives

8.3.1. FP7 & H2020 Projects

8.3.1.1. VIAMASS

Type: FP7

Instrument: ERC Starting Grant

Duration: 04/2014 – 03/2019

Coordinator: Hervé Jégou

Inria contact: Hervé Jégou

Abstract: VIAMASS is a ERC Starting grant project coordinated by Hervé Jégou and with Teddy Furon as co-investigator. The goal of the project is to automatically discover visual links within a very large collection of images. These "visual hyper-links" will connect the objects across the images of the collection. This raises a major obstacle with respect to scalability: cross matching all the images is of quadratic complexity when performed with a brute-force approach. To this end, VIAMASS addresses issues at the frontier of the current state of the art in computer vision and signal processing.

8.3.1.2. Forensic Image Identifier and Analyzer

Program: Eurostars

Duration: 03/2011 – 07/2014

Coordinator: Videntifier Technologies

Other partners: Videntifier Technologies (Iceland), Forensic Pathways (UK)

Abstract: FIIA is an innovative software service for the Forensic market that automatically identifies and analyzes the content of images on web sites and seized computers. The service saves time and money, gathers better evidence, and builds stronger court cases. We are in charge of helping with the technology needed to identify the logos from terrorist organizations that are inserted in images or videos. Challenges are related to the poor resolution and small size of logos as well as to the very strict efficiency constraints that the logo detector must match.

8.4. International Initiatives

8.4.1. Inria Associate Teams

8.4.1.1. MOTIF

Title: Unsupervised motif discovery in multimedia content

International Partner (Institution - Laboratory - Researcher):

Pontifícia Universidade Católica de Minas Gerais - VIPLAB - Silvio Jamil Guimãraes

Universidade Federal Minas Gerais - NPDI - Arnaldo Albuquerque de Araújo

Duration: 2014 - 2017

See also: http://www.icei.pucminas.br/projetos/viplab/projects/associate-team/index.html

MOTIF aims at studying various approaches to unsupervised motif discovery in multimedia sequences, i.e., to the discovery of repeated sequences with no prior knowledge on the sequences. On the one hand, we will develop symbolic approaches inspired from work on bioinformatics to motif discovery in the multimedia context, investigating symbolic representations of multimedia data and adaptation of existing symbolic motif discovery algorithms. On the other hand, we will further develop cross modal clustering approaches to repeated sequence discovery in video data, building upon previous work.

8.4.2. Inria International Partners

8.4.2.1. Informal International Partners

- National Institute for Informatics, Japan
- Berkeley University, USA
- University of Amsterdam, The Netherlands
- Katholieke Universiteit Leuven, Belgium
- National Technical University of Athens, Greece
- Czech Technical University, Czech Republic

8.4.3. Other International Programs

- PICS CNRS MM-Analytics
  – Title: Fouille, visualisation et exploration multidimensionnelle de contenus multimédia ; Multi-Dimensional Multimedia Browsing, Mining, Analytics (num 6382).
  – International Partner (Institution - Laboratory - Researcher):
      Reykjavík University, Iceland - Björn Þór Jónsson
  – Jan. 2014 – Dec. 2016
- STIC AmSud MAXIMUM Unsupervised Multimedia Content Mining
  – International coordinator: Guillaume Gravier, CNRS – IRISA, France
  – Scientific coordinators : Arnaldo de Albuquerque Araújo (Universidade Federal de Minas Gerais, Computer Science Department, NPDI); Benjamin Bustos (Universidad de Chile, Department of Computer Science, PRISMA); Silvio Jamil F. Guimarães (Pontifícia Universidade Católica de Minas Gerais, VIPLAB)
  – Jan. 2014 - Dec. 2015

8.5. International Research Visitors

8.5.1. Visits of International Scientists

Yannis Avrithis
Dates: October 2014 (2 weeks)
Institution: National Technical University of Athens (Greece)

8.5.2. Internships

Miaojing Shi
Dates: February 2014–January 2015 (1 year)
Subject: Large scale visual search
Institution: Pekin University (China)

8.5.3. Visits to International Teams

8.5.3.1. Research stays abroad

Petra Bosilj
Date: Sep. – Nov., 2014
Institution: Johann Bernoulli institute, Groningen, The Netherlands

Anca-Roxana Simon
Date: Apr. – June, 2014
Institution: Katholieke Universiteit Leuven, Belgium

<p align="center" style="color:red">MAGRIT Project-Team</p>

8. Partnerships and Cooperations

8.1. Regional Initiatives

Collaboration with Nancy School of Surgery

We are working with Nancy School of Surgery on soft tissue dissection simulation. In an effort to generate a more realistic model of tissue dissection in laparoscopic surgery we started to investigate on a novel method based on a task analysis. Nancy School of Surgery experts have defined the key features of the simulator. Initially we have chosen to model the basic geometry of this task rather than a whole laparoscopic procedure. Preliminary work has led to the development of a real time simulator performing cutting with a haptic thread at 1000Hz on a simple 2D geometry using SOFA Framework [23].

8.2. National Initiatives

8.2.1. ANR

- ANR IDeaS (2012-2016)
  Participants: R. Anxionnat, M.-O. Berger, E. Kerrien.
  The IDeaS Young Researcher ANR grant explores the potential of Image Driven Simulation (IDS) applied to interventional neuroradiology. IDS recognizes the current, and maybe essential, incapacity of interactive simulations to exactly superimpose onto actual data. Reasons are various: physical models are often inherently approximations of reality, simplifications must be made to reach interactive rates of computation, (bio-)mechanical parameters of the organs and surgical devices cannot but be known with uncertainty, data are noisy. This project investigates filtering techniques to fuse simulated and real data. MAGRIT team is in particular responsible for image processing and filtering techniques development, as well as validation.

8.2.2. Project funded by GDR ISIS in collaboration with Institut Pascal, Université de Clermont-Ferrand

- Participant: F. Sur.
  Since June 2012, we have been engaged in a collaboration with Pr. Michel Grédiac. The aim is to give a mathematical analysis and to help improving the image processing tools used in experimental mechanics at Institut Pascal.

  The TIMEX project (2014-2016) is funded by GDR ISIS ("Appel à projet exploratoire, projet interdisciplinaire"). It aims at investigating image processing tools for enhancing the metrological performances of contactless measurement systems in experimental mechanics.

8.2.3. Collaboration with the SHACRA team and AEN SOFA

Participants: R. Anxionnat, M.-O. Berger, E. Kerrien, A. Yureidini.
The SOFA-InterMedS large-scale Inria initiative is a research-oriented collaboration across several Inria project-teams, international research groups and clinical partners. Its main objective is to leverage specific competences available in each team to further develop the multidisciplinary field of Medical Simulation research. Our action within the initiative takes place in close collaboration with both SHACRA Inria project-team in Lille and the Department of diagnostic and therapeutic interventional neuroradiology of Nancy University Hospital. We aim at providing in-vivo models of the patient's organs, and in particular a precise geometric model of the arterial wall. Such a model is used by SHACRA team to simulate the coil deployment within an intracranial aneurysm. The associated medical team in Nancy, and in particular our external collaborator René Anxionnat, is in charge of validating our results. For three years, we have also been collaborating with the SHACRA team about real time augmentation of deformable organs

8.2.4. Collaboration with the Parole team

Participants: M.-O. Berger, P. -F. Villard, B. Wrobel-Dautcourt

Our collaboration with the local Inria team Parole is about the augmented head. This project aims at building a realistic head augmented by external and internal articulators with foreseen applications to language learning technologies [18].

8.3. International Research Visitors

8.3.1. Visits to International Teams

8.3.1.1. Research stays abroad

Pierre-Frédéric Villard started a one year full time CNRS delegation in September 2014 in the Harvard Bio-robotics Laboratory.

<p style="text-align: center; color: red;">**MORPHEO Project-Team**</p>

8. Partnerships and Cooperations

8.1. ARC6 project PADME – Perceptual quality Assessment of Dynamic MEshes and its applications

In this project, we propose to use a new and experimental "bottom-up" approach to study an interdisciplinary problem, namely the objective perceptual quality assessment of 3D dynamic meshes (i.e., shapes in motion with temporal coherence). The objectives of the proposed project are threefold:

1. to understand the HVS (human visual system) features when observing 3D animated meshes, through a series of psychophysical experiments;

2. to develop an efficient and open-source objective quality metric for dynamic meshes based on the results of the above experiments;

3. to apply the learned HVS features and the derived metric to the application of compression and/or watermarking of animated meshes.

This work is funded by the Rhône-Alpes région through an ARC6 grant for the period 2013-2016. The three partners are LIRIS (University Lyon 1, Florent Dupont), GIPSA-Lab (CNRS, Kai Wang) and LJK (University of Grenoble, Franck Hétroy-Wheeler). A PhD student, Georges Nader, is working on this project.

8.2. National Initiatives

8.2.1. *Motion analysis of laboratory rodents*

In order to evaluate the scalabililty of previous work on motion analysis of laboratory rodents, a collaboration has been initiated with the Institut Clinique de la Souris (ICS), in Institut de Génétique et de Biologie Moléculaire et Cellulaire (IGBMC). This institute is dedicated to phenotypying of mice and requires reliable motion analysis tools. A multicamera plateform has been deployed at ICS and will be exploited next year for tests ranging from one to two hundreds mice.

8.2.2. *ANR*

8.2.2.1. *ANR project Morpho – Analysis of Human Shapes and Motions*

Morpho is aimed at designing new technologies for the measure and for the analysis of dynamic surface evolutions using visual data. Optical systems and digital cameras provide a simple and non invasive mean to observe shapes that evolve and deform and we propose to study the associated computing tools that allow for the combined analysis of shapes and motions. Typical examples include the estimation of mean shapes given a set of 3D models or the identification of abnormal deformations of a shape given its typical evolutions. Therefore this does not only include static shape models but also the way they deform with respect to typical motions. It brings a new research area on how motions relate to shapes where the relationships can be represented through various models that include traditional underlying structures, such as parametric shape models, but are not limited to them. The interest arises in several application domains where temporal surface deformations need to be captured and analyzed. It includes human body analyses but also extends to other deforming objects, sails for instance. Potential applications with human bodies are anyway numerous and important, from the identification of pathologies to the design of new prostheses. The project focus is therefore on human body shapes and their motions and on how to characterize them through new biometric models for analysis purposes. 3 academic partners will collaborate on this project: the Inria Rhône-Alpes with the Morpheo team, the GIPSA-lab Grenoble and the Inria Lorraine with the Alice team. Website: http://morpho.inrialpes.fr/.

8.2.3. Competitivity Clusters

8.2.3.1. FUI project Creamove

Creamove is a collaboration between the Morpheo team of the Inria Grenoble Rhône-Alpes, the 4D View Solution company specialised in multi-camera acquisition systems, the SIP company specialised in multi-media and interactive applications and a choreographer. The objective is to develop new interactive and artistic applications where humans can interact in 3D with virtual characters built from real videos. Dancer performances will be pre-recorded in 3D and used on-line to design new movement sequences based on inputs coming from human bodies captured in real time. Website: http://www.creamove.fr.

8.3. European Initiatives

8.3.1. FP7 & H2020 Projects

8.3.1.1. Re@ct

Type: FP7 COOPERATION

Defi: IMMERSIVE PRODUCTION AND DELIVERY OF INTERACTIVE 3D CONTENT

Instrument: Specific Targeted Research Project

Objectif: Networked Media ans Search Systems

Duration: December 2011 - November 2014

Coordinator: BBC (UK)

Partner: BBC (UK), Fraunhofer HHI (Germany), University of Surrey (UK), Artefacto (France), OMG (UK).

Inria contact: Jean-Se´bastien Franco, Edmond Boyer

Abstract:RE@CT will introduce a new production methodology to create film-quality interactive characters from 3D video capture of actor performance. Recent advances in graphics hardware have produced interactive video games with photo-realistic scenes. However, interactive characters still lack the visual appeal and subtle details of real actor performance as captured on film. In addition, existing production pipelines for authoring animated characters are highly labour intensive. RE@CT aims to revolutionise the production of realistic characters and significantly reduce costs by developing an automated process to extract and represent animated characters from actor performance capture in a multiple camera studio. The key innovation is the development of methods for analysis and representation of 3D video to allow reuse for real-time interactive animation. This will enable efficient authoring of interactive characters with video quality appearance and motion. The project builds on the latest advances in 3D and free-viewpoint video from the contributing project partners. For interactive applications, the technical challenges are to achieve another step change in visual quality and to transform captured 3D video data into a representation that can be used to synthesise new actions and is compatible with current gaming technology.

8.4. International Initiatives

8.4.1. Inria International Partners

8.4.1.1. Declared Inria International Partners

8.4.1.1.1. Joint project with Forest Research, UK

A common work with an ecophysiologist from Forest Research, Eric Casella, is currently carried out to detect, analyse and correct acquisition noise from terrestrial laser scans (t-LiDAR) of trees. This project is funded by Grenoble university, through the AGIR framework. First results have been presented during the 5th French-Canadian workshop "Use of t-LiDAR systems in forest ecology".

8.4.1.2. Informal International Partners

8.4.1.2.1. Collaboration with TU Munich

The long term collaboration with TU Munich and Slobodan Ilic on human motion capture is ongoing with the work of Paul Huang [5] that was published atCVPR this year. The work contributes with an approach that identifies and takes benefit of key poses when tracking shapes.

8.5. International Research Visitors

8.5.1. Visits to International Teams

8.5.1.1. Sabbatical programme

Reveret Lionel

Date: Jul 2014 - June 2015

Institution: Brown University (USA)

<div align="center">

PERCEPTION Project-Team

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6. Partnerships and Cooperations

6.1. National Initiatives

6.1.1. ANR

6.1.1.1. MIXCAM

> Type: ANR BLANC
>
> Duration: March 2014 - February 2016
>
> Coordinator: Radu Horaud
>
> Partners: 4D View Solutions SAS
>
> Abstract: Humans have an extraordinary ability to see in three dimensions, thanks to their sophisticated binocular vision system. While both biological and computational stereopsis have been thoroughly studied for the last fifty years, the film and TV methodologies and technologies have exclusively used 2D image sequences, including the very recent 3D movie productions that use two image sequences, one for each eye. This state of affairs is due to two fundamental limitations: it is difficult to obtain 3D reconstructions of complex scenes and glass-free multi-view 3D displays, which are likely to need real 3D content, are still under development. The objective of MIXCAM is to develop novel scientific concepts and associated methods and software for producing live 3D content for glass-free multi-view 3D displays. MIXCAM will combine (i) theoretical principles underlying computational stereopsis, (ii) multiple-camera reconstruction methodologies, and (iii) active-light sensor technology in order to develop a complete content-production and -visualization methodological pipeline, as well as an associated proof-of-concept demonstrator implemented on a multiple-sensor/multiple-PC platform supporting real-time distributed processing. MIXCAM plans to develop an original approach based on methods that combine color cameras with time-of-flight (TOF) cameras: TOF-stereo robust matching, accurate and efficient 3D reconstruction, realistic photometric rendering, real-time distributed processing, and the development of an advanced mixed-camera platform. The MIXCAM consortium is composed of two French partners (Inria and 4D View Solutions). The MIXCAM partners will develop scientific software that will be demonstrated using a prototype of a novel platform, developed by 4D Views Solutions, and which will be available at Inria, thus facilitating scientific and industrial exploitation.

6.2. European Initiatives

6.2.1. FP7 & H2020 Projects

6.2.1.1. EARS

> Type: FP7
>
> Challenge: Cognitive Systems and Robotics
>
> Instrument: Specific Targeted Research Project
>
> Objectif: Robotics, Cognitive Systems and Smart Spaces, Symbiotic Interaction
>
> Duration: January 2014 - December 2016
>
> Coordinator: Friedrich Alexander Universiteit (Germany)
>
> Partners: Inria (France), Ben Gurion University (Israel), Imperial College (UK), Humboldt University Berlin (Germany), and Aldebaran Robotics (France)
>
> Inria contact: Radu Horaud

Abstract: The success of future natural intuitive human-robot interaction (HRI) will critically depend on how responsive the robot will be to all forms of human expressions and how well it will be aware of its environment. With acoustic signals distinctively characterizing physical environments and speech being the most effective means of communication among humans, truly humanoid robots must be able to fully extract the rich auditory information from their environment and to use voice communication as much as humans do. While vision-based HRI is well developed, current limitations in robot audition do not allow for such an effective, natural acoustic human-robot communication in real-world environments, mainly because of the severe degradation of the desired acoustic signals due to noise, interference and reverberation when captured by the robot's microphones. To overcome these limitations, EARS will provide intelligent *ears* with close-to-human auditory capabilities and use it for HRI in complex real-world environments. Novel microphone arrays and powerful signal processing algorithms shall be able to localize and track multiple sound sources of interest and to extract and recognize the desired signals. After fusion with robot vision, embodied robot cognition will then derive HRI actions and knowledge on the entire scenario, and feed this back to the acoustic interface for further auditory scene analysis. As a prototypical application, EARS will consider a welcoming robot in a hotel lobby offering all the above challenges. Representing a large class of generic applications, this scenario is of key interest to industry and, thus, a leading European robot manufacturer will integrate EARS's results into a robot platform for the consumer market and validate it. In addition, the provision of open-source software and an advisory board with key players from the relevant robot industry should help to make EARS a turnkey project for promoting audition in the robotics world.

6.2.1.2. VHIA

Type: FP7

Instrument: ERC Advanced Grant

Duration: February 2014 - January 2019

Principal Investigator: Radu Horaud

Abstract: The objective of VHIA is to elaborate a holistic computational paradigm of perception and of perception-action loops. We propose to develop a completely novel twofold approach: (i) learn from mappings between auditory/visual inputs and structured outputs, and from sensorimotor contingencies, and (ii) execute perception-action interaction cycles in the real world with a humanoid robot. VHIA will launch and achieve a unique fine coupling between methodological findings and proof-of-concept implementations using the consumer humanoid NAO manufactured in Europe. The proposed multimodal approach is in strong contrast with current computational paradigms that are based on unimodal biological theories. These theories have hypothesized a modular view of perception, postulating that there are quasi-independent and parallel perceptual pathways in the brain. VHIA takes a radically different view than today's audiovisual fusion models that rely on clean-speech signals and on accurate frontal-images of faces; These models assume that videos and sounds are recorded with hand-held or head-mounted sensors, and hence there is a human in the loop whose intentions inherently supervise both perception and interaction. Our approach deeply contradicts the belief that complex and expensive humanoids (often manufactured in Japan) are required to implement research ideas. VHIA's methodological program addresses extremely difficult issues, such as how to build a joint audiovisual space from heterogeneous, noisy, ambiguous and physically different visual and auditory stimuli, how to properly model seamless interaction based on perception and action, how to deal with high-dimensional input data, and how to achieve robust and efficient human-humanoid communication tasks through a well-thought tradeoff between offline training and online execution. VHIA bets on the high-risk idea that in the next decades robot technology will have a considerable social and economical impact and that there will be millions of humanoids, in our homes, schools and offices, which will be able to naturally communicate with us.

6.3. International Initiatives

6.3.1. Inria International Partners

6.3.1.1. Declared Inria International Partners

- The Czech Technical University in Prague (Dr. Jan Cech)
- The Technion (Prof. Yoav Schechner)
- Queen Mary University London (Dr. Miles Hansard)
- Bar Ilan University (Prof. Sharon Gannot)
- University of Cordoba (Prof. Manuel Jesus Marin Jimenez)
- University of Patras (Prof. Manolis Psarakis)
- Oxford Brookes University (Dr. Fabio Cuzzolin)

6.4. International Research Visitors

6.4.1. Visits of International Scientists

- Prof. Sharon Gannot (Bar Ilan University)
- Prof. Manuel Jesus Marin Jimenez (Cordoba University)

<p style="text-align:center; color:red;">**PRIMA Project-Team**</p>

7. Partnerships and Cooperations

7.1. European Initiatives

7.1.1. CATRENE Project AppsGate - Smart Home Application Gateway

Duration: june 2012 - June 2015

Coordinator: ST Microelectronics

Other partners: Pace, Technicolor, NXP, Myriad France SAS, 4MOD Technology, HI-IBERIA Ingenieria y Proyectos, ADD Semiconductor, Video Stream Network, SoftKinetic, Optrima, Fraunhofer, Vsonix, Evalan, University UJF/LIG, and Institut Telecom.

The Prima Project team has worked with 15 other partners to develop a new generation of set-top box for smart home applications. In close collaboration with ST Microelectronics and Immotronics, Prima has developed the core middleware components for plug and play integration of smart home devices for distributed smart home services, as well as interactive tools for End User Development of Smart Home services.

AppsGate has developed an Open Platform to provide integrated home applications to the consumer mass market. The set-top box is the primary point of entry into the digital home for television services including cable TV, satellite TV, and IPTV. AppsGate will transform the set-box into a residential gateway, capable of delivering multiple services to the home, including video, voice and data. PRIMA is involved in designing End User Development tools dedicated for the Smart Home

7.1.2. ICTLabs Smart Energy Systems Activity 11831 Making Energy Visible

Participants: Sabine Coquillart, James Crowley [correspondant], Patrick Reignier, Mayeul de Werbier d Antigneul.

Smart energy Systems, Smart Grids

Within Activity 11831 Open SES Experience Labs, PRIMA is responsible for the A1405 "Making Energy Visible" within the Smart Energy Systems action line of ICTlabs. The objective of this task is to design, implement and evaluate tools for online and offline interaction with energy usage. The group works with Immotronics to define an open middleware that will enable logging, aggregation and interactive visualization of data and information on energy consumption and on environmental parameters that define comfort. The open middleware will include an SQL Data base, web socket and an xml markup language to define a common naming scheme, tools for assigning location in both space (geometry coordinates) and place (functional places), as well as data aggregation tools.

The open middleware will serve as a common software platform that will be used for the Inria Rapid Deployment mini-kit as well as for data acquisition by other partners using other sensors. Univ Bologna will provide (sell) copies of their new energy measurement meter for integration into the system. Univ of Bologna, Fraunhofer, Fortis and Inria will construct tools for offline and online visualization. The system will be deployed and evaluated by social scientists at the living lab of Politechnico Turin. Turin will specify requirements for visualisation of energy and comfort for smart grid applications, and perform user studies and evaluations on the resulting systems.

Visualisation includes on-line and offline exploration, as well as tools for html web interface, Mobile augmented reality tools, apps for display on mobile devices, 3D visual interaction, and immersive interaction with an oculus Rift.

7.2. National Initiatives

7.2.1. *EquipEx AmiQual4Home - Ambient Intelligence for Quality of Life*

Participants: Stan Borkowski, Sabine Coquillart, Joelle Coutaz, James Crowley [correspondant], Alexandre Demeure, Thierry Fraichard, Amaury Negre, Patrick Reignier, Dominique Vaufreydaz, Nicolas Bonnefond, Rémi Pincent, Mayeul de Werbier d Antigneul, Rémi Barraquand, David Lombard.

Ambient Intelligence, Equipment d'Excellence, Investissement d'Avenir

The AmiQual4Home Innovation Factory is an open research facility for innovation and experimentation with human-centered services based on the use of large-scale deployment of interconnected digital devices capable of perception, action, interaction and communication. The Innovation Factory is composed of a collection of workshops for rapid creation of prototypes, surrounded by a collection of living labs and supported by a industrial innovation and transfer service. Creation of the Innovation Factory has been made possible by a 2.140 Million Euro grant from French National programme "Investissement d'avenir", together with substantial contributions of resources by Grenoble INP, Univ Joseph Fourier, UPMF, CNRS, Schneider Electric and the Commune of Montbonnot. The objective is to provide the academic and industrial communities with an open platform to enable research on design, integration and evaluation of systems and services for smart habitats.

The AmiQual4Home Innovation Factory is a unique combination of three different innovation instruments: (1) Workshops for rapid prototyping of devices that embed perception, action, interaction and communication in ordinary objects based on the MIT FabLab model, (2) Facilities for real-world test and evaluation of devices and services organised as open Living Labs, (3) Resources for assisting students, researchers, entrepreneurs and industrial partners in creating new economic activities. The proposed research facility will enable scientific research on these problems while also enabling design and evaluation of new forms of products and services with local industry.

The core of the AmiQual4Home Innovation Factory is a Creativity Lab composed of a collection of five workshops for the rapid prototyping of devices that integrate perception, action, interaction and communications into ordinary objects. The Creativity Lab is surrounded by a collection of six Living Labs for experimentation and evaluation in real world conditions. The combination of fabrication facilities and living labs will enable students, researchers, engineers, and entrepreneurs to experiment in co-creation and evaluation. The AmiQual4Home Innovation Factory will also include an innovation and transfer service to enable students, researchers and local entrepreneurs to create and grow new commercial activities based on the confluence of digital technologies with ordinary objects. The AmiQual4Home Innovation Factory will also provide an infrastructure for participation in education, innovation and research activities of the European Institute of Technology (EIT) KIC ICTLabs.

The AmiQual4Home Innovation Factory will enable a unique new form of coordinated ICT-SHS research that is not currently possible in France, by bringing together expertise from ICT and SHS to better understand human and social behaviour and to develop and evaluate novel systems and services for societal challenges. The confrontation of solutions from these different disciplines in a set of application domains (energy, comfort, cost of living, mobility, well-being) is expected to lead to the emergence of a common, generic foundation for Ambient Intelligence that can then be applied to other domains and locations. The initial multidisciplinary consortium will progressively develop interdisciplinary expertise with new concepts, theories, tools and methods for Ambient Intelligence.

The potential impact of such a technology, commonly referred to as "Ambient Intelligence", has been documented by the working groups of the French Ministry of Research (MESR) [32] as well as the SNRI (Stratégie Nationale de la Recherche et de l'Innovation).

In 2013 our efforts were focused on specifying the requirements for major components of the project, and on finalising contractual issues with ANR. We defined the layout and arrangement of the Creativity Lab workshops, we started the specification of the instrumentation needed for the Living Labs, and developed a first version of a set of easy-deployable wireless sensors for infield data acquisition, that we call the Rapid

Deployment Minikit. A set of CNC machines was purchased, including a Fused Filament Fabrication 3D printer, a CO_2 Laser cutter and engraver, and a CNC mill.

Following the kickoff meeting of the project held in October 2013, we received positive feedback and interest form local industry and research institutions, and several national project proposals submitted in 2013 identified AmiQual4Home as an important ressource.

7.2.2. FUI PRAMAD

Participants: Claudine Combe, Lucas Nacsa, Maxime Portaz, Amaury Negre, Dominique Vaufreydaz [correspondant].

Pramad is a collaborative project about *Plateforme Robotique dÁssistance et de Maintien à Domicile*. There are seven partners:

- R&D/industry: Orange Labs (project leader) and Covéa Tech (insurance company),
- Small companies: Interaction games (game designer, note that Wizardbox, the original partner was bought by Interaction games) and Robosoft (robot).
- Academic labs: Inria/PRIMA, ISIR (Paris VI) and Hôpital Broca (Paris).

The objectives of this project are to design and evaluate robot companion technologies to maintain frail people at home. Working with its partners, PRIMA research topics are:

- social interaction,
- robotic assistance,
- serious game for frailty evaluation and cognitive stimulation.

7.2.3. Inria Project-Teams PAL

Participants: Rémi Barraquand, Thierry Fraichard, Patrick Reignier, Amaury Negre, Dominique Vaufreydaz [correspondant].

The 12 Inria Project-Teams (IPT) participating in a Large-scale initiative action Personally Assisted Living (PAL http://pal.inria.fr) propose to work together to develop technologies and services to improve the autonomy and quality of life for elderly and fragile persons. The goal of this program is to unite these groups around an experimental infrastructure, designed to enable collaborative experimentations.

PAL is organized arround 12 IPT:

Demar, E-Motion, Flowers, Hephaistos, Lagadic, Lagadic-Sophia, Maia, Madynes, Phoenix, Prima, Stars and Reves.

The role of PRIMA within this project is to develop new algorithms mainly along two research axes:

- assessing frailty degree of the elderly,
- social interaction.

7.3. International Research Visitors

7.3.1. Visits to International Teams

7.3.1.1. Sabbatical programme

Fraichard Thierry, Sabbatical Visit to BIU, ISRAEL, from May 2014 - May 2015

7.3.1.2. Research stays abroad

Varun Jain, 6 month visit to Carnegie-Mellon University, Pittsburgh PA, on a Region Rhone-Alpes ExploraDoc Grant from January 2014 to July 2014

<p style="text-align:center">**SIROCCO Project-Team**</p>

8. Partnerships and Cooperations

8.1. European Initiatives

8.1.1. FP7 & H2020 projects

8.1.1.1. FP7-PEOPLE-SHIVPRO

Participants: Olivier Le Meur, Zhi Liu.

- Title : Saliency-aware High-resolution Video Processing.
- Research axis : 6.1.1 .
- Partners : Visting professor from Shanghai University.
- Funding : EC-FP7 MC-IIF International Incoming Fellowships (IIF).
- Period : 08/2012-07/2014

The SHIVPRO project has been supporting the visit of Dr. Z. Liu, from Beijing University in the team from August 2012 to August 2014. The objective of this project was to propose an efficient spatio-temporal saliency model to predict salient regions in High-Resolution (HR) videos, and fully exploit it to ease the design and improve the performance of HR video compression and retargeting applications. With the aim to overcome the drawbacks of existing saliency models, based on a multiscale region representation, the proposed model systematically realizes statistical model saliency measuring, intra-scale saliency modification, inter-scale saliency propagation and flexible incorporation of top-down information, to generate a novel saliency representation form with scalability, saliency tree, from which a multiscale saliency fusion scheme is used to derive high-quality saliency maps at various scales.

8.2. International Research Visitors

8.2.1. Visits of International Scientists

Dr. Zhi Liu, from Shanghai University, has been visiting the team from August 2012 until August 2014. His stay has been funded by the FP7-PEOPLE-2011-IIF program. The funding scheme is the MC-IIF International Incoming Fellowships (IIF).

8.2.2. Visits to International Teams

8.2.2.1. Sabbatical programme

C. Guillemot has spent a six months sabbatical stay (Mar. 2014- Aug. 2014) at EPFL (Ecole Polytechnique Federale de Lausanne)

<div align="center">

STARS Project-Team

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8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR

8.1.1.1. MOVEMENT

Program: ANR CSOSG

Project acronym: MOVEMENT

Project title: AutoMatic BiOmetric Verification and PersonnEl Tracking for SeaMless Airport ArEas Security MaNagemenT

Duration: January 2014-June 2017

Coordinator: MORPHO (FR)

Other partners: SAGEM (FR), Inria Sophia-Antipolis (FR), EGIDIUM (FR), EVITECH (FR) and CERAPS (FR)

Abstract: MOVEMENT is focusing on the management of security zones in the non public airport areas. These areas, with a restricted access, are dedicated to service activities such as maintenance, aircraft ground handling, airfreight activities, etc. In these areas, personnel movements tracking and traceability have to be improved in order to facilitate their passage through the different areas, while insuring a high level of security to prevent any unauthorized access. MOVEMENT aims at proposing a new concept for the airport's non public security zones (e.g.customs control rooms or luggage loading/unloading areas) management along with the development of an innovative supervision system prototype.

8.1.1.2. SafEE

Program: ANR TESCAN

Project acronym: SafEE

Project title: Safe & Easy Environment for Alzheimer Disease and related disorders

Duration: December 2013-May 2017

Coordinator: CHU Nice

Other partners: Nice Hospital(FR), Nice University (CobTeck FR), Inria Sophia-Antipolis (FR), Aromatherapeutics (FR), SolarGames(FR), Taichung Veterans General Hospital TVGH (TW), NCKU Hospital(TW), SMILE Lab at National Cheng Kung University NCKU (TW), BDE (TW)

Abstract: SafEE project aims at investigating technologies for stimulation and intervention for Alzheimer patients. More precisely, the main goals are: (1) to focus on specific clinical targets in three domains behavior, motricity and cognition (2) to merge assessment and non pharmacological help/intervention and (3) to propose easy ICT device solutions for the end users. In this project, experimental studies will be conducted both in France (at Hospital and Nursery Home) and in Taiwan.

8.1.2. Investment of Future

8.1.2.1. Az@GAME

Program: DGCIS

Project acronym: Az@GAME

Project title: un outil d'aide au diagnostic médical sur l'évolution de la maladie d'Alzheimer et les pathologies assimilées.

Duration: January 2012- December 2015

Coordinator: Groupe Genious

Other partners: IDATE (FR), Inria(Stars), CMRR (CHU Nice) and CobTek(Nice University).

See also: http://www.azagame.fr/

Abstract: This French project aims at providing evidence concerning the interest of serious games to design non pharmacological approaches to prevent dementia patients from behavioural disturbances, most particularly for the stimulation of apathy.

8.1.3. Large Scale Inria Initiative

8.1.3.1. PAL

Program: Inria

Project acronym: PAL

Project title: Personally Assisted Living

Duration: 2010 -2014

Coordinator: COPRIN team

Other partners: AROBAS, DEMAR, E-MOTION, STARS, PRIMA, MAIA, TRIO, and LAGADIC Inria teams

See also: http://www-sop.inria.fr/coprin/aen/

Abstract: The objective of this project is to create a research infrastructure that will enable experiments with technologies for improving the quality of life for persons who have suffered a loss of autonomy through age, illness or accident. In particular, the project seeks to enable development of technologies that can provide services for elderly and fragile persons, as well as their immediate family, caregivers and social groups.

8.1.4. Other Collaborations

- G. Charpiat works with Yann Ollivier and Jamal Atif (TAO team) as well as Rémi Peyre (École des Mines de Nancy / Institut Élie Cartan) on the topic of image compression.
- G. Charpiat works with Giacomo Nardi, Gabriel Peyré and François-Xavier Vialard (Ceremade, Paris-Dauphine University) on the generalization of gradient flows to non-standard metrics.

8.2. European Initiatives

8.2.1. FP7 & H2020 Projects

8.2.1.1. CENTAUR

Type: FP7

Defi: Computer vision

Instrument: Industry-Academia Partnerships and Pathway

Objective: a network of scientific excellence addressing research topics in computer vision

Duration: January 2013 - December 2016

Coordinator: Honeywell (CZE)

Partner: Neovison (CZE), Inria Sophia-Antipolis (CZE), Queen Mary University of London (UK) and EPFL in Lausanne (CH).

Inria contact: François Brémond

Abstract: CENTAUR aims at developing a network of scientific excellence addressing research topics in computer vision and advancing the state of the art in video surveillance. The cross fertilization of ideas and technology between academia, research institutions and industry will lay the foundations to new methodologies and commercial solutions for monitoring crowded scenes.Three thrusts identified will enable the monitoring of crowded scenes: (a) multi camera, multicoverage tracking of objects of interest, (b) Anomaly detection and fusion of multimodal sensors, c) activity recognition and behavior analysis in crowded environments.

8.2.1.2. PANORAMA

Type: FP7

Defi: Computer vision

Instrument: Industry-Academia Partnerships and Pathway

Objective: techniques and architectures for imaging applications

Duration: April 2012 - March 2015

Coordinator: Philips Healthcare (NL)

Partner :Medisys (FR), Grass Valley (NL), Bosch Security Systems (NL), STMicroelectronics (FR), Thales Angenieux (FR), CapnaDST (UK), CMOSIS (BE), CycloMedia (Netherlands), Q-Free (Netherlands), TU Eindhoven (NL) , University of Leeds (UK), University of Catania (IT), Inria(France), ARMINES (France), IBBT (Belgium).

Inria contact: François Brémond

Abstract: PANORAMA aims to research, develop and demonstrate generic breakthrough technologies and hardware architectures for a broad range of imaging applications. For example, object segmentation is a basic building block of many intermediate and low level image analysis methods. In broadcast applications, segmentation can find people's faces and optimize exposure, noise reduction and color processing for those faces; even more importantly, in a multi-camera set-up these imaging parameters can then be optimized to provide a consistent display of faces (e.g., matching colors) or other regions of interest. PANORAMA will deliver solutions for applications in medical imaging, broadcasting systems and security & surveillance, all of which face similar challenging issues in the real time handling and processing of large volumes of image data. These solutions require the development of imaging sensors with higher resolutions and new pixel architectures. Furthermore, integrated high performance computing hardware will be needed to allow for the real time image processing and system control. The related ENIAC work program domains and Grand Challenges are Health and Ageing Society - Hospital Healthcare, Communication & Digital Lifestyles - Evolution to a digital lifestyle and Safety & Security - GC Consumers and Citizens security (see also: http://www.panorama-project.eu/).

8.2.1.3. SUPPORT

Title: Security UPgrade for PORTs

Type: FP7

Defi: Port Security

Instrument: Industry-Academia Partnerships and Pathway

Objective: secure European ports

Duration: July 2010 - June 2014

Coordinator: BMT Group (UK)

Other partners: Inria Sophia-Antipolis (FR); Swedish Defence Research Agency (SE); Securitas (SE); Technical Research Centre of Finland (FI); MARLO (NO); INLECOM Systems (UK).

Inria contact: François Brémond

Abstract: SUPPORT is addressing potential threats on passenger life and the potential for crippling economic damage arising from intentional unlawful attacks on port facilities, by engaging representative stakeholders to guide the development of next generation solutions for upgraded preventive and remedial security capabilities in European ports. The overall benefit will be the secure and efficient operation of European ports enabling uninterrupted flows of cargos and passengers while suppressing attacks on high value port facilities, illegal immigration and trafficking of drugs, weapons and illicit substances all in line with the efforts of FRONTEX and EU member states.

8.2.1.4. Dem@Care

Title: Dementia Ambient Care: Multi-Sensing Monitoring for Intelligent Remote Management and Decision Support

Type: FP7

Defi: Cognitive Systems and Robotics

Instrument: Industry-Academia Partnerships and Pathway

Objective: development of a complete system providing personal health services to persons with dementia

Duration: November 2011-November 2015

Coordinator: Centre for Research and Technology Hellas (G)

Other partners: Inria Sophia-Antipolis (FR); University of Bordeaux 1(FR); Cassidian (FR), Nice Hospital (FR), LinkCareServices (FR), Lulea Tekniska Universitet (SE); Dublin City University (IE); IBM Israel (IL); Philips (NL); Vistek ISRA Vision (TR).

Inria contact: François Brémond

Abstract: The objective of Dem@Care is the development of a complete system providing personal health services to persons with dementia, as well as medical professionals, by using a multitude of sensors, for context-aware, multiparametric monitoring of lifestyle, ambient environment, and health parameters. Multisensor data analysis, combined with intelligent decision making mechanisms, will allow an accurate representation of the person's current status and will provide the appropriate feedback, both to the person and the associated medical professionals. Multi-parametric monitoring of daily activities, lifestyle, behaviour, in combination with medical data, can provide clinicians with a comprehensive image of the person's condition and its progression, without their being physically present, allowing remote care of their condition.

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Informal International Partners

8.3.1.1.1. Collaborations with Asia:

Stars has been cooperating with the Multimedia Research Center in Hanoi MICA on semantics extraction from multimedia data. Stars also collaborates with the National Cheng Kung University in Taiwan and I2R in Singapore.

8.3.1.1.2. Collaboration with U.S.A.:

Stars collaborates with the University of Southern California.

8.3.1.1.3. Collaboration with Europe:

Stars collaborates with Multitel in Belgium, the University of Kingston upon Thames UK, and the University of Bergen in Norway.

8.3.2. Participation in Other International Programs

- The ANR SafEE (see section 8.1.1.2 collaborates with international partners as Taichung Veterans General Hospital TVGH (TW), NCKU Hospital(TW), SMILE Lab at National Cheng Kung University NCKU (TW) and BDE (TW).

8.4. International Research Visitors

8.4.1. Visits of International Scientists

8.4.1.1. Internships

ABDALLA OMAR
    Date: from Apr 2014 until Sep 2014
    Institution: Université Française du Caire (Egypt)

BOUATIRA Mohamed
    Date: from Mar 2014 until Sep 2014
    Institution: Ecole Mohammadia d'Ingénieurs (Marocco)

CAVERZASI Augustin
    Date: until Feb 2014
    Institution: Universidad Nacional de Córdoba, Facultad de Ciencias Exactas Físicas y Naturales, Argentina

GOMEZ URIA COVELLA Alvaro
    Date: from Mar 2014 until Dec 2014
    Institution: National University of Rosario, Argentina

MARTINS DE MELO Filipe
    Date: from Apr 2014 until Sep 2014
    Institution: Federal University of Penambucco, Brazil

NEGIN Farood
    Date: from Apr 2014 until Nov 2014
    Institution: Sabanci University, Turkey

NGUYEN Thi Lan Anh
    Date: from Mar 2014 until Oct 2014
    Institution: Dhai Nguyen Uiversity of Information and Communication Technology, Vietnam

PHAM Ngoc Hai
    Date: from May 2014 until Nov 2014
    Institution: Science and Technologu University of Hanoi, Vietnam

PUSIOL Pablo Daniel
    Date: from Apr 2014 until Sep 2014
    Institution: National University of Cordoba, Argentina

SARRAY Ines
    Date: Apr 2014 - Oct 2014
    Institution: ESPRIT (Ecole d'ingénieurs Tunis) (Tunisia)

STRUMIA Carola
    Date: from Oct 2014
    Institution: University of Genova, Italy

SUBRAMANIAN Kartick
    Date: until August 2014
    Institution: Nanyang Technological University, Singapore

ZHOU Kouhua
    Date: from Jul 2014 until Sep 2014
    Institution: Polytech University of Dalan, China

WILLOW Project-Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. *Agence Nationale de la Recherche (ANR): SEMAPOLIS*

Participants: Mathieu Aubry, Josef Sivic.

The goal of the SEMAPOLIS project is to develop advanced large-scale image analysis and learning techniques to semantize city images and produce semantized 3D reconstructions of urban environments, including proper rendering. Geometric 3D models of existing cities have a wide range of applications, such as navigation in virtual environments and realistic sceneries for video games and movies. A number of players (Google, Microsoft, Apple) have started to produce such data. However, the models feature only plain surfaces, textured from available pictures. This limits their use in urban studies and in the construction industry, excluding in practice applications to diagnosis and simulation. Besides, geometry and texturing are often wrong when there are invisible or discontinuous parts, e.g., with occluding foreground objects such as trees, cars or lampposts, which are pervasive in urban scenes. This project will go beyond the plain geometric models by producing semantized 3D models, i.e., models which are not bare surfaces but which identify architectural elements such as windows, walls, roofs, doors, etc. Semantic information is useful in a larger number of scenarios, including diagnosis and simulation for building renovation projects, accurate shadow impact taking into account actual window location, and more general urban planning and studies such as solar cell deployment. Another line of applications concerns improved virtual cities for navigation, with object-specific rendering, e.g., specular surfaces for windows. Models can also be made more compact, encoding object repetition (e.g., windows) rather than instances and replacing actual textures with more generic ones according to semantics; it allows cheap and fast transmission over low- bandwidth mobile phone networks, and efficient storage in GPS navigation devices.

This is a collaborative effort with LIGM / ENPC (R. Marlet), University of Caen (F. Jurie), Inria Sophia Antipolis (G. Drettakis) and Acute3D (R. Keriven).

8.2. European Initiatives

8.2.1. *European Research Council (ERC) Advanced Grant: "VideoWorld" - Jean Ponce*

Participants: Jean Ponce, Ivan Laptev, Josef Sivic.

WILLOW will be funded in part from 2011 to 2015 by the ERC Advanced Grant "VideoWorld" awarded to Jean Ponce by the European Research Council.
This project is concerned with the automated computer analysis of video streams: Digital video is everywhere, at home, at work, and on the Internet. Yet, effective technology for organizing, retrieving, improving, and editing its content is nowhere to be found. Models for video content, interpretation and manipulation inherited from still imagery are obsolete, and new ones must be invented. With a new convergence between computer vision, machine learning, and signal processing, the time is right for such an endeavor. Concretely, we will develop novel spatio-temporal models of video content learned from training data and capturing both the local appearance and nonrigid motion of the elements—persons and their surroundings—that make up a dynamic scene. We will also develop formal models of the video interpretation process that leave behind the architectures inherited from the world of still images to capture the complex interactions between these elements, yet can be learned effectively despite the sparse annotations typical of video understanding scenarios. Finally, we will propose a unified model for video restoration and editing that builds on recent advances in sparse coding and dictionary learning, and will allow for unprecedented control of the video stream. This project addresses fundamental research issues, but its results are expected to serve as a basis for groundbreaking technological advances for applications as varied as film post-production, video archival, and smart camera phones.

8.2.2. European Research Council (ERC) Starting Grant: "Activia" - Ivan Laptev
Participant: Ivan Laptev.

WILLOW will be funded in part from 2013 to 2017 by the ERC Starting Grant "Activia" awarded to Ivan Laptev by the European Research Council.

Computer vision is concerned with the automated interpretation of images and video streams. Today's research is (mostly) aimed at answering queries such as "Is this a picture of a dog?", "Is the person walking in this video?" (image and video categorisation) or sometimes "Find the dog in this photo" (object detection). While categorisation and detection are useful for many tasks, inferring correct class labels is not the final answer to visual recognition. The categories and locations of objects do not provide direct understanding of their function, i.e., how things work, what they can be used for, or how they can act and react. Neither do action categories provide direct understanding of subject's intention, i.e., the purpose of his/her activity. Such an understanding, however, would be highly desirable to answer currently unsolvable queries such as "Am I in danger?" or "What can happen in this scene?". Answering such queries is the aim of this project.

The main challenge is to uncover the functional properties of objects and the purpose of actions by addressing visual recognition from a different and yet unexplored perspective. The major novelty of this proposal is to leverage observations of people, i.e., their actions and interactions to automatically learn the use, the purpose and the function of objects and scenes from visual data. This approach is timely as it builds upon two key recent technological advances: (a) the immense progress in visual object, scene and human action recognition achieved in the last ten years, and (b) the emergence of massive amounts of image and video data readily available for training visual models. My leading expertise in human action recognition and video understanding puts me in a strong position to realise this project. ACTIVIA addresses fundamental research issues in automated interpretation of dynamic visual scenes, but its results are expected to serve as a basis for ground-breaking technological advances in practical applications. The recognition of functional properties and intentions as explored in this project will directly support high-impact applications such as prediction and alert of abnormal events and automated personal assistance, which are likely to revolutionise today's approaches to crime protection, hazard prevention, elderly care, and many others.

8.2.3. European Research Council (ERC) Starting Grant: "Leap" - Josef Sivic
Participant: Josef Sivic.

The contract has begun on Nov 1st 2014. WILLOW will be funded in part from 2014 to 2018 by the ERC Starting Grant "Leap" awarded to Josef Sivic by the European Research Council.

People constantly draw on past visual experiences to anticipate future events and better understand, navigate, and interact with their environment, for example, when seeing an angry dog or a quickly approaching car. Currently there is no artificial system with a similar level of visual analysis and prediction capabilities. LEAP is a first step in that direction, leveraging the emerging collective visual memory formed by the unprecedented amount of visual data available in public archives, on the Internet and from surveillance or personal cameras - a complex evolving net of dynamic scenes, distributed across many different data sources, and equipped with plentiful but noisy and incomplete metadata. The goal of this project is to analyze dynamic patterns in this shared visual experience in order (i) to find and quantify their trends; and (ii) learn to predict future events in dynamic scenes. With ever expanding computational resources and this extraordinary data, the main scientific challenge is now to invent new and powerful models adapted to its scale and its spatio-temporal, distributed and dynamic nature. To address this challenge, we will first design new models that generalize across different data sources, where scenes are captured under vastly different imaging conditions such as camera viewpoint, temporal sampling, illumination or resolution. Next, we will develop a framework for finding, describing and quantifying trends that involve measuring long-term changes in many related scenes. Finally, we will develop a methodology and tools for synthesizing complex future predictions from aligned past visual experiences. Our models will be automatically learnt from large-scale, distributed, and asynchronous visual data, coming from different sources and with different forms of readily-available but noisy and incomplete metadata such as text, speech, geotags, scene depth (stereo sensors), or gaze and body motion (wearable sensors). Breakthrough progress on these problems would have profound implications on our everyday lives as well as science and

commerce, with safer cars that anticipate the behavior of pedestrians on streets; tools that help doctors monitor, diagnose and predict patients' health; and smart glasses that help people react in unfamiliar situations enabled by the advances from this project.

8.2.4. EIT-ICT labs: Mobile visual content analysis (Inria)

Participants: Ivan Laptev, Josef Sivic.

The goal of this project within the European EIT-ICT activity is to mature developed technology towards real-world applications as well as transfer technology to industrial partners. Particular focus of this project is on computer vision technology for novel applications with wearable devices. The next generation mobile phones may not be in the pocket but worn by users as glasses continuously capturing audio-video data, providing visual feedback to the user and storing data for future access. Automatic answers to "Where did I leave my keys yesterday?" or "How did this place look like 100 years ago?" enabled by such devices could change our daily life while creating numerous new business opportunities. The output of this activity is new computer vision technology to enable a range of innovative mobile wearable applications.

This is a collaborative effort with S. Carlsson (KTH Stockholm) and J. Laaksonen (Aalto University).

8.3. International Initiatives

8.3.1. IARPA FINDER Visual geo-localization (Inria)

Participants: Josef Sivic, Petr Gronat, Relja Arandjelovic.

Finder is an IARPA funded project aiming to develop technology to geo-localize images and videos that do not have geolocation tag. It is common today for even consumer-grade cameras to tag the images that they capture with the location of the image on the earth's surface ("geolocation"). However, some imagery does not have a geolocation tag and it can be important to know the location of the camera, image, or objects in the scene. Finder aims to develop technology to automatically or semi-automatically geo-localize images and video that do not have the geolocation tag using reference data from many sources, including overhead and ground-based images, digital elevation data, existing well-understood image collections, surface geology, geography, and cultural information.

Partners: ObjectVideo, DigitalGlobe, UC Berkeley, CMU, Brown Univ., Cornell Univ., Univ. of Kentucky, GMU, Indiana Univ., and Washington Univ.

8.3.2. Inria Associate Team VIP

Participants: Ivan Laptev, Josef Sivic.

This project brings together three internationally recognized research groups with complementary expertise in human action recognition (Inria), qualitative and geometric scene interpretation (CMU) and large scale object recognition and human visual perception (MIT). The goal of VIP (Visual Interpretation of functional Properties) is to discover, model and learn functional properties of objects and scenes from image and video data.

Partners: Aude Oliva (MIT) and Alexei Efros (CMU / UC Berkeley). The project will be funded during 2012-2014.

8.3.3. Inria International Chair - Prof. John Canny (UC Berkeley)

Participants: John Canny [UC Berkeley], Jean Ponce, Ivan Laptev, Josef Sivic.

Prof. John Canny (UC Berkeley) has been awarded the Inria International chair in 2013. He has visited Willow during three months in 2014.

8.3.4. Inria CityLab initiative

Participants: Josef Sivic, Jean Ponce, Ivan Laptev, Alyosha Efros [UC Berkeley].

Willow participates in the ongoing CityLab@Inria initiative (co-ordinated by V. Issarny), which aims to leverage Inria research results towards developing "smart cities" by enabling radically new ways of living in, regulating, operating and managing cities. The activity of Willow focuses on urban-scale quantitative visual analysis and is pursued in collaboration with A. Efros (UC Berkeley).

Currently, map-based street-level imagery, such as Google Street-view provides a comprehensive visual record of many cities worldwide. Additional visual sensors are likely to be wide-spread in near future: cameras will be built in most manufactured cars and (some) people will continuously capture their daily visual experience using wearable mobile devices such as Google Glass. All this data will provide large-scale, comprehensive and dynamically updated visual record of urban environments.

The goal of this project is to develop automatic data analytic tools for large-scale quantitative analysis of such dynamic visual data. The aim is to provide quantitative answers to questions like: What are the typical architectural elements (e.g., different types of windows or balconies) characterizing a visual style of a city district? What is their geo-spatial distribution (see figure 1)? How does the visual style of a geo-spatial area evolve over time? What are the boundaries between visually coherent areas in a city? Other types of interesting questions concern distribution of people and their activities: How do the number of people and their activities at particular places evolve during a day, over different seasons or years? Are there tourists sightseeing, urban dwellers shopping, elderly walking dogs, or children playing on the street? What are the major causes for bicycle accidents?

Break-through progress on these goals would open-up completely new ways smart cities are visualized, modeled, planned and simulated, taking into account large-scale dynamic visual input from a range of visual sensors (e.g., cameras on cars, visual data from citizens, or static surveillance cameras).

8.4. International Research Visitors

8.4.1. Visits of International Scientists

Prof. Alexei Efros (UC Berkeley) has visited Willow for one month in 2014. Prof. John Canny (UC Berkeley) has visited Willow during three months in 2014 within the framework of Inria's International Chair program.

8.4.1.1. Internships

Stefan Lee (Indiana University) has been a visiting PhD student at Willow since May 2014. Yumin Suh (Seoul National University) has been a visiting PhD student at Willow since Dec. 2014.