Activity Report 2013

Section Partnerships and Cooperations

<div align="center">

DAHU Project-Team

</div>

6. Partnerships and Cooperations

6.1. European Initiatives

6.1.1. FP7 Projects

6.1.1.1. Webdam

Title: WebDam

Type: IDEAS

Instrument: ERC Advanced Grant (Advanced)

Duration: December 2008 - November 2013

Coordinator: Serge Abiteboul, Inria (France)

Others partners: Pierre Senellart, Telecom Paristech.

See also: http://webdam.inria.fr

Abstract: The goal is to develop a formal model for Web data management. This model will open new horizons for the development of the Web in a well-principled way, enhancing its functionality, performance, and reliability. Specifically, the goal is to develop a universally accepted formal framework for describing complex and flexible interacting Web applications featuring notably data exchange, sharing, integration, querying and updating. We also propose to develop formal foundations that will enable peers to concurrently reason about global data management activities, cooperate in solving specific tasks and support services with desired quality of service.

6.2. International Initiatives

6.2.1. Inria International Partners

6.2.1.1. Declared Inria International Partners

Victor Vianu, UC San Diego, USA.

6.3. International Research Visitors

6.3.1. Visits of International Scientists

- Benoît Larose

    Subject: Constraint Satisfaction Problems

    Institution: concordia Univeresity, Montreal, Canada.

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. *Projet RTR: Coupling observation/simulation for decision-aid in environment complex systems*

Participants: Sid Ahmed Benabderrahmane, Marie-Odile Cordier, Thomas Guyet, Simon Malinowski, René Quiniou.

This RTR (Réseaux Thématiques de Recherche - Thematic Research Networks) project is a collaboration between COSTEL (UMR LETG, Rennes), the team Obelix (IRISA, Vannes), UMR SAS (INRA, Rennes) and the EPI Dream. The project began in 2013 and has been funded for one year. It aims at studying the relationships between observations and simulations. The objective is to better understand what one side can provide to the other side in order to improve decision-making. This project gathers partners having expertise and skills in teledetection and image analysis, in modeling and simulation, and in knowledge acquisition for aiding decision in environmental research. The targeted applications belong to the domain of hydrology and agriculture. A final workshop (http://tinyurl.com/k3smbox) has been organized in november.

8.2. National Initiatives

8.2.1. *ACASSYA: Supporting the agro ecological evolution of breeding systems in coastal watersheds*

Participants: Marie-Odile Cordier, Véronique Masson, René Quiniou.

The ACASSYA project (ACcompagner l'évolution Agro-écologique deS SYstèmes d'élevage dans les bassins versants côtiers) is funded by ANR/ADD. It started at the beginning of 2009 and will end in June 2013. The main partners are our colleagues from INRA (SAS from Rennes. One of the objectives is to develop modeling tools supporting the management of ecosystems, and more precisely the agro ecological evolution of breeding systems in coastal watersheds. In this context, the challenge is to transform existing simulation tools (as SACADEAU or TNT2 into decision-aid tools, able to answer queries or scenarios about the future evolution of ecosystems. (http://tinyurl.com/ptzdqo5)

8.2.2. *Asterix : spatio-temporal analysis of remote sensing images*

Participant: Thomas Guyet.

The ASTERIX project (Analyse Spatio-temporelle pour la Télédétection de l'Environnement par Reconnaissance dans les Images compleXes) is funded by ANR/JCJC. The project leader is S. Lefèvre from the IRISA/Vannes Team Obelix. The other partners are OSUR/University of Rennes-2, the Laboratory Image, Ville, Environnement (LIVE), University of Strasbourg, DYNAFOR (INRA/ENSAT), Toulouse and Institut de Physique du Globe de Strasbourg (IPGS), University of Strasbourg. The project started at the end of 2013 (http://anr-asterix.irisa.fr/) and will end in 2017.

The goal of the ASTERIX project is to provide methods, algorithms and software in the field of image analysis and machine learning/data mining to support the analysis of remote sensing images. The project addresses the specific issues of such data: dimensionality, heterogeneity, volume, spatio-temporal nature and the temporal evolution. It is dedicated to the field of environmental remote sensing and deals with concrete applications such as the evolution of the coastline or the colonization of grasslands by ash.

Our contribution to this project will be the proposition of data mining algorithms to deal with the spatio-temporal dimensions of satellite image time series.

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Declared Inria International Partners

- University of Potsdam, Germany. Prof. Torsten Schaub has been awarded an Inria international senior grant from 2103 to 2017.

8.3.1.2. Informal International Partners

- University of Calgary, Canada. Dr Edouard Timsit, Dept. of production Animal Health, Faculty of Veterinary, Medicine.
- University di Torino, Italy, Dr Roberto Micalizio, Dept. of Computer Science.

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 §6.2).

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 §6.2).

7.2. European Initiatives

7.2.1. FP7 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

Duration: October 2013 - September 2015

Coordinator: D'appolonia Spa (Italy)

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

Inria contact: Jérôme Euzenat

Participants: Jérôme Euzenat, Luz Maria Priego-Roche, Jérôme David

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

Abstract: The READY4SmartCities project intends to increase awareness and interoperability for the adoption of ICT 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 RTD and innovation outcomes and ICT-based solutions.

7.3. International Research Visitors

7.3.1. Visits of International Scientists

- **Esther Lozano (Universidad Politecnica de Madrid)** visited EXMO from January 8th to May 8th, 2013 working on the combination of context-based matching with semantic modelling systems;

- **Jorge Gracia (Universidad Politecnica de Madrid)** visited EXMO from May 1st to July 27th, 2013, working on multilingual ontology/instance matching and expressive ontology matching;

- **Daniel Vila (Universidad Politecnica de Madrid)** visited EXMO from June 2nd to July 23rd, 2013 working on data interlinking and ontology inference;

- **Angela Locoro (Universita deggli Studi di Genova)** visited EXMO from June 1st to 29th, 2013 working on context-based ontology matching and generalised the notion of context;

- **Lihua Zhao (NII, Tokyo)** visited EXMO from August 17th to September 21st, 2013 on combining data interlinking from ontology matching with ontology matching from links.

7.3.2. Visits to International Teams

- Jérôme David Visited Tsinghua University (Juanzi Li group), Beijing, China. 5/11 – 21/11/2013. He worked in the framework of the LINDICLE project on the refinement of ontologies extracted from online encyclopedia.

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

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR

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

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

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 6.1 for this year results (Extensions of the Framework).*

8.1.1.2. Pagoda
Participants: Jean-François Baget, Marie-Laure Mugnier, Mélanie König, 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.

The primary aim of this project is to help 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 6.1 for this year results.*

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

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.

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 6.3 for this year results.*

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 developping 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 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 aboratory). 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". GraphIK is involved in this project via its common members with IATE team. The budget is managed by IATE team.

- *See Section 6.2 for this year 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 and Michaël Thomazo collaborate 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-supervise a PhD student (Tjitze Rienstra).

Sebastian Rudolph: TU Dresden (Germany)

Jean-François Baget, Marie-Laure Mugnier and Michaël Thomazo collaborate with Sebastian Rudolph on existential rules. Michaël Thomazo started a postdoc in Sebastian Rudolph's team. Madalina Croitoru collaborates with Sebastian Rudolph (also with Sarah Gaggl) on approximation algorithms for argumentation semantics, as well as on multi agent knowledge allocation.

Srdjan Vesic: University of Luxmbourg, Individual and Collective Reasoning research group (Luxembourg)

Madalina Croitoru collaborates with Srdjan Vesic on logical argumentation in the positive existential fragment of first-order logic with and without preferences.

Nir Oren: University of Aberdeen, Department of Computing Science (United Kingdom)

Madalina Croitoru collaborates with Nir Oren on graphical norm representation and reasoning, as well as on arguing about preferences using a structured argumentation framework.

Ioannis A. Vetsikas: University of Athens, IIT (Greece)

Madalina Croitoru collaborates with Ioannis A. Vetsikas on information selling mechanism design.

Talal Rahwan: University of Southampton, School of Electronics and Computer Science (United Kingdom)

Tomasz Michalak: University of Oxford, Department of Computer Science (United Kingdom)

Madalina Croitoru collaborates with Talal Rahwan and Tomasz Michalak on coalition formation using graphs structures.

8.3. International Research Visitors

8.3.1. Visits of International Scientists

- March 2013: Richard Booth (Univ. of Luxembourg). LIRMM AI seminar on *Quantifying disagreement in argument-based reasoning*.
- March 2013: Wojtek Jamroga (Univ. of Luxembourg). LIRMM AI seminar on *Some Funny Complexity Results for Judgment Aggregation*.
- April 2013: Pierre Bourhis (Univ. of Oxford). GraphIK seminar on *The Impact of Disjunction on Query Answering Under Guarded-based Existential Rules*.
- May 2013: Georg Gottlob (Univ. of Oxford). GraphIK seminar on *The Hypergraph Transversal Problem: Applications, Complexity, and Tractable Cases*.
- October 2013: Carsten Lutz (Univ. of Bremen). GraphIK seminar on *Ontology-Based Data Access: A Study Through Disjunctive Datalog, CSP, and MMSNP*, in the context of Michaël Thomazo's PhD's defense.
- October 2013: Georg Gottlob (Univ. of Oxford). GraphIK seminar on *Robust Constraint Satisfaction and Local Hidden Variables in Quantum Mechanics*, in the context of Michaël Thomazo's PhD's defense.
- November 2013: Roman Kontchakov and Michael Zakharyaschev (Birkbeck College, Londres). GraphIK seminar on *Theory and practice of ontology-based data access with OWL 2 QL*.

8.3.2. Visits to International Teams

Patrice Buche visited Wageningen UR Food and Biobased Research (Nederlands) two days in May 2013 (scientific exchanges on quantity and units ontologies).

<p align="center" style="color:red">LINKS Team</p>

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 project on "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. 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. International Initiatives

7.3.1. Inria International Partners

7.3.1.1. Declared Inria International Partners

We have submitted a proposal for an Inria North-European Lab Lille-Oxford, which has been accepted. The main people involved are Joachim Niehren (leader), 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 (leader), Dan Olteanu, Andreas Pieris (postdoc). Further promising cooperation opportunities are to be explored with members of Georg Gottlob's ERC project DiaDem (http://www.cs.ox.ac.uk/projects/DIADEM/index.html) on semantics-based information ex- traction.

7.4. International Research Visitors

7.4.1. Visits of International Scientists

Tova Milo (Tel-Aviv University, Israel) visited the team in Febraury 2013 for one day.

Amr El Abbadi (UCSB, Usa) visited the team in March 2013 for one day.

Jan van den Bussche (Hasselt University, Belgium) visited the team in November 2013 for two days.

7.4.2. Visits to International Teams

Pierre Bourhis visited the Oxford database group (http://www.cs.ox.ac.uk/isg/db) for three weeks in October, November and December 2013.

MAGNET Team

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. *Thèse Inria-Région NPdC (2012-2015)*
Participants: Marc Tommasi [correspondent], Pascal Denis, David Chatel.

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

8.2. National Initiatives

8.2.1. *ANR*

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

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.

8.3. European Initiatives

8.3.1. *Collaborations in European Programs, except FP7*

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.

In addition, MAGNET, in collaboration with SEQUEL, is part of the INRIA Lille - Nord Europe site for the European Network of Excellence in Pattern Analysis, Statistical Modelling and Computational Learning (PASCAL2).

<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, Amandine Dubois.

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 those presented in section 6.2.2.1 at an industrial level.

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 developing intelligent environments and distributed tracking devices for people walking analysis and robotic assistance (smart tiles, 3D camera network, assistant robots), cf. Sec. 6.2.2.1 , 6.2.2.2 and 6.2.1.4 .

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. Inria ADT Percee (2011-13)

Participants: Olivier Simonin, François Charpillet, Nicolas Beaufort.

Olivier Rochel, from SED, is an external collaborator. Moutie Chaider was hired as an IJD in 2012.

Percee, for "Perception Distribuée pour Environnements Intelligents", is a project proposed by the Maia and Madynes teams and funded by Inria. This ADT (Action de Développement Technologique) supports our action in the PAL Inria National Scale Initiative (Personally Assisted Living, see 8.2.1).

The project deals with the development and the study of intelligent homes. Since two years we have developed an experimental platform, the smart apartment. It allows us to study models and technology for life assistance (walk analysis with iTiles and camera networks, robotic assistants, health diagnostic, domotic functions, wireless communication inside home).

In particular we develop a new tactile floor, which is the iTiles network. Two engineers are funded by the ADT: Moutie Chaider (IJD) and Olivier Rochel (Inria research engineer) for two years.

8.2.4. ANR

8.2.4.1. 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. Collaborations in European Programs, except FP7

Program: InterReg IV B
Project acronym: InTraDE
Project title: Intelligent Transportation for Dynamic Environment
Duration: 2010 - 2014
Coordinator: University of Science and Technology of Lille (Lille 1-LAGIS) (France),
Other partners: South East England Development Agency (United Kingdom), Centre Régional d'Innovation et de Transfert de Technologie – Transport et Logistique (CRITT TL) (France), AG Port of Oostende (AGHO) (Belgium), National Institute for Transport and Logistics, Dublin Institute of Technology (Ireland), Liverpool John Moores University (LOOM) (United Kingdom)
Abstract:

The InTraDE project (Intelligent Transportation for Dynamic Environments, http://www.intrade-nwe.eu/) is funded by the European North West Region. The project is coordinated by Rochdi Merzouki from University of Science and Technology of Lille (LAGIS lab.). Other partners are the Maia team, Liverpool John Moores University (LOOM), the National Institute for Transport and Logistics in Dublin Institute of Technology, the South East England Development Agency, the AGHO Port of Oostende and the CRITT in Le Havre. In the context of seaports and maritime terminals, the InTraDE project aims to improve the traffic management and space optimization inside confined spaces by developing a clean and safe intelligent transportation system. This transportation system will operate in parallel with virtual simulation software of the automated site, allowing a robust and real-time supervision of the goods handling operation.

The Maia team partner focuses on decentralized approaches to deal with the control of automated vehicle platooning and the adaptation of the traffic. Maia is funded with two PhD fellowships and one engineer. Both PhD thesis started in the end of 2010. The PhD of Jano Yazbeck, supervised by F. Charpillet and A. Scheuer, aims at studying a "Secure and robust immaterial hanging for automated vehicles" (see Sec. 6.2.1.1). The PhD of Mohamed Tlig, supervised by O. Simonin and O. Buffet, addresses "Reactive coordination for traffic adaptation in large situated multi-agent systems" (see Sec. 6.2.1.3).

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- Dr. Iadine Chadès, Research Scientist at CSIRO, Ecosystem Sciences division (Brisbane, Australia), visited MAIA for 1 week in July 2013.

OAK Project-Team

7. Partnerships and Cooperations

7.1. Regional Initiatives

Data Warehousing for RDF (DW4RDF) is a 3-year project sponsored by the Digiteo foundation, between Inria and UNIV. PARIS-SUD. The project aims at defining and deploying a full framework for RDF data analytics, supporting its inherent structural heterogeneity and semantics, while at the same time providing powerful analytic tools for summarizing and analyzing the data. The project supports the PhD of Alexandra Roatiş.

7.2. National Initiatives

7.2.1. ANR

Apprentissage Adaptatif pour le Crowdsourcing Intelligent et l'Accès à l'Information (ALICIA) is a 3.5-year project, starting in February 2014, supported by the ANR CONTINT call. The project is coordinated by Bogdan Cautis, with Nicole Bidoit, Melanie Herschel, 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 project accepted by the ANR in 2013 and is currently under financial negotiation. The project is 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 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.

7.3. European Initiatives

7.3.1. Collaborations in European Programs, except FP7

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.

Program: KIC EIT ICT Labs "Computing in the Cloud" Action Line

Project acronym: Europa

Project title: Massively Parallel Data Management

Duration: Jan 2013 – Dec 2013

Coordinator: Volker Markl (TU Berlin, Germany)

Other partners: UNIV. PARIS-SUD (France), Aalto Univ (Finland), InternetMemory (France)

Abstract: Europa focuses on massively parallel algorithms and platforms for data management in the cloud. At TU Berlin, the Stratosphere open-source platform has been developed as part of this activity. At Inria and UNIV. PARIS-SUD, our work has focused on developing the AMADA platform for efficiently exploiting Web data in the Amazon cloud.

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

Inria principal investigator: Ioana Manolescu

International Partner (Institution - Laboratory - Researcher):

>   University of California San Diego (United States) - Computer Science and Engineering - Ioana Manolescu

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 collaborate closely with TU Berlin within the Europa KIC EIT ICT Labs Europa project; A. Katsifodimos moved there for his post-doc after completing his PhD in OAK.

We have collaborated significantly with researchers from the University of Pisa and University of Basilicata [15], [16].

7.5. International Research Visitors

7.5.1. Visits of International Scientists

Participant: Stefano Ceri.

Date: September 2013

Institution: Politecnico di Milano, Italy.

Participant: Alin Deutsch.

Date: July-August 2013

Institution: UCSD, USA.

7.5.1.1. Internships

Damian Alexis Bursztyn

Subject: Take What You Need: Efficiently Querying Semantic Web Data

Date: from Mar 2013 until Aug 2013

Institution: University of Buenos Aires (Argentina).

Varun Malhotra

Subject: Task factorization for PACT programs on semistructured data

Date: from May 2013 until Aug 2013

Institution: IIT Delhi (India).

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

8. Partnerships and Cooperations

8.1. International Initiatives

8.1.1. Participation In International Programs

8.1.1.1. Facepe Inria Project: CM2ID
Participants: Amedeo Napoli [contact person], Chedy Raïssi.

This research project called "Combining Numerical and Symbolical Methods for the Classification of Multi-valued and Interval Data (CM2ID)" involves the Orpailleur Team at Inria NGE, AxIS at Inria Rocquencourt (Yves Lechevallier) and the computer science laboratory of the University of Recife (Prof. Francisco de A.T. de Carvalho). The project aims at developing and comparing classification and clustering algorithms for 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.

Finally, a workshop was organized in April 2013 , namely the "French-Brazilian Workshop on Numerical and Symbolic Methods of Data Analysis -WFB2013" (http://www.cin.ufpe.br/~wfb2013/).

8.1.1.2. Fapemig Inria Project: IKMSDM
Participants: Amedeo Napoli [contact person], Chedy Raïssi.

This Fapemig – Inria research project, called "Incorporating knowledge models into scalable data mining algorithms" involves 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 are interested in the mining of large amount of data and we target two relevant application scenarios where such issue may be observed. The first one is text mining, i.e. extracting knowledge from texts and document categorization. The second application scenario is graph mining, i.e. determining relationship-based patterns and use these relations to perform classification tasks. In both cases, the computational complexity is large either because the high dimensionality of the data or the complexity of the patterns to be mined. Loïc Cerf from UFMG visited the Orpailleur team in January 2013 while Chedy Raïssi visited UFMG in May 2013.

8.1.1.3. 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.

8.1.1.4. International collaborations in Mining complex data
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.

8.1.1.4.1. PICS CNRS CAdOE

A collaboration involves the Orpailleur team, "Université du Québec à Montréal" (UQAM) in Montréal with Prof. Petko Valtchev and Laboratoire LIRMM in Montpellier with Prof. Marianne Huchard. This collaboration is supported by a CNRS PICS project (2011-2014), which is called "Concept Analysis driving Ontology Engineering" and abbreviated in "CAdOE". The research work within this project is aimed at defining and implementing a semi-automatic methodology supporting ontology engineering based on the joint use of Formal Concept Analysis (FCA) and Relational Concept Analysis (RCA). This year the work was mainly focused on RCA and some important papers were published [33], [57].

8.1.1.4.2. Miscellaneous

- An on-going collaboration involves the Orpailleur team and Sergei Kuznetsov at Higher School of Economics in Moscow (HSE). Amedeo Napoli visited HSE laboratory in March 2013 (with the support of HSE) and met Sergei Kuznetsov several times during the year. In addition, Alexey Neznanov from HSE Moscow visited the Orpailleur team in May 2013 while Dmitry Ignatov visited the visited the Orpailleur team in September 2013.

  These visits were the occasion of preparing a publications. Moreover, Sergei Kuznetsov and Amedeo Napoli, together with Claudio Carpineto organized a workshop related to the ECIR Conference in Moscow in March 2013 on "Formal Concept Analysis meets Information Retrieval" (http://www.hse.ru/en/org/hse/fcair).

- A so-called AGAUR Project funded by UPC Barcelona involves Amedeo Napoli and Jaume Baixeries who is an Associate Professor at UPC Barcelona (Universitat Politècnica de Catalunya). Both researchers have worked, jointly with Mehdi Kaytoue, on the characterization of functional dependencies in many-valued data with FCA and pattern structures [38].

- A PHC Zenon project (Cyprus) with Florent Domenach, associated professor at the University of Nicosia in Cyprus was finished at the end of last year. This project was entitled "Knowledge Discovery for Complex Data in Formal and Relational Concept Analysis" (KD4CD) and is aimed at studying and combining different types of classification process in the framework of FCA. As a result of this collaboration, some papers were published this year, among which one at the ICFCA Conference in Dresden [49], [61].

- A PHC Proteus project (Slovenia) with Riste Škrekovski, professor at the University of Ljubljana ended at the end of 2013. This project was entitled "Graphs for combinatorial chemistry and complex networks". Several manuscripts are under submission.

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

The Hybride research project (http://hybride.loria.fr/) aims at developing new methods and tools for supporting knowledge discovery from textual data by combining methods from Natural Language Processing (NLP) and Knowledge Discovery in Databases (KDD). 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 analyzing 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. itemsets and sequences, formal concept analysis and variations, and graph mining. In this way, NLP methods applied to some texts locate "textual information" that can be used by KDD methods as constraints for focusing the mining of textual data. By contrast, KDD methods can extract itemsets or sequences that can 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 a new generation of tools for querying full-text documentation, analyzing their content or extracting information and knowledge units. 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 July 2014, funded by French National Agency for Research (ANR), program ANR CONTINT. The aim of the project is investigation on man-machine collaboration in continuous knowledge-construction flows.

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

8.2.1.5. PEPSI: Polynomial Expansions of Protein Structures and Interactions

Participants: David Ritchie, Marie-Dominique Devignes, Malika Smaïl-Tabbone.

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 term candidates (information extraction) and on disambiguation.

In the Orpailleur team, we are mainly concerned by information extraction using Formal Concept Analysis techniques, but also itemset or sequence extraction. 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 term and its corresponding domain.

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 is to represent and analyze "patient care trajectories" (patient suffering from cancer limited to breast, colon, rectum, and lung cancers) and the associated healthcares. The data are related to patients receiving hospital cares in the "Bourgogne" region and using data from the PMSI. Such an analysis involves various data, e.g. type of cancer, number of visits, type of stays, hospitalization services and therapies used, and demographic factors, i.e. age, gender, place of residence.

One thesis is currently carried out on this subject whose objective is to design a knowledge discovery system working on multidimensional and sequential data for characterizing Patient Care Trajectories (PCT) [52], [62]. This thesis combines knowledge discovery and knowledge representation methods for improving the definition of patient care trajectories as temporal objects (sequential data mining). The overall objective is to improve decision support and healthcare in detecting for example typical or exceptional trajectories for planning with precision healthcare for a given population.

In parallel, Formal Concept Analysis techniques were used in conjunction with regression tree analysis to produce semi-automated classification of PCTs in the field of breast cancer in France [27].

8.2.2. Other National Initiatives and Collaborations

8.2.2.1. PEPS Cryo-CA

Participant: David Ritchie [Inria Nancy].

Cryo-CA is a two-year PEPS project ("Projets exploratoires pluridisciplinaires") funded by CNRS, involving a collaboration with cryo-electron microscopy experimentalists at the IGBMC ("Institut de Génétique et de Biologie Moléculaire et Cellulaire") in Strasbourg. People involved in the project with David Ritchie are Sergei Grudinin (Inria Grenoble), Annick Dejaegere (IGBMC, Strasbourg), and Patrick Schultz (IGBMC Strasbourg). The aim of the project is to encourage collaborations between experimentalists and computer scientists in order to advance the state of the art of computational algorithms in structural biology.

8.2.2.2. 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. We collaborated on the NRPS toolbox [109]. 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.

8.3. Regional Initiatives

8.3.1. *Le Bois Santé (LBS)*

Participants: Emmanuel Bresso, 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.

The BioProLor consortium is composed of 5 enterprises and 7 academic research teams, which were funded for 3 years (2010–2013) by AME ("Agence pour la Mobilisation Economique") for the design of compounds with high added-value which originate from plants in Lorraine. Finally, it should be noticed that the PhD Thesis work of Emmanuel Bresso was taken in charge by Harmonic Pharma (CIFRE contract, 2009-2013).

8.3.2. *PEPS Mirabelle EXPLOD-Biomed*

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

This project initiates 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 are playing the role of experts, guiding the different steps of the knowledge discovery process.

8.3.3. *Hydreos*

Participant: Jean-François Mari [contact person].

The research project Hydreos (http://www.hydreos.fr/fr) is aimed at evaluating the quality of water. Actually, water resources relies on many agronomic variables, including land use successions. Accordingly, one objective of this research project 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 and UMR Costel Rennes http://www.univ-rennes2.fr/costel). In addition, we participated in various meetings of researchers involved in the study of quality of groundwater in Alsace-Lorraine.

This year, or research work focused on collecting and preprocessing satellite data sampled in a territory in Brittany where there is an important phytoplanktonic biomass and Ulva species mass proliferation risk.

8.3.4. Contrat Plan État Région” (CPER)

The links between the Regional Administration and LORIA are materialized through the so-called "Contrat Plan État Région" (CPER) which is running from 2007 to 2013. The associated scientific program is called "Modélisations, informations et systèmes numériques" (MISN) and includes two tracks in which the Orpailleur team is involved.

- "Modeling Bio-molecules and their Interactions" (MBI).

  The general objective of this project is to study how domain knowledge can be taken into account for improving the modeling of biomolecules and their interactions, and the modeling of biological systems (http://bioinfo.loria.fr). Six scientific projects are currently under development and involve collaborations with computer scientists and people working either in biology or chemistry. This project is coordinated by Marie-Dominique Devignes.

- An Inria experimental research platform is currently developed in the framework of MBI (http://bioinfo.loria.fr/Plateforme%20MBI), which is aimed at sharing data and computing resources. The specific features of this platform are relative to biomolecules modeling, to classification and to data integration for data mining. The platform is a constituent of the North-East node of RENABI –"Réseau National des Plateformes Bioinformatiques"– together with the platforms in Strasbourg, Reims, Lille, and Nancy-INIST.

- "Traitement Automatique des Langues et des Connaissances" (TALC).

  TALC stands for "Automatic Processing of Languages and Knowledge". The general objective of TALC is to study the relations existing between knowledge discovery, knowledge representation, reasoning, and natural language processing. In the framework of TALC, the Orpailleur team plays an important role as the research themes of the team are closely related to those of TALC. Actually, research projects are currently under development on knowledge management and decision support involving in particular the Kasimir and the Taaable systems.

SMIS Project-Team

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. ARC CAPPRIS (Dec. 2011 - Dec. 2015)

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

An ARC 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 will be 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 will be 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) will be 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.

8.1.4. Digiteo LETEVONE chair (2010-2013)

Partners: LIX (Ecole Polytechnique), PRiSM (UVSQ), DBWeb (Telecom ParisTech), Exalead S.A..

Funding: Grant covers the expenses of Pr. Vazirgiannis' visits to France (hosted by LIX) and of 2 PHD students.

Participant in the DIGITEO Learning Techniques for Evolving Networks chair, held by Pr. Michalis Vazirgiannis (Athens University of Economics and Business) from 2010 to 2013. The overall objective of the proposed project is mining and learning from the large scale and dynamically evolving data and graphs generated in the Web 2.0 context. Our particular collaboration has delt with privacy protection of users' data in this context.

8.2. European Initiatives

8.2.1. FP7 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
Coordinator: Philippe Bonnet (ITU of Copenhagen)
Other 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 wellsuited 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 [6], 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. The study of flash devices started during a short sabbatical of Luc Bouganim (from April to August 2008) in Copenhagen. The uFLIP study has been conducted in close cooperation with Philippe Bonnet from IT University of Copenhagen and Björn Þór Jónsson from Reykjavík University. The cooperation with Copenhagen is very active and led to new studies on flash devices and on the Trusted Cell architecture Two PhD students are currently co-supervised by Luc Bouganim and Philippe Bonnet. Philippe Bonnet got a Marie-Curie IEF grant and will visit SMIS for one year in 2013-2014.
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

See Section 8.2.1 .

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

7. Partnerships and Cooperations

7.1. National Initiatives

7.1.1. Investissements d'avenir

CLAIRE

Title: Community Learning through Adaptive and Interactive multichannel Resources for Education

Call: Technologies for e-education

Duration: March 2012 - February 2014

Coordinator: OpenClassrooms, ex-SimpleIT

Others partners: LIRIS

See also: http://www.projet-claire.fr/

Abstract: Project CLAIRE aims at developing an open-source tool for collaborative authoring in an e-learning environment (Learning Content Management System), targeting teachers and students in high-school and universities. Its innovative features include:

- a platform for collaborative structured editing of rich meda and "semantic" content, e.g.: tools for chaptering video, and for generating interactive evaluation tests
- processes for continuous enhancement of content, e.g.: social annotation, behaviour analysis, accessible multi-support publishing, e.g.: web, PDF, ODT, LaTeX, smartphones, tablets.

Datalyse

Title: Entrepôt Intelligent pour Big Data hétérogènes. Investissements d'Avenir Développement de l'Economie Numérique.

Call: Cloud Computing, num 3 – Big Data.

Duration: May 2013 - November 2016

Coordinator: Business & Decision Eolas

Others partners: Groupement des Mousquetaires, Inria Saclay (OAK EPC), LIG (Hadas and Erods teams), LIRMM (Montpellier), LIFL (Lille).

See also: http://www.datalyse.fr/

Abstract: Project Datalyse aims at designing and deploying an infrastructure for big data storage, collection, certification, integration, categorization, enrichment and sharing over very large heterogeneous data sets. It relies on an industrial platform, to be made available on the cloud, and focuses on three flagship applications, showcasing three uses of big data over different data sets:

- Data Center Monitoring: The goal of this application is to provide features such as traceability, reporting, optimization and analysis of abnormal behaviour regarding energy efficiency and security issues. The application will be built with an existing application called ScopeBR (Eolas) and will be deployed in two different green data centers, those of Eolas and GDF SUEZ.
- "Territoire de données ouvertes et liées": This application aims at extracting and provisioning public open data collected from the city of Grenoble and its suburbs. The goal is to make public data available to third-party application developers and to federate local actors around a single platform.
- Real-time Business Intelligence for the management and processing of points of sale: this application will focus on real-time data analytics and will be deployed within "Groupement des Mousquetaires" in support of their business intelligence platforms.

7.1.2. ANR

Typex

> Title: Typeful certified XML: integrating language, logic, and data-oriented best practices
>
> Call: Programme Blanc
>
> Duration: January 2012 - December 2014
>
> Coordinator: PPS (CNRS - Paris 7 Diderot)
>
> Others partners: LRI (Orsay)
>
> See also: http://typex.lri.fr
>
> Abstract: The highly ambitious and final goal of this project is to produce a new generation of XML programming languages stemming from the synergy of integrating three approaches into a unique framework:
>
> - a logical approach based on solvers
> - a programming language (PL) approach
> - a data-oriented approach

These languages will feature precise and polymorphic type systems that merge PL typing techniques with logical-solver-based type inference. They will be implemented efficiently using the latest research on tree automata and formally certified using modern theorem prover technology. They will offer the capacity to specify and formally verify invariants, business rules, and data integrity, and will have a direct and immediate impact on standardization processes.

7.2. European Initiatives

7.2.1. FP7 Projects

7.2.1.1. VENTURI

> Title: immersiVe ENhancemenT of User-woRld Interactions
>
> Type: Cooperation (ICT)
>
> Call: FP7-ICT-20111.5 Networked Media and Search Systems
>
> Instrument: Specific Targeted Research Project (STREP)
>
> Duration: October 2011 - September 2014
>
> Coordinator: Fondazione Bruno Kessler (Italy)
>
> Others partners: Fraunhofer Heinrich Hertz Institute (Germany), ST Microelectronics (Italy), ST-Ericsson (France), Metaio (Germany), e-Diam Interactive (Spain), Sony-Ericsson (Sweden)
>
> See also: https://venturi.fbk.eu/
>
> Abstract: Venturi aims to create a pervasive Augmented Reality paradigm, where available information will be presented in a user- rather than device-specific way. The goal is to create an experience that is always present whilst never obstructing. Venturi will exploit, optimize and extend current and next generation mobile platforms; verifying platform and QoE performance through life-enriching use cases and applications to ensure device-to-user continuity.

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. ePSP

Participants: Alain Giboin, Nhan Le Than, Michel Buffa.

Nhan Le Than animates the ePSP interdisciplinary working group at Nice Sophia Antipolis University on the topics of personalized eHealth [15].

8.1.2. HCI Group of Pôle GLC at I3S UNS

Participant: Alain Giboin.

The HCI Group brings together researchers from Pôle 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. Collaboration took place this year 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. The prototype allows a composition mainly driven by the direct manipulation of UI elements, the other components (task model and software components) being hidden, but still being linked to the UI elements. A user testing of both the process and the prototype has been designed and implemented [70].

8.1.3. Collaboration Agorantic-Inria

Participant: Alain Giboin.

Agorantic is a Federative Structure for Research of the Université d'Avignon et des Pays du Vaucluse, conducting studies on "Culture, heritage and digital societies". Agorantic is interested in how worlds of culture and heritage interact with the Web and digital technology, leading, e.g., to: new forms of knowledge sharing and access to culture, heritage and territories; new forms of writing, mediation and use of cultural events and heritage; new forms of mobility and of territorial representation. Collaboration began this year between ITCS and HSS teams from Agorantic and Inria Sophia Antipolis, including Wimmics, conducting interdisciplinary ITCS-HSS research. This initial collaboration resulted in setting up a proposal of a project for analyzing, designing, and evaluating a system recommending visit tours to museum visitors (individuals and groups).

8.1.4. MSHS : Axe-2 "TIC, Usages et Communautés"

Participants: Alain Giboin, Aurore Defays, Fabien Gandon.

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 involved in the second group-project. In this group, we reported our work on the analysis and modeling of the representations shared by members of a group (also called common ground or common frame of reference).

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[15]http://epsp.unice.fr/

8.1.5. MSHS : SyCoViSo project, Systèmes Cognitifs et Formes de Vie Sociale

Participants: Alain Giboin, Elena Cabrio, Fabien Gandon.

SyCoViSo is a project of the MSHS Sud-Est that brings together researchers in HSS and ITCS. Several Inria teams are involved in this project, including Wimmics. SyCoViSo goal is to analyze and model internal and external cognitive processes involved in various forms of social life. SycoViso consisted originally of eight thematic groups; Wimmics was a member of the "Artifacts, interaction and social networks" group. Following the two SyCoViSo scientific days organized in June 2013, the project was given a second level of organization with three areas having a cross-disciplinary potential: (1) Computational modelling; (2) Classification of artefacts lying beyond the skin; (3) Unconscious factors impacting decision making: emotions, beliefs, morale, etc. Wimmics interest focused in particular on computational modeling of linguistic exchanges occurring in social networks and online communities.

8.2. National Initiatives

8.2.1. 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.

8.2.2. 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

8.2.3. ANR Datalift

DataLift is an ANR project (2010-2013). Its goal is to design a platform to publish and interlink datasets on the Web of data. Datalift will both publish datasets coming from a network of partners and data providers and propose a set of tools for easing the datasets publication process. DataLift brings raw structured data coming from various formats (relational databases, CSV, XML, ...) to semantic data interlinked on the Web of Data.

Partners: Inria Exmo & Wimmics, LIRMM, Eurecom, Mondeca, Atos, IGN, INSEE, FING

Web site: http://www.datalift.org

8.2.4. 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

8.2.5. 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

8.2.6. 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 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

8.2.7. Inria Large Scale Initiative Action PAL

Participants: Alain Giboin, Célia Ormea.

In collaboration with David Daney (Coprin), Rémy Ramadour (Coprin), Rémi Barraquand (Prima), Marie Babel (Lagadic).

For the second year, Wimmics participated 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 frail persons. Wimmics was involved in two main actions: (1) 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; the results of this study are documented in Célia Ormea Master Thesis; (2) the development and the application of a procedure to collaboratively elaborate a shared scenario to structure the demonstration of the platform integrating the different PAL services.

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

8.3. International Initiatives

8.3.1. Informal International Partners

Université de Montréal, Canada

HERON (Higher Educational Research ON tutoring systems) Laboratory (Head: Claude Frasson).

Topic of the collaboration: Social exchanges and emotions in mediated polemics – Analysis and data.

Polytechnique Montréal, Canada

Software Engineering Laboratory (Head: Pierre Robillard).

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

Annaba University, Algeria

The funding of the scientific collaboration project with the LabGed laboratory of university of Annaba (Algeria) by CNRS and DPGRF (Algeria) ended last year but continued in 2013 through the co-supervising of two PhD students from the university of Annaba with our Algerian colleague Hassina Seridi. Samia Beldjoudi works on the personalization of resource recommendation and Khaled Halimi on the personalization and socialization of ubiquitous e-learning systems based on Semantic Web models and techniques.

In 2013 Khaled Halimi visited the team for three months and started writing his thesis during this period. Catherine Faron Zucker received his PhD advisor Hassina Seridi in december with the project of setting a collaboration within the PICS CNRS program in 2014.

8.3.2. Inria International Labs

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

Catherine Faron Zucker participated to the LIRIMA scientific days in September in Marocco [16].

8.3.3. Participation In other International Programs

Our team is strongly involved in W3C activities:

- Fabien Gandon in the Advisory Committee representative for Inria.
- Olivier Corby participates to SPARQL 1.1 standardization working group.
- Fabien Gandon and Olivier Corby participate to RDF 1.1 standardization working group.
- Serena Villata participates to the LDP (Linked Data Platform) standardization working group.

8.4. International Research Visitors

8.4.1. Visits of International Scientists

Oscar Rodriguez Rocha:

Exploiting the Semantic Web, UGC and Context-Awareness to enhance mobile services for end-users, January 25.

Claude Frasson: *The Emotional Brain*, March 3.

Alberto Barrón Cedeño: *"Uncovering" Good Feedback Instances from an On-line Machine Translation Systems*, April 26.

Luis Ibáñez: *Live Linked Data: making Linked Data writable with massive optimistic replication and Conflict-Free Replicated Data Types*, June 10.

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[16]http://www.lirima.uninet.cm/index.php/en

Bernardo Magnini: *The KNOWLEDGE STORE: an Integrated Framework for Ontology Population*, September 6.

Alessio Palmero Aprosio: *Extending Linked Open Data resources exploiting Wikipedia as source of informations*, October 7.

Pierre Robillard, Professor, Department of Computer Engineering, Polytechnique Montréal, Canada.

Stefan Decker, From Networked Knowledge to Insight(s), November 29.

8.4.1.1. Internships

Aurore Defays, PhD student in Ergonomics at the University of Liège, Belgium.

Gessica Puri, PhD student at the Architecture Faculty of Genoa, Italy.

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ZENITH Project-Team

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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. Patrick Valduriez heads 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. ANR

8.2.1.1. OTMedia (2011-2013), 150Keuros
Participants: Alexis Joly, Julien Champ, Pierre Letessier.

The Transmedia Observatory project, launched in November 2010, aims to develop processes, tools and methods to better understand the challenges and changes in the media sphere. Studying and tracking media events on all media (web, press, radio and television) are the two prioritized research areas. OTMedia brings together six partners: Inria (Zenith), AFP (French Press Agency), INA (French National Audiovisual Institute), Paris 3 Sorbonne Nouvelle (researchers in Information Science and Communication), Syllabs (a SME specialized in semantic analysis and automatic creation of text) and the Computer Science Laboratory of Avignon University. Zenith addresses more specifically the research challenges related to the trans-media tracking of visual contents (images and videos) and the clustering of heterogeneous information sources.

8.2.2. PIA

8.2.2.1. 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.

8.2.2.2. Xdata (2013-2015), 125Keuros
Participants: Emmanuel Castanier, 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 plafftorm 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.

8.2.3. Others

8.2.3.1. RTRA Pl@ntNet (2009-2013), 1Meuros
Participants: Alexis Joly, Hervé Goëau, Julien Champ, Saloua Litayem, Mathias Chouet.

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 [6], IMEDIA project team at Inria, and the French botanical network TelaBotanica [7]), 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.

8.2.3.2. CIFRE INA/Inria (2011-2013), 100Keuros
Participants: Alexis Joly, Pierre Letessier.

This CIFRE contract with INA allows funding a 3-years PhD (Pierre Letessier). This PhD addresses research challenges related to content-based mining of visual objects in large collections.

8.2.3.3. 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.

8.2.3.4. CNRS INS2I Mastodons (2013), 30Keuros
Participants: 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

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

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 no SQL 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.

8.4. International Initiatives

8.4.1. Inria Associate Teams

8.4.1.1. BIGDATANET

Title: A hybrid P2P/cloud for big data

Inria principal investigator: Patrick Valduriez

International Partner (Institution - Laboratory - Researcher):

University of California at Santa Barbara (United States) - Distributed Systems Lab. - 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. International Benchmarks

8.4.2.1. ImageCLEF

Title: The CLEF Cross Language Image Retrieval Track

Inria principal investigator: Alexis Joly

International Partners (Institution - Laboratory - Researcher): HES-SO (Switzerland), Yahoo! Research (Spain), IBrandenburg Technical University (Germany), diap Research Institute (Switzerland), University of Alicante (Spain), Universidad Politécnica de Valencia (Spain), UMR AMAP (France)

Duration: 2011 -2013

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

Since its first edition in 2003, ImageCLEF has become one of the key initiatives promoting the benchmark evaluation of algorithms for the cross-language annotation and retrieval of images in various domains, such as public and personal images, to data acquired by mobile robot platforms and botanic collections. Over the years, by providing new data collections and challenging tasks to the community of interest, the ImageCLEF lab has achieved an unique position in the multi lingual image annotation and retrieval research landscape. As an illustration of its impact, the 2013 edition attracted more than 100 registered team world-wide and 42 of them did cross the finish line by submitting runs of their system [30]. Zenith, through the implication of Alexis Joly and Hervé Goëau, is one of the co-organizer of the lab and the initiator of the plant retrieval task since 2011

8.4.3. Inria International Partners

8.4.3.1. 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)

8.4.4. Inria International Labs

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

8.4.5. Participation In other International Programs

We are involved in the following international actions:

- FAPERJ-Inria project SwfP2Pcloud (Data-centric workflow management in hybrid P2P clouds, 2011-2013) with UFRJ (Marta Mattoso, Vanessa Braganholo, Alexandre Lima) and LNCC, Rio de Janeiro (Fabio Porto) to work on large scale scientific workflows in hybrid P2P clouds;
- 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

Dennis Shasha (NYU, USA) gave a seminar on "Storing Clocked Programs Inside DNA: A Simplifying Framework for Nanocomputing" in january.

Prof. Marta Mattoso (UFRJ, Rio de Janeiro) gave a seminar in the context of IBC on "Big Data Workflows – how provenance can help" in march and "Algebraic Dataflows for Big Data Analysis" in november.

Aravind Venkatesan (NTNU, Trondheim, Norway) gave a seminar in the context of IBC on "Bringing Semantic Web Technology to the Lab Bench" in october.

Sihem Amer-Yahia (LIG) gave a seminar on "New Perspectives in Social Data Management" in november.

Themis Palpanas (Univ. Trento, Italy) gave a seminar on "Enabling Exploratory Analysis on Very Large Scientific Data" in december.

8.5.2. Visits to International Teams

Reza Akbarinia and Florent Massglia visited UCSB (Prof. Divy Agrawal and Amr El Abbadi) in may. Esther Pacitti and Patrick Valduriez also visited UCSB and Lawrence Berkeley Laboratory, Berkeley (Dr. Arie Shoshani and Deb. Agrawal) in june.

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ALICE Project-Team

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6. Partnerships and Cooperations

6.1. Regional Initiatives

"Contrat région projet émergent" CORIDA (X. Antoine)/ALICE (B. Lévy): budget of 25 K€ shared between both teams.

6.2. National Initiatives

6.2.1. 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.

6.2.2. ANR Bond (2013 – 2017)

X. Antoine is a member of ANR BOND ("projet blanc").

6.2.3. ANR TECSER

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.

6.2.4. ANR Similar-Cities (jeune chercheur)

Sylvain Lefebvre has a continued collaboration with our industrial partners Allegorithmic and the CSTB (Centre Scientifique et Technique du Bâtiment) through the ANR project Similar-Cities. A technological transfer agreement was signed in early 2013 and the project ended on February.

6.2.5. ANR Physigraphix (jeune chercheur)

Rhaleb Zayer has continued the investigations on the ANR project Physigraphix, which aim is to bridge the gap between acquisition and modeling in the context of deformable objects.

6.2.6. ANR Morpho

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.

6.3. European Initiatives

6.3.1. FP7 Projects

6.3.1.1. GoodShape

Title: Numerical Geometric Abstractions: from bits to equations

Type: IDEAS

Instrument: ERC Starting Grant

Duration: August 2008 – July 2013

Coordinator: Inria

Inria contact: Bruno Lévy

Abstract: GoodShape involves several fundamental aspects of 3D modeling and computer graphics. GoodShape is taking a new approach to the classic, essential problem of sampling, or the digital representation of objects in a computer. This new approach proposes to simultaneously consider the problem of approximating the solution of a partial differential equation and the optimal sampling problem. The proposed approach, based on the theory of numerical optimization, is likely to lead to new algorithms, more efficient than existing methods. Possible applications are envisioned in inverse engineering and oil exploration.

6.3.1.2. ShapeForge

Title: ShapeForge: By-Example Synthesis for Fabrication

Type: IDEAS

Instrument: ERC Starting Grant

Duration: December 2012 – November 2017

Coordinator: Inria

Inria contact: Sylvain Lefebvre

Abstract: Despite the advances in fabrication technologies such as 3D printing, we still lack the software allowing for anyone to easily manipulate and create useful objects. Not many people possess the required skills and time to create elegant designs that conform to precise technical specifications. 'By–example' shape synthesis methods are promising to address this problem: New shapes are automatically synthesized by assembling parts cutout of examples. The underlying assumption is that if parts are stitched along similar areas, the result will be similar in terms of its low–level representation: Any small spatial neighbourhood in the output matches a neighbourhood in the input. However, these approaches offer little control over the global organization of the synthesized shapes, which is randomized. The ShapeForge challenge is to automatically produce new objects visually similar to a set of examples, while ensuring that the generated objects can enforce a specific purpose, such as supporting weight distributed in space, affording for seating space or allowing for light to go through. This properties are crucial for someone designing furniture, lamps, containers, stairs and many of the common objects surrounding us. The originality of our approach is to cast a new view on the problem of 'by–example' shape synthesis, formulating it as the joint optimization of 'by–example' objectives, semantic descriptions of the content, as well as structural and fabrication objectives. Throughout the project, we will consider the full creation pipeline, from modeling to the actual fabrication of objects on a 3D printer. We will test our results on printed parts, verifying that they can be fabricated and exhibit the requested structural properties in terms of stability and resistance.

6.3.1.3. VORPALINE

Title: Vorpaline PoC

Type: IDEAS

Instrument: ERC Proof of Concept

Objectif: development of the Vorpaline software (see above)

Duration: July 2013 – June 2014

Coordinator: Inria

Inria contact: Bruno Lévy.

Abstract: The VORPALINE "Proof-of-Concept" project, funded by the European Research Council, aims at transforming the scientific results stemming from the GoodShape project into a technological component directly transferable to the industry. The funding allowed us to hire an experimented software architect, Thierry Valentin, who created the industrial software architecture and development tools (continuous integration platform, non-regression tests, software quality tools ...). The result of the project is the Vorpaline software (see section 4.1).

6.4. International Initiatives

6.4.1. Participation in Other International Programs

Xavier Antoine started two collaborations:

- E. Lorin et A.D. Bandrauk (University of Carleton, Canada) and CRM, Montréal, on numerical analysis for quantum chemistry.
- W. Bao (National University of Singapore), on numerical methods for simulating Bose-Einstein condensates.

6.5. International Research Visitors

6.5.1. Visits of International Scientists

- Klaus Hildebrandt (*Max-Planck-Institut für Informatik*) visited us and gave a talk on October 22. He was invited by Rhaleb Zayer.
- Frédéric Claux visited us during two days, from IRIT in Toulouse.

6.5.2. Visits to International Teams

Sylvain Lefebvre visited

- Niloy Mitra, University College London.
- Jérôme Darbon, CNRS & UCLA.

Xavier Antoine gave an invited talk at "EMF 2013, The Ninth International Symposium on Electric and Magnetic Fields", Bruges, Belgium, April 2013.

AVIZ Project-Team

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 Projects

8.2.1.1. DREAM

Program: FP7

Project acronym: **DREAM**

Project title: Design and development of REAlistic food Models with well-characterised micro- and macro-structure and composition

Duration: 2009–2013

Coordinator: INRA - CEPIA department, Monique Axelos

Other partners: Technical Research Centre of Finland, Actilait France, ADRIA Développement France, CNRS, INRA Transfert, Société de Recherche et Développement Alimentaire Bongrain, Campden BRI Magyarország Nonprofit Kft. Hungary, Central Food Research Institute Hungary, Teagasc - Agriculture and Food Development Authority Ireland, Consiglio Nazionale delle Ricerche - Istituto di Scienze delle Produzioni Alimentari Italy, Top Institute Food and Nutrition The Netherlands, Wageningen University (WUR) The Netherlands, University of Ljubljana, Biotechnical Faculty Slovenia, Institute for Food and Agricultural Research and Technology Spain, Campden BRI UK, Institute of Food Research UK, United Biscuits (UK) Limited.

Abstract:

The overall goal of DREAM (Design and development of REAlistic food Models with well-characterised micro- and macro-structure and composition) is to develop realistic, physical and mathematical models to be used as standards that can be exploited across all major food categories to facilitate development of common approaches to risk assessment and nutritional quality for food research and industry.

The partnership involves 18 partners from 9 european countries, among which two multinationals. The project is lead by INRA, CEPIA department, and Inria participation is managed by delegation by the ISC-PIF (CNRS-CREA, UMR 7656).

See more at http://dream.aaeuropae.org/.

The role of AVIZ has been to develop evolutionary techniques adapted to the modeling of agrifood process. In 2012, the work was focussed on the development:

- of robust evolutionary methods to learn the structure of Bayesian Networks when experimental data are rare (in collaboration with Alberto Tonda, Cédric Baudrit and Nathalie Perrot of INRA/GMPA and Pierre-Henri Wuillemin od LIP6/DESIR), applied to cheese making and biscuit baking process,

- of a model of milk gel based on partial differential equations, where numerical parameters were learn by artificial evolution (in collaboration with Julie Foucquier, Sébastien Gaucel Alberto Tonda, and Nathalie Perrot of INRA/GMPA).

8.2.1.2. 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 [70], [69].

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 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 (see Section 7.1) and to evaluation methodology in information visualization [71]. Heidi Lam from Google spent 3 months at AVIZ to collaborate more closely.

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 [72] 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 not porting the Obvious Toolkit [61] in this environment to integrate all its components [64].

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- Stefan Manegold, in May, from CWI Amsterdam on Big-Data Visual Analytics

8.4.1.1. Internships

- Candemir Doger, from June 2013 to September 2013
  Subject: Interactive Visualization on Tablet-sized Devices
  Institution: Sabanci University, Istanbul, Turkey

- Qi Lan, from April 2013 to September 2013
  Subject: Multi-touch selection for data graphics
  Institution: Université Paris Sud, France

- Sai Ganesh Swaminathan, from June 2013 to October 2013
  Subject: Software Tools for Physical Visualizations
  Institution: none – student from M1 HCID / M2R Interaction

8.4.2. Visits to International Teams

- Tobias Isenberg: University of Granada, Spain, April 2013

HYBRID Project-Team

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. BRAINVOX Project

Participants: Anatole Lécuyer [contact], Jozef Legény.

BRAINVOX is a project funded by Brittany region in the frame of the CREATE call. It is a 4-year project (2009-2013) on the topic of Brain-Computer Interfaces. The objective is to reach a "mental vocabulary", more elaborated, and richer, for BCI applications, enabling to exploit various mental activities within novel hybrid schemes.

8.1.2. W3D Project

Participants: Ferran Argelaguet Sanz, Anatole Lécuyer [contact], Maud Marchal.

W3D is a project funded by Brittany region and "Images et Réseaux" competitivity cluster. It is a 3-year project (2011-2013) dedicated to the improvement of perception and navigation on 3D Web content. It involves Inria/Hybrid and LOUSTIC lab, and two SMEs in the field of multimedia and web applications : MBA Multimédia and Polymorph Studio.

8.1.3. CNPAO Project

Participant: Valérie Gouranton [contact].

CNPAO ("Conservatoire Numérique du Patrimoine Archéologique de l'Ouest") is a 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.

8.1.4. 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.

8.1.5. 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).

8.2. 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.
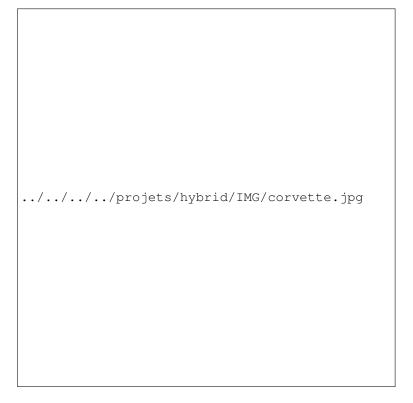
../../../../projets/hybrid/IMG/corvette.jpg

Figure 10. Exhibition of the CORVETTE project at Laval Virtual 2013.

8.2.2. ANR MANDARIN

Participants: Merwan Achibet, 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. ANR ACOUSTIC

Participant: Maud Marchal [contact].

ACOUSTIC is a 3-year ANR project (2011-2013). Partners of the project are : INSERM/University of Rennes 1, CRICM, University of Strasbourg, Inria (Hybrid and Shacra teams). The main objective of the project ACouStiC is to develop an innovative strategy based on models for helping decision-making process during surgical planning in Deep Brain Stimulation. Models rely on different levels involved in the decision-making process; namely multimodal images, information, and knowledge. The project aims at developing methods for 1) building generic and patient specific models and 2) automatically computing optimal electrodes trajectories from these models taking into account possible simulated deformations occurring during surgery. Hybrid is involved in the project with Inria team Shacra and aims at providing models of deformations of the cerebral structures and electrodes for the surgical planning. The objective is to propose a biomechanical approach to model the brain and electrode deformations and also their mutual interaction.

8.2.5. ANR OpenViBE2

Participants: Anatole Lécuyer [contact], Jozef Legény, Jonathan Mercier-Ganady.

OpenViBE2 is a 4-year ANR project (2009-2013) led by Anatole Lécuyer which ended in February 2013. Partners of the project were: Inria/Hybrid, INSERM, GIPSA-LAB, CEA, CHART, CLARTE, UBISOFT, BLACK SHEEP, and KYLOTONN GAMES. The objective of OpenViBE2 was to study the potential of Brain-Computer Interfaces (BCI) for videogames. OpenViBE2 has proposed a shift of perspective about the use of BCI. First, in OpenViBE2 we considered the possibility to merge a BCI with traditional peripherals such as joysticks, mice and other devices, all being possibly used simultaneously in a virtual environment. Therefore, BCI was not seen as a replacement but as a complement of classical HCI. Second, we aimed at monitoring brain cognitive functions and mental states of the user in order to adapt, in real-time and in an automated fashion, the interaction protocol as well as the content of the remote/virtual environment (VE).

8.2.6. 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 (section 5.2).

8.2.7. FUI Previz

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

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.

8.2.8. 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.

8.2.9. ADT OpenViBE-NT

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

The ADT OpenViBE-NT is a 2-year project (2012-2014) 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 VISIONAIR

Participants: Valérie Gouranton, Thierry Duval, Bruno Arnaldi.

- 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. 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. Francesco Grani, Postdoc at the Aalborg University, Denmark, spent a half month stay in our group in Rennes in June 2013 to work on auditory feedback in virtual environments, in the frame of EU FP7 "VISIONAIR" project.

8.5.2. Internships

- Mr. Takuya Sato, Master Student at the University of Tohoku in Sendai, Japan, spent a two-month internship in our group in Rennes in November and December 2013 to work on haptic feedback in collaborative virtual environments (Supervisors : Thierry Duval and Anatole Lécuyer).

8.5.3. Visits to International Teams

- Mr. Anthony Talvas, PhD student in the team, spent a three-month stay at University Rey Juan Carlos in Madrid, Spain, under the supervision of Pr. Miguel Otaduy. His stay was funded by Rennes Metropole.

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

7. Partnerships and Cooperations

7.1. Regional Initiatives

7.1.1. 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.

7.1.2. 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.

7.1.3. 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.

7.2. National Initiatives

7.2.1. ANR ROMMA (01/2010-12/2013)

Participants: François Faure, Jean-Claude Léon, Stefanie Hahmann.

The ANR project ROMMA has been accepted in 2009 and started in January 2010. The partners of this project are academic and industry experts in mechanical engineering, numerical simulation, geometric modeling and computer graphics. There are three academic members in the consortium: the LMT in Cachan, G-SCOP and LJK (EVASION and MGMI teams) in Grenoble. There are four industrial members: EADS, which coordinates the project, SAMTECH, DISTENE and ANTECIM. The aim of the project is to efficiently and robustly model very complex mechanical assemblies. We are working on the interactive computation of contacts between mechanical parts using GPU techniques. We will also investigate the Visualization of data with uncertainty, applied in the context of the project.

7.2.2. 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.

Dicko Ali Hamadi is a Ph.D. student within EVASION team. His works turns around the problems in SOHUSIM project. He is co-tutored Olivier Palombi in IMAGINE. A part of this work was presented at Siggraph Asia [5].

7.2.3. 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.

7.2.4. 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 [34], [33] to practical animation tools. This contract provides us with the funding of two engineers and one graphical artist during two years.

7.2.5. 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.

7.2.6. 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.

7.2.7. *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 (Chrles 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.

7.2.8. *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).

7.2.9. *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.

7.2.10. *MSTIC Adamo (03/2012 - 12/2013)*

Participant: Olivier Palombi.

7.3. European & International Initiatives

7.3.1. 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.

7.3.2. PhD grant from USM (University Sains Malaysia) (08/2012 - 07/2015)

This grand from USM funds one PhD student: Chen Kim Lim who is supervised in IMAGINE my Marie-Paule Cani. The subject of the thesis is about crowd modeling and animation.

7.3.3. Piper

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.

7.4. International Research Visitors

7.4.1. Visits of International Scientists

- Bedrich Benes: Inverse Procedural Modeling. University of Purdue (12/12/2013).
- Paul Kry: Preserving Topology and Elasticity for Embedded Deformable Models. University of Toronto (14/11/2013).
- James Gain: Better Interfaces to Procedural Modelling. University of Cape Town (31/11/2013).
- Joaquim Jorge: Adding More Than Two Dimensions to Tabletop Interfaces. Is Tony Stark home? Universidade de Lisboa (23/09/2013).
- Frédéric Cordier: Inferring 3D curves from sketches, Université de Haute Alsace (11/07/2013)
- Karan Singh: Pose centric animation: support for a primitive artform, Université de Toronto (04/07/2013)
- Julien Pettre: Velocity-based Models for Microscopic Crowd Simulation, Inria Rennes (20/06/2013)
- Ladislav Kavan: Elasticity-Inspired Deformers for Character Articulation University of Pennsylvania (06/06/2013)
- Yotam Gingold: Rescuing Computers from Hard Problems, George Mason University (30/05/2013)
- Eftychios Sifakis: Detailed Functional Simulation of Human Anatomy: Design Challenges, Performance Considerations and Emerging Applications, University of Winsconsin-Madison (23/05/2013)
- Marc Christie: Directors Lens: an intelligent assistant for virtual cinematography, IRISA/Inria Rennes (05/04/2013)
- Loic Barthe: Models for Intuitive Modeling, Université de Toulouse (IRIT) (07/03/2013).

IN-SITU Project-Team

8. Partnerships and Cooperations

8.1. 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 the size, in single-user and collaborative contexts.

8.2. 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 the project 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 will contribute 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 members from InSitu Theophanis Tsandilas (Inria) and Wendy Mackay, and Prof. Maneesh Agrawala (Berkeley), called DRAO, to create interactive graphics tools to support sketching. The kickoff meeting was held in Nov. 2012 and included interviews with designers from Toyota.

8.3. European Initiatives

8.3.1. FP7 Projects

8.3.1.1. 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.

8.3.1.2. 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.

8.3.2. Collaborations in European Programs, except FP7

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 of the two 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.

8.3.3. 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).

8.4. International Initiatives

8.4.1. Inria Associate Teams

SIRIUS, Situated Interaction Research, Associate Team between Inria, Stanford Univ. and UC San Diego. Scott Klemmer, Stanford Univ. and Jim Hollan, UC San Diego

Inria Silicon Valley allowed us to expand the scope of our work with Stanford and U.C. San Diego to include U.C. Berkeley (see below). Daniel Strazzula, a Master's student, was accepted as a Ph.D. student (Cordi grant), and Lora Oehlberg, a Ph.D. student, was accepted as a Post-Doc (Cordi Inria Silicon Valley) at InSitu. Members of InSitu went to Stanford and Berkeley for several week-long visits during the year. Volunteers from Berkeley, Stanford and U.C. San Diego were actively involved in the creation technology to support the CHI'13 conference in Paris, including the Interactive Schedule ([29]), author-sourcing [35]; the Video Previews, and the use of HydraScope to create CHIWall, for collaborative scheduling of the CHI'13 conference.

8.4.2. Inria International Partners

8.4.2.1. Declared Inria International Partners

BayScope - Architectures and Interaction Paradigms for Multi-surface Environments, NSF CNIC (Catalyzing New International Organizations) grant (2012-2013), Coordinator: Wendy Mackay. Partners: InSitu, Berkeley Institute of Design (BiD).

In the context of the 22m€ Digiscope project in France and corresponding projects at UCSD and Berkeley, we continued to work on BayScope, a strategy for creating novel applications for wall-size display and multisurface environments, by aggregating existing or new web-based applications. Prof. Bjoern Hartmann obtained support for this collaboration (NSF grant) that he secured for our collaboration. We developed HydraScope ([24]), a framework for transforming existing web applications into meta-applications that execute and synchronize multiple copies of applications in parallel, with a multi-user input layer for interacting with it, which was validated with five meta-applications.

8.4.3. Inria International Labs

CIRIC Chili (Emmanuel Pietriga & Claude Puech) – Publications on wall displays [27], mobile devices [31], [30] and focus+context navigation [28]. Thesis of C. Pindat.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

8.5.1.1. Internships

- Maria Jesus Lobo, Pontificia Universidad Católica de Chile. *Graphical interaction techniques for undo and redo*, January - March 2013, Caroline Appert & Olivier Chapuis.
- Iuliia Vlasenko, University of Alberta, Canada. *Interactive visualization of temporal data on wall-size display*, June - November 2013, Wendy Mackay.

<p align="center" style="color:red">**MANAO Team**</p>

7. Partnerships and Cooperations

7.1. Regional Initiatives

7.1.1. CTP materials (2011-2015):

U. Zaragoza, U. Girona
<u>Leader</u>: P. Barla (*MANAO*)
This collaboration between regions on both French and Spanish sides of Pyrénées aims at studying material properties through their connections between physical and image space. Although the purpose of such a study is general in scope, we also target a particular application: the acquisition of material properties from a single image of an object of unknown shape, under unknown illumination.

7.2. National Initiatives

7.2.1. ANR

7.2.1.1. ALTA (2011-2015):

MAVERICK, REVES
<u>Leader</u>: 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 offline, high-quality simulation or interactive simulations.

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

IRIT
<u>Leader</u>: 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.

7.2.1.3. SeARCH (2009-2013):

PFT3D Archéovision (CNRS), CEAlex (USR CNRS 3134), ESTIA
<u>Leader</u>: P. Reuter
Cultural Heritage (CH) artifacts often come as a set of broken fragments leading to difficult 3D puzzles and sometime impossible to solve in a real world. The project's goal is to propose solutions from on-site acquisition, 3D surface reconstruction and semi-automatic virtual reassembly, taking into account the expertise of CH scientists. This project ended officially in March 2013, and we organized a closing conference and meeting in Bordeaux. We presented the results at "ANR - Les rencontres du numérique de l'ANR" in Paris at April 17th and 18th, 2013.

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 Projects

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

partners available at http://www.v-must.net/participants
Leader: S. Pescarin (CNR - Italy)
V-MusT.net is a new 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):

Giessen University, Université Paris-Descartes, Bilkent University, Université de Leuven, Delft University, Birmingham University, Philips and NextLimit
Leader: Roland 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. Deutsche Forschungsgemeinschaft

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

Inria
Leader: Ivo Ihrke (Inria)
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.

<div align="center">**MAVERICK Project-Team**</div>

7. Partnerships and Cooperations

7.1. National Initiatives

7.1.1. ANR BLANC: ALTA

Participants: Nicolas Holzschuch, 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.

7.1.2. ANR CONTINT: Galaxy/veRTIGE

Participants: Eric Bruneton, Jean-Dominique Gascuel, Nicolas Holzschuch, Fabrice Neyret.

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.

7.1.3. ANR COSINUS: ROMMA

Participants: Georges-Pierre Bonneau, 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.

7.1.4. ANR CONTINT: MAPSTYLE

Participants: Joëlle Thollot, 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.

7.2. International Initiatives

7.2.1. 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.

7.3. International Research Visitors

7.3.1. Visits to International Teams

Fabrice Neyret is visiting WETA Digital (New-Zeland) since November 23, 2013. Eric Heitz visited WETA Digital (New-Zeland) from November 23, 2013 to December 12, 2013..

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

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR Contint: iSpace&Time

Participants: Fabrice Lamarche [contact], Julien Pettré, Marc Christie, Carl-Johan Jorgensen.

The iSpace&Time project is founded by the ANR and gathers six partners: IGN, Lamea, University of Rennes 1, LICIT (IFSTTAR), 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 will end in 2014.

8.1.2. ANR Contint: Chrome

Participants: Julien Pettré [contact], Kevin Jordao, Orianne Siret.

The Chrome project is leaded 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 far 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 a crowded scene visualisation thorugh the scope of virtual camera control (Inria Rennes and Grenoble)

8.1.3. ANR TecSan: RePLiCA

Participant: Armel Crétual [contact].

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. RePLiCA started in january 2012 and will end in July 2015.

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.

8.1.4. 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.

8.1.5. ANR Contint: ENTRACTE

Participants: Charles Pontonnier [contact], Georges Dumont, Nicolas Bideau, Franck Multon, Julien Pettré, Richard Kulpa, Ana Lucia Cruz Ruiz, Steve Tonneau.

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 in 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 entering in its third year is also developing bio-inspired posture generators for avatar navigation in encumbered environments.

8.1.6. ADT: Man-IP

Participant: Franck Multon [contact].

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.

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.

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 Projects

8.2.1.1. INFRA-FP7: VISIONAIR
Participants: Georges Dumont [contact], Charles Pontonnier.

Acronysm: VISIONAIR

Title: VISION Advanced Infrastructure for Research

Duration: 2011-2015

See also:http://www.infra-visionair.eu/

The european project VISIONAIR began in February 2011 in the infrastructure call of FP7. The 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 European partners.

Our actual Virtual Reality systems allowed us to be a key partner within this European project. 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.

Within the frame of this project, studies on VR and sports about basketball throwing (see 6.4) and VR and ergonomics about fidelity of virtual environments for ergonomic applications (see 6.2) have been leaded.

8.3. International Initiatives

8.3.1. Inria Associate Teams

8.3.1.1. FORMOSA
Title: Fostering Research on Models for Storytelling Applications

Inria principal investigator: Marc Christie

Partner contact: Pr. Tsai Yen li

International Partner (Institution - Laboratory - Researcher):

National Cheng Chi University (Taiwan) - Intelligent Media Lab - Marc Christie

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

Inria principal investigator: Julien Pettré

Partner contact: Pr. Ming Lin

International Partner (Institution - Laboratory - Researcher):

University of North Carolina at Chapel Hill (United States) - GAMMA Research Group - Julien Pettré

Duration: 2012 - 2014

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

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.

8.4. International Research Visitors

8.4.1. Internships

- Alexandra Covaci, PhD student from University Brassov (Romania) partially funded by the VISION-AIR project and Brassov University, from March to April 2013. Joint works about virtual training in sports applied to basketball free throw.

<div style="text-align:center">

MINT Project-Team

</div>

7. Partnerships and Cooperations

7.1. National Initiatives

7.1.1. InSTInCT (ANR ContInt, 2009-2013)

Participants: Géry Casiez [correspondant], Frédéric Giraud, Laurent Grisoni, Nicolas Roussel.

This project focused on the design, development and evaluation of new simple and efficient touch-based interfaces, with the goal of bringing widespread visibility to new generations of interactive 3D applications.

Partners: Inria [Mint, Iparla], Immersion, Cap Sciences

Web site: http://anr-instinct.cap-sciences.net/

7.1.2. TOUCHIT (13th FUI, 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, Univ. Lille 1, Inria, Orange Labs, CNRS, EASii IC, MENAPIC and ALPHAUI.

Competitive clusters involved: Minalogic, Cap Digital and MAUD.

7.1.3. 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 start 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)

7.2. International Research Visitors

7.2.1. Visits of International Scientists

Short visits:
- Michael Terry (University of Waterloo, Canada) in June
- Andy Cockburn (University of Canterbury, New Zealand) in July
- Karan Singh (University of Toronto, Canada) in December

7.2.2. Visits to International Teams

F. Giraud was invited researcher at the electrical and computer engineering department of the University of Toronto (Ontario, Canada). He was granted with the sabbatical program of the international relations (september 2012, july 2013).

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

7. Partnerships and Cooperations

7.1. Regional Initiatives

Potioc has strong relationships with Cap Sciences.

7.2. National Initiatives

FUI SIMCA 2000:
- duration: 2011-2013
- partners: Oktal, ENAC (Ecole Nationale de l'Aviation Civile), Toulouse-Blagnac airport, Air France, CGx AERO in SYS
- website: https://team.inria.fr/potioc/fr/collaborative-projects/simca/

PIA ville numérique "Villes transparentes":
- duration: 2012-2014
- partners: Pages Jaunes/Mappy, Vectuel/Virtuelcity

Inria ADT OpenViBE-NT:
- duration: 2012-2014
- partners: Inria teams Hybrid, Neurosys and Athena
- 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)
- Project around BCI in the evaluation process, with collaboration just starting (first meeting with all the partners in October 2013)

7.3. European Initiatives

7.3.1. *Collaborations with Major European Organizations*

Collaboration with the University of Bristol, BIG (UK):
- University of Bristol, 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:
- Bordeaux Idex funding 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:

- Program: Inria - Philips - Fraunhofer partnership
- Project title: LIfe-style Research Association, Lifestyle Management: Stress and Relaxation
- 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

7.4. International Initiatives

7.4.1. Inria International Partners

7.4.1.1. Informal International Partners

- Pr. Gerwin Schalk (Schalk Lab, Wadsworth center, NY, USA), Pr. Jonathan Brumberg (Kansas University, USA), Dr. Cuntai Guan (I2R, Singapore).
- Collaboration in the context of a project around the analysis of ElectroCorticoGraphic (ECoG) brain signals in order to decode speech related information from them.
- Multidisciplinary project involving experts from ECoG signals (Gerwin Schalk), speech neuroscience (Jonathan Brumberg) and speech recognition (Cuntai Guan)

7.5. International Research Visitors

7.5.1. Internships

This year, the Potioc team has hosted three PhD students

- Nicoletta Caramia, University de Pavia, Italy (Avril-July 2013)
- Asier Marzo, Universidad Pública de Navarra, Spain (August-November 2013)
- Flavio Bertini, University of Bologna, Italy (December 2013-February 2014)

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

7. Partnerships and Cooperations

7.1. National Initiatives

7.1.1. 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. 5.1.3 .

7.1.2. 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 assisting drawing from photographs [19] and vector drawing of stylized materials [14].

7.1.3. 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.

7.2. European Initiatives

7.2.1. FP7 Projects

7.2.1.1. 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.

For the second period (October 2012 - September 2013), the consortium continued the work on implementing and improving the different solutions for the three use-cases: fear, apathy and anxieties. Different technologies were developed:

- Kitchen, a serious game for apathy.
- Freezing of Gait, a serious game for fear.
- Fear of Falling, a serious game for fear.
- Crowd-Phobia, a virtual reality application for anxieties.
- Memory Motivation Virtual Experience (MeMoVE), virtual reality application for apathy.

In particular REVES was mainly involved in the second use-case with the MeMoVE scenario. During this second period, the IBR technique was ported to the Immersive Space on a single screen of the CAVE. Experiments with healthy adults were performed in collaboration with the hospital of Nice (CHUN). The results of these experiments will be published in IEEE VR2014.

7.2.1.2. 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.

7.3. International Initiatives

7.3.1. Inria Associate Teams

- EA CRISP http://www-sop.inria.fr/reves/crisp/

  The goal of the CRISP associate team between REVES and University of California (UC) Berkeley is to investigate novel ways to create, render and interact with images based on the study of human perception. This novel and emerging area has been the focus of ongoing collaborations between researchers from the REVES research group at Inria (Adrien Bousseau, George Drettakis) and researchers in Computer Science and Vision Science at UC Berkeley (Maneesh Agrawala, Ravi Ramamoorthi, Martin S. Banks (Human Vision Science)). All of the researchers involved in CRISP share a common interest in creating and manipulating effective synthetic imagery. To achieve this goal we focus on understanding how people perceive complex material, lighting and shape, on developing new rendering algorithms based on this understanding, and on building interactive tools that enable users to efficiently specify the kind of image they wish to create. More specifically, we explore the following research directions :

  Perception: Images are generated from the interaction of lighting, material, and geometry. We evaluate how people perceive material, lighting, and geometry in realistic images such as photographs, and non realistic images such as drawings and paintings. This knowledge of human perception is essential for developing efficient rendering algorithms and interaction tools that focus on the most important perceptual features of an image.

  Rendering: We develop rendering algorithms that generate images that are plausible with respect to the user's intent and allocate resources on the visual effects that best contribute to perception.

  Interaction: We facilitate the creation of material, lighting, and geometric effects in synthetic images by developing novel user interfaces for novice and professional users.

  Our contributions have the potential to benefit different applications of image creation such as illustration (archeology, architecture, education); entertainment (video games, movies) and design

(sketching, photograph editing). This research naturally falls in Inria's strategic objective of inter-acting with real and virtual worlds.

The CRISP collaboration has resulted in three publications this year in ACM Transactions on Graphics, two being in the SIGGRAPH proceeding. These publications explore the perception of materials in stylized images [11], the perception of distortions in image-based rendering [18] and vector drawing tools for depicting stylized materials [14]. Ongoing projects include those described in Sec. 5.3.9 and Sec. 5.1.3 .

7.3.2. Informal International Partners

7.3.2.1. France-USA
Participants: Gaurav Chaurasia, Adrien Bousseau, George Drettakis.

Beyond CRISP, we have an ongoing collaboration with Yale University (Holly Rushmeier and Julie Dorsey), on weathering, and we are continuing this collaboration on stone aging.

We also have an ongoing collaboration with Adobe Research (Sylvain Paris) and MIT (Fredo Durand) on parallel image-proccessing languages and global illumination (Fredo Durand).

7.3.2.2. France-Germany
Participant: George Drettakis.

We collaborate with the Max-Planck-Institut, Germany, where P. Vangorp (previously at REVES) is now a PostDoc. We collaborate on perception techniques for rendering see publication [18].

7.3.2.3. 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. 5.3.10).

7.3.2.4. France-Greece
Participant: George Drettakis.

As mentioned in Sec. 5.2.3 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).

7.4. International Research Visitors

7.4.1. Visits of International Scientists

7.4.1.1. Visitors
We hosted several researchers this year:
- George Koulieris (Tech. Univ. of Crete), in February.
- Eugene Fiume (Univ. of Toronto), in June.
- Peter Vangorp (MPI Informatik), in June.
- Wendy McKay, Theophanis Tsandilas and Lora Oehlberg (Insitu) in July.
- Floraine Berthouzoz (Berkeley), in April.
- Marty Banks (Berkeley), in September.
- Belen Masia (Zaragoza), in October.
- Pierre-Yves Laffont (Brown), in November.
- Holly Rushmeier (Yale), in November.
- Erik Reinhard (Technicolor), in November.

7.4.1.2. Internships

Participant: Joan Sol Roo.

Subject: Geometry Upsampling for Real-Time Rendering of Refractive Objects

Date: from May 2013 until Aug 2013

Institution: National University of the Center of the Buenos Aires Province (Argentina)

Participant: Arunim Samat.

Subject: Approximate Reflection Computation

Date: from Jul 2013 until Aug 2013

Institution: IIT Delhi (India)

Participant: Kritarth Anand.

Subject: Free-Viewpoint Image Based Rendering from Images With Dynamic Objects

Date: from May 2013 until Jul 2013

Institution: IIT Delhi (India)

TITANE Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. Grand emprunt

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

8.2. European Initiatives

8.2.1. FP7 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

Dmitry Anisimov, from University of Lugano, visited us in September-October. We also had short visits of Marcel Campen and Henrik Zimmer from RWTH Aachen.

8.3.1.1. Internships

Anmol Garg from IIT Bombay: Anisotropic metrics for shape approximation.

8.3.2. Visits to International Teams

David Bommes visited the Applied Geometry Lab at California Institute of Technology (Caltech) from May to June.

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

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

Participants: Laurence Danlos, Benoît Sagot, Chloé Braud, Marie-Hélène Candito, Benoît Crabbé, Pascal Denis, Charlotte Roze, Pierre Magistry, Djamé Seddah, Juliette Thuilier, 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 (see 6.5 for example). In 2013, two post-docs funded by Labex EFL have worked at Alpage (Yves Scherrer) or jointly at Alpage and LLF (Margaret Grant).

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 Benoît 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.

8.2. National Initiatives

8.2.1. ANR

8.2.1.1. ANR project ASFALDA (2012 – 2015)

Participants: Marie-Hélène Candito [principal investigator], Marianne Djemaa, Benoît Sagot, Éric Ville-monte de La Clergerie, Laurence Danlos.

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 [47] 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.

8.2.1.2. ANR project EDyLex (2010 – 2013)

Participants: Benoît Sagot [principal investigator], Rosa Stern, Damien Nouvel, Virginie Mouilleron, Marion Baranes, Sarah Beniamine, Laurence Danlos.

EDYLEX was an ANR project (STIC/CONTINT) headed by Benoît Sagot, which came to an end on June 30, 2013. The focus of the project was the dynamic acquisition of new entries in existing lexical resources that are used in syntactic and semantic parsing systems: how to detect and qualify an unknown word or a new named entity in a text? How to associate it with phonetic, morphosyntactic, syntactic, semantic properties and information? Various complementary techniques will be explored and crossed (probabilistic and symbolic, corpus-based and rule-based...). Their application to the contents produced by the AFP news agency (Agence France-Presse) constitutes a context that is representative for the problems of incompleteness and lexical creativity: indexing, creation and maintenance of ontologies (location and person names, topics), both necessary for handling and organizing a massive information flow (over 4,000 news wires per day).

The participants of the project, besides Alpage, were the LIF (Université de Méditerranée), the LIMSI (CNRS team), two small companies, Syllabs and Vecsys Research, and the AFP.

In 2013, several important developments have been achieved:

- Finalization of a beta version of the first non-alpha release of the WOLF (Free French WordNet)
- Improvement or development of modules for automatic detection, classification and morphological analysis of unknown words (neologisms, new named entities) in French corpora and integration within a full-featured processing pipeline (see 6.2);
- Collaboration with Vocapia for interfacing the results of this pipeline with Vocapia's language models, in order to improve speech recognition systems used at AFP;
- Use of an EDyLex-specific version of the NewsProcess architecture, previously developed at Alpage, for meeting the expectations of the EDyLex project in terms of lexicon extension from dynamic corpora, here AFP news wires.

8.2.1.3. ANR project Polymnie (2012-2015)

Participants: Laurence Danlos, Éric Villemonte de La Clergerie.

Polymnie is an ANR research project headed by Sylvain Podogolla (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. 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 define two languages: an abstract language for the abstract forms, and an object language for the surface forms.

The role of Alpage in this project is to develop sentential or discursive grammars written in TAG so as to study their conversion in ACG. First results achieved in 2013 are described in 6.14 .

8.2.2. Other national initiatives

8.2.2.1. "Investissements d'Avenir" project PACTE (2012 – 2014)

Participants: Benoît Sagot, Kata Gábor.

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 2013 within PACTE are described in 6.7

8.2.3. 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.

8.3. European Initiatives

8.3.1. Collaborations in European Programs, except FP7

Program: COST

Project acronym: PARSEME

Project title: Parsing and multi-word expressions. Towards linguistic precision and computational efficiency in natural language processing

Duration: 03/2013- 03/2017

Coordinator: Agata SAVARY

Other partners: 24 participating countries

Abstract: This Action aims at increasing and enhancing the support of the European multilingual heritage from Information and Communication Technologies (ICT). This general aim is addressed through improving linguistic representativeness, precision and computational efficiency of Natural Language Processing (NLP) applications. The Action focuses on the major bottleneck of these applications: Multi-Word Expressions (MWEs), i.e. sequences of words with unpredictable properties such as "to count somebody in" or "to take a haircut." A breakthrough in their modelling and processing can only result from a coordinated effort of multidisciplinary experts in different languages. COST is the most adequate framework answering this need. Fourteen European languages will be addressed from a cross-theoretical and cross-methodological perspective, necessary for coping with current fragmentation issues. Expected deliverables include enhanced language resources and tools, as well as recommendations of best practices for cutting-edge MWE-aware language models. The Action will lead to a better understanding of the nature of MWEs. It will establish a long-lasting collaboration within a multilingual network of MWE specialists. It will pave the way towards competitive next generation text processing tools which will pay greater attention to language phenomena.

8.4. International Initiatives

8.4.1. Inria International Partners

8.4.1.1. Informal International Partners

Alpage has active collaborations with several international teams. The most active in 2013 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 and Nizar Habash)
- collaboration with the Weizmann Institute of Science (Israel) on parsing morphologically rich languages (Djamé Seddah, with Reut Tsarfaty)
- collaboration with the Indiana University (United States) on parsing morphologically rich languages (Djamé Seddah, with Sandra Kubler)
- collaboration with the Uppsala University (Sweden) on statistical parsing (Marie-Hélène Candito and sDjamé Seddah, with Joakim Nivre)

PANAMA Project-Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. OSEO: QUAERO CTC and Corpus Projects
Participants: Frédéric Bimbot, Laurence Catanese, Gabriel Sargent.

Main academic partners : IRCAM, IRIT, LIMSI, Telecom ParisTech

Duration: 2008 -december 2013

Research axis: 3.3

Description: Quaero is a European research and development program with the goal of developing multimedia and multilingual indexing and management tools for professional and general public applications (such as search engines).

Partners: Other companies involved in the consortium are: France Télécom, Exalead, Bertin Technologies, Jouve, Grass Valley GmbH, Vecsys, LTU Technologies, Siemens A.G. and Synapse Développement. Many public research institutes are also involved, including LIMSI-CNRS, Inria, IRCAM, RWTH Aachen, University of Karlsruhe, IRIT, Clips/Imag, Telecom ParisTech, INRA, as well as other public organisations such as INA, BNF, LIPN and DGA.

Funding: This program is supported by OSEO.

Coordinator: The consortium is led by Technicolor.

Contribution of PANAMA:

PANAMA is involved in two technological domains : audio processing and music information retrieval (WP6). The research activities (CTC project) are focused on improving audio and music analysis, segmentation and description algorithms in terms of efficiency, robustness and scalability. Some effort is also dedicated on corpus design, collection and annotation (Corpus Project).

PANAMA also takes part to research and corpus activities in multimodal processing (WP10), in close collaboration with the TEXMEX project-team.

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

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. A beta version was internally released and tested from July 2013. The first public release is planned for January 2014.

8.2. European Initiatives

8.2.1. *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.

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/

8.2.2. *Eureka-Eurostars: i3DMusic*
Participant: Laurent Simon.

Duration: October 2010 - September 2013

Research axis: 3.2.2

Partners: Audionamix (FR), Sonic Emotion (CH), École Polytechnique Fédérale de Lausanne (CH), PANAMA (FR)

Program: Eureka - Eurostars

Project acronym: i3DMusic

Project title: Real-time Interative 3D Rendering of Musical Recordings

Abstract:The i3DMusic project (Real-time Interative 3D Rendering of Musical Recordings) has been setup with the SMEs Audionamix and Sonic Emotion and the academic partner EPFL to provide a system enabling real-time interactive respatialization of mono or stereo music content. This will be achieved through the combination of source separation and 3D audio rendering techniques. Metiss 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 Research Visitors

8.3.1. Visits of International Scientists

- Mike Davies, from May until July, Professor of Signal and Image Processing, University of Edinburgh
- Anders Hansen, from April until April, Research Fellow Royal Society, Center for Mathematical Sciences, University of Cambridge
- Dan Stowell, from March until March, Postdoctoral research assistant, Center for Digital Music, Queen Mary University of London
- Bob Sturm, from March until March, Assistant Professor, Aalborg University Copenhagen
- Boris Mailhé, from March until March, Postdoctoral research assistant, Center for Digital Music, Queen Mary University of London
- Simon Foucart, from March until March, Assistant Professor, Drexel University

8.3.2. Internships

- Anwaya Aras, from July until December, Third year undergraduate, Department of Computer Science BITS-Pilani, India.
- Emmanuel Deruty, from April to September, PhD Preparatory year, Musicology Department, Catholic University Louvain, Belgium

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

8. Partnerships and Cooperations

8.1. National initiatives

8.1.1. Equipex ORTOLANG

Project acronym: ORTOLANG [3]

Project title: Open Resources and TOols for LANGuage

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

Coordinator: 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 our language bringing us up to the best international level;
- facilitate the use and transfer of resources and tools set up within public laboratories towards industrial partners, in particular towards SME which cannot often 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, such as text-speech alignment, speech visualization, syntactic parsing and annotation, ...

8.1.2. ANR ARTIS

Project acronym: ARTIS

Project title: Inversion articulatoire de la parole audiovisuelle pour la parole augmentée

Duration: January 2009 - June 2013

Coordinator: Yves Laprie (LORIA)

Other partners: Gipsa-Lab, LTCI, IRIT

Abstract: The main objective of ARTIS is to recover the temporal evolution of the vocal tract shape from the acoustic signal.

This contract started in January 2009 in collaboration with LTCI (Paris), Gipsa-Lab (Grenoble) and IRIT (Toulouse). Its main purpose is the acoustic-to-articulatory inversion of speech signals. Unlike the European project ASPI the approach followed in our group will focus on the use of standard spectra input data, i.e. cepstral vectors. The objective of the project is to develop a demonstrator enabling inversion of speech signals in the domain of second language learning.

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

This year the work has focused on the development of the inversion from cepstral data as input. We particularly worked on the comparison of cepstral vectors calculated on natural speech and those obtained via the articulatory to acoustic mapping. Bilinear frequency warping was combined with affine adaptation of cepstral coefficients. These two adaptation strategies enable a very good recovery of vocal tract shapes from natural speech. The second topic studied is the access to the codebook. Two pruning strategies, a simple one using the spectral peak corresponding to F2 and a more elaborated one exploiting lax dynamic programming applied on spectral peaks enable a very efficient access to the articulatory codebook used for inversion.

This year, the project focused on the articulatory synthesis in order to generate better sequences of consonant/vowel/consonant by developing time patterns coordinating source and vocal tract dynamics.

8.1.3. ANR ViSAC

Project acronym: VISAC

Project title: Acoustic-Visual Speech Synthesis by Bimodal Unit Concatenation

Duration: January 2009 - June 2013

Coordinator: Slim Ouni

Other partners: Magrit EPI (Inria)

Abstract: The main VISAC objective is to realize the bimodal (audio plus visual) synthesis of speech.

This contract started in January 2009 in collaboration with Magrit Inria team. The purpose of this project is to develop synthesis techniques where speech is considered as a bimodal signal with its acoustic and visual components that are considered simultaneously. This is done by concatenating bimodal diphone units, that is, units that comprise both acoustic and visual information. The latter is acquired using a stereovision technique. The proposed method addresses the problems of asynchrony and incoherence inherent in classic approaches to audiovisual synthesis. Unit selection is based on classic target and join costs from acoustic-only synthesis, which are augmented with a visual join cost. This final year of the project, we have performed an extensive evaluation of the synthesis system using perceptual and subjective evaluations. The overall outcome of the evaluation indicates that the proposed bimodal acoustic-visual synthesis technique provides intelligible speech in both acoustic and visual channels [22].

8.1.4. ANR ORFEO

Project acronym: ORFEO [4]

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 ORFEO objective is the constitution of a Corpus for the Study of Contemporary French.

In this project, we have provided 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 alignment.

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

8.1.5. 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 will be recorded by German speakers learning French, recoding 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.

8.1.6. ANR ContNomina

Project acronym: ContNomina

Project title: Exploitation of context for proper names recognition in the 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 will address:

- 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.

8.1.7. FUI RAPSODIE

Project acronym: RAPSODIE [5]

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

In this project, the parole team 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.

8.1.8. ADT FASST

The Action de Développement Technologique Inria (ADT) FASST (2012–2014) is conducted by PAROLE in collaboration with the teams PANAMA and TEXMEX of Inria Rennes. It aims to reimplemented into efficient C++ code the Flexible Audio Source Separation Toolbox (FASST) originally developed in Matlab by A. Ozerov, E. Vincent and F. Bimbot in the METISS team of Inria Rennes. This will enable the application of FASST on larger data sets, and its use by a larger audience. The new C++ version will be released early 2014. The second year of the project will be devoted to the integration of FASST with speech recognition software in order to perform noise robust speech recognition.

8.1.9. ADT VisArtico

The technological Development Action (ADT) Inria Visartico just started this November (11/2013 - 10/2015). The purpose of this project is to develop and improve VisArtico, an articulatory vizualisation software. In addition to improve the basic functionalities, several articulatory analysis and processing will be integrated. We will also work on the integration of multimodal data.

8.2. European initiatives

8.2.1. Collaborations in European Programs, except FP7

8.2.1.1. Interreg Allegro

Program: Interreg
Project acronym: Allegro
Project title: Adaptive Language LEarning technology for the Greater Region
Duration: 01/01/2009 to 31/12/2012
Coordinator: Saarland University
Other partners: Supélec Metz and DFK Kaiserslautern
Abstract: Allegro is an Interreg project (in cooperation with the Department of COmputational LInguistics and Phonetics of the Saarland University and Supélec Metz) which started in April 2010. It is intended to develop software for foreign language learning. Our contribution consists of developing tools to help learners to master the prosody of a foreign language, i.e. the prosody of English by French learners, and then prosody of French by German learners. We started by recording (with the project Intonale) and segmenting of a corpus made up of English sentences uttered by French speakers and we analyzed specific problems encountered by French speakers when speaking English. The corrections were implemented in Jsnoori. The final review was held on May 15 in Saarbrücken.

8.2.1.2. Eureka - Eurostars i3DMusic

Besides the above contracts of which PAROLE is officially part, E. Vincent is 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: 01/10/2010 to 31/03/2014
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 will be 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. Declared Inria 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.

8.4. International research visitors

8.4.1. Visits of international scientists

- Mouhcin, Chami, INPT, Maroco, June,
- Karima Meftouh, Annaba University, until October,
- Amar Djeradi, USTHB, July, Algeria

<p align="center">**SÉMAGRAMME 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 started from 2013 January 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.

This year, the first transcriptions of pathological interviews are analyses. The management chain was implemented for anonymization. Moreover, we use Distagger (Matthieu Constant and Anne Dister) to tag disfluences in the interviews wich give interesting results. We also use Jsafran (Christophe Cerisara) and FRMG (Eric de la Clergerie) in order to have dependencies.

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 SLAMproject was supported by the MSH–Lorraine, USR 3261, and won a one year PEPS project HuMaIn (mission pour l'interdisciplinarité du CNRS). The CNRS part of the budget help to organize a workshop which gather linguists, psychologists and computer scientists in december : http://webloria.loria.fr/~amblard/SLAM/index.php?n=Main.In-coh%E9rence13

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[4] 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 define two languages: an abstract language for the abstract forms, and an object language for the surface forms.

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

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 it 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.

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 formulation have been proposed. In particular, a formulation based on continuation semantics allow them to be expressed quite naturally in the ACG architecture. Dynamic effects of discourse, in particular those related to anaphora resultion or rhetoretical 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 [5].

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.

POLYMNIEfocuses on studying and implementing the modeling 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 functionnalities 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*

7.3.1.1. Internships

- Ahmed Abbache (Université Hassiba Benbouali, Algeria) did a 5 month internship in the Sémagramme team. He has been working on a formalization of the neokhalilian theory using ACGs.

7.3.2. *Visits to International Teams*

- Philippe de Groote, Aleksandre Maskharashvili, and Sylvain Pogodalla visited Pr. Makoto Kanazawa at NII, Tokyo, Japan, Oct. 21-25 2013.
- Philippe de Groote gave an invited talk at the Center for Logic and Philosophy of Science of the Tilburg University, on the occasion of Reinhard Muskens' 60th birthday.

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

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

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR

8.1.1.1. ID4CS project

Participant: Yves Papegay.

The ID4CS project, supported by French National Research Agency (ANR) through COSINUS program has the ambition to propose a modeling and simulation environment for designing complex systems such as aircrafts, based on a self-adaptive, distributed and open multi-agent architecture distributing the optimization process inside the agents.

As a partner of the project we are mainly involved in the definition of the use case on preliminary aircraft design, in collaboration with Airbus (6.2.1), in development of uncertainty analysis algorithms, and in automatic generation of agents based on models.

8.1.1.2. COGIRO project

Participants: Julien Alexandre Dit Sandretto, David Daney [correspondant], Jean-Pierre Merlet.

We are collaborating with LIRMM, LASMEA and TECNALIA for the development of large scale wire-driven parallel robots [1]. We are especially involved in the calibration of a prototype developed by LIRMM and TECNALIA, see section 6.1.1.2 .

8.2. European Initiatives

8.2.1. FP7 Projects

8.2.1.1. 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, ACCIONA, VICINAY

Inria contact: Jean-Pierre Merlet

Abstract: The CABLEBOT project [2] 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

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[1] http://www.lirmm.fr/cogiro/
[2] http://www.cablebot.eu/

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 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.

8.2.1.2. 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), INGEMA (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.

8.3. International Initiatives

8.3.1. Informal International Partners

Our collaboration are described in the figure 1 .

../../../../projets/coprin/IMG/collab.jpg

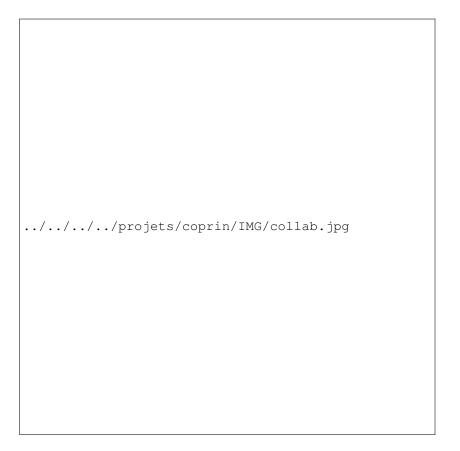*Figure 1. COPRIN collaboration. JP:joint project, JS: joint stay, Jphd: joint PhD students*

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

The Yvelines General Council has designated the winners of its second call for projects "Intelligent Car - City of the Future". Following a selection made by a jury, the winners were four consortia. IMARA was involved in two of the four winning projects: TRANS'YVES, coordinated by ADM Concept, and Link & Go coordinated by AKKA Technologies (with Controlsys, Inria and DBT) project. The Yvelines department wanted to promote the emergence of projects on sustainable development and automated driving with electric vehicles. On four projects selected, two of them are just referring to a concept of automatic parking, the vehicle comes to park all alone with no one on board. The call for proposals with a budget of 3 million Euros has been used to finance demonstrators that were exhibited at the Geneva Motor Show in 2013 as part of the Green Pavilion.

Link & Go was coordinated has been awarded the prestigious *2013 Grand National Engineering Award*.

8.2. National Initiatives

8.2.1. ANR

8.2.1.1. ABV

Title: Automatisation basse vitesse

Instrument: ANR

Duration: January 2009 - April 2013

Coordinator: IFFSTAR

Others partners: Continental, IBISC, IEF, Induct, Inria, LAMIH, Vismetris, UHA-MIPS, Veolia Environnement

See also: http://www.projet-abv.fr/

Abstract: This ambitious project aims at demonstrating automated driving at low speed in urban areas and on peri-urban roads. The aim is to demonstrate the technical feasibility of automating driving at low speeds, typically in situations of congestion or heavy traffic.

8.2.1.2. SCORE@F

Title: Système COopératif Routier Expérimental Français

Instrument: FUI

Duration: 2010-2013

Coordinator: Renault-REGIENOV

Others partners: UTAC, LAB, EURECOM, IFSTTAR, Inria, Télécom Ecole de Management

See also: http://www.scoref.fr/

Abstract: SCORE@F (French Experimental Road Cooperative System) is a collaborative research project, experimental road cooperative systems as part of a European framework for experimentation. The SCORE@F is intended to prepare the deployment of "road cooperative systems" on motorways and other road environments through the implementation of operational tests in an open environment. Road cooperative systems are based on wireless local communication between vehicles and road infrastructure (V2I - I2V) and between vehicles (V2V). The deployment of cooperative systems will be strongly influenced by road Framework Directive of the European Commission ITS.

8.2.1.3. COCOVEA

Title: Coopération Conducteur-Véhicule Automatisé

Instrument: ANR

Duration: 01/11/2013 – 30/04/2017

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.

8.2.2. Competitivity Clusters

IMARA 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. IMARA is also the main Inria contributor in the VeDeCoM institute (IEED). VeDeCoM is financing a PhD thesis of Pierre Merdrignac; his scientific research topic is on the fusion of perception and communication for pedestrian assistance, monitoring and tracking.

8.3. European Initiatives

8.3.1. FP7 Projects

8.3.1.1. DRIVE C2X

Type: COOPERATION

Defi: Driving implementation of car 2 x communication technology

Instrument: Integrated Project

Objectif: ICT for Mobility of the Future

Duration: January 2011 - December 2013

Coordinator: DAIMLER AG (Germany)

Partner: 31 partners from automotive industry, electronic and supplier industry, software development, traffic engineering, research institutes and road operators.

Inria contact: Thierry Ernst

Abstract: With 31 partners, 15 support partners and 18.8 million Euro budget, DRIVE C2X will lay the foundation for rolling out cooperative systems in Europe. Hence, lead to a safer, more economical and more ecological driving.

8.3.1.2. ITSSV6

Type: COOPERATION

Defi: IPV6 ITS Station Stack for Cooperative Systems FOTs

Instrument: Specific Targeted Research Project

Objectif: ICT for Mobility of the Future

Duration: February 2011 - January 2014

Coordinator: Inria (France)

Partner: Universidad de Murcia (Spain), Institut Télécom (France), Mines ParisTech (france), Inria (France), Lesswire (Germany), SZTAKI (Hungary), IPTE (Austria), BlueTechnix (Austria).

Inria contact: Thierry Ernst

Abstract: ITSSv6 builds on the base of existing standards from ETSI, ISO and IETF and IPv6 software available from CVIS and GeoNet projects. Its main objective is to deliver an optimized IPv6.

See also: http://itssv6.inria.fr/

8.3.1.3. SANDRA

Type: COOPERATION

Instrument: Integrated Project

Objectif: NC

Duration: October 2009 - September 2013

Coordinator: SELEX ES SPA (Italy)

Partner: Acreo (Sweden), Airtel ATN (Ireland), Alenia Aermacchi (Italy), Altys (France), Bradford University (United Kingdom), Cyner (Netherlands), Dassault Aviation (France), Deutsche Flugsicherung GmbH (Germany), Deutsches Zentrum fur Luft- und Raumfahrt e.V. (Germany), EADS Innovation Works (France), Gatehouse (Denmark), IMST GmbH (Germany), Inria (France), Intecs (Italy), LionixBV (Netherlands), Monitorsoft (Russian Federation), Nationaal Lucht- en Ruimtevaartlaboratorium - NLR (Netherlands), Paris Lodron Universitat (Salzburg), RadioLabs (Italy), SITA (Switzerland), Slot Consulting (Hungary), Thales Aerospace (United Kingdom), Thales Alenia Space (France), Thales Avionics(France), Thales TRT-UK (United Kingdom), TriaGnoSys GmbH (Germany), University of Pisa (Italy), University of Twente (Netherlands).

Inria contact: Thierry Ernst

Abstract: The SANDRA concept consists of the integration of complex and disparate communication media into a lean and coherent architecture for aeronautical networking.

See also: http://sandra.aero/2013/

8.3.1.4. CATS

Title: City Alternative Transport System

Type: COOPERATION (TRANSPORTS)

Instrument: Specific Targeted Research Project (STREP)

Objectif: NC

Duration: January 2010 - December 2013

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

8.3.1.5. FURBOT

Title:Architectures of Light Duty Vehicles for urban freight transport

Type: COOPERATION (TRANSPORTS)

Instrument: Specific Targeted Research Project (STREP)

Objectif: NC

Duration: November 2011 - October 2014

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.

8.3.1.6. CityMobil2

Type: COOPERATION (TRANSPORTS)

Instrument: Large-scale integrating project

Objectif: NC

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/

8.3.1.7. DESERVE

Title: DEvelopment platform for Safe and Efficient dRiVE

Objectif: NC

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-ia.eu/project/index/view/?project=38

8.3.1.8. Mobility2.0

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

Type: COOPERATION (TRANSPORTS)

Objectif: NC

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/

8.3.2. Collaborations with Major European Organizations

- IMARA 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.
- IMARA is member of the Working Group on Automation. 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.

8.4. International Initiatives

8.4.1. Inria International Partners

8.4.1.1. Declared Inria International Partners

IMARA has developed a wide collaboration network with international partners from both academia and industry.

- **NAIST :** IMARA has signed a MoU with the Nara Institute of Science and Technology (NAIST). The research themes of cooperation are in the area of *advanced intelligent transportation systems (ITS)*.
- **YAMAHA :** IMARA has signed a MoU with YAMAHA to conduct joint research on the *New Generation of AGV projects* (Autonomous Ground Vehicles).
- **AXTER Technologies :** IMARA has signed a MoU with AXTER Technologies for the cooperation on the *autonomous navigation in indoor environments for automated industrial vehicles*.
- **Simon Bolìvar University :** IMARA and University Simon Bolivar (Venezuela) have started a privileged cooperation thanks to the ECOS Nord Program. The collaboration will start effectively in 2014. Researchers and PhD from both institutes will visit each other and conduct common research on the benefits of ITS solutions for an enhanced mobility in congested cities. IMARA has already hosted in the past 3 engineers as trainees working in the field of intelligent control.

8.4.1.2. Informal International Partners

CITRIS : IMARA has been part of Inria's teams involved in the cooperation with the CITRIS (Center for Information Technology Research in the Interest of Society, California), as a key actor of the joint research between Inria and the University of Berkeley around the smart city.

8.4.2. Participation In other International Programs

ECOS Nord : Since December 4th (2013), Inria and the University of Simon Bolivar (Venezuela) are partners of a project financed by the ECOS Nord Program (ECOS Nord No. V14M01). This project is co-financed by the Ministries of Foreign Affairs of Venezuela and France.

8.5. International Research Visitors

8.5.1. 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 2013. During this period he made joint research on intelligent adaptive control applied to vehicle manoeuvring (automated parking and assisted overtaking).

- *Satoshi MATSUURA* : He has been a Visiting Professor from NAIST (Nara Institute of Science and Technology, Japan). Until March 2013, he has been working in the area of telecommunications applied to ITS. He was also the initiator of the signed MoU between NAIST and IMARA.

8.5.1.1. Internships

- M. Kenta Mori : he was an intern from NAIST, working in the field of telecommunications applied to ITS applications, under the supervision of Mrs. Oyunchimeg Shagdar.

- M. José Javier Anaya Catala : he was an intern from the Technical University of Madrid (UPM, Spain). He developed a vehicle-to-pedestrian communication protocole using WiFi devices.

- Miss Oriana Rojas-Michelena : she was an intern from Simón Bolìvar University and she developed an on-board vehicle controller dedicated to the management of the approach of traffic lights.

- M. Ray Lattarulo Arias : he was an intern from Simón Bolìvar University (Venezuela). He developed a fuzzy controller to follow Bezier-like trajectories executed by a cybercar.

- Ernest Creiser : he was an intern from ENSAE ParisTech / Univ. Paris Dauphine. He worked on the development of man-machine interfaces dedicated to the EU-FURBOT project.

- Mohamed Maddouri : he was intern from Télécom SudParis and he developed a tool dedicated to the calibration of a laser-camera set used in a moving vehicle.

<p style="text-align:center; color:red">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. Major European Organizations with which you have followed Collaborations

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.

7.2.2. Visits of International Scientists

Mario Garzon, phD at Universidade de Madrid was in our team from february 2013 to april 2013.

7.2.3. Inria International Labs

7.2.3.1. "iCeiRA"
[Jan 2013- Jan 2018] The e-Motion project-team has won (in cooperation with the CNRS laboratories LAAS and ISIR) a major partnership with Taiwan in the scope of the call "International Excellence Laboratories" (I-RiCE program) launched by the National Science Council (NSC) of Taiwan. The laboratory is hosted by the National University of Taiwan, it is supported for 5 years, and the collaborative research is focusing on Human centered Robotics.

7.2.4. Participation In other International Programs

7.2.4.1. "ict-PAMM"

[September 2011 - September 2013]
ict-PAMM is an ICT-ASIA project accepted in 2011 for 2 years. It is funded by the French Ministery of Foreign Affair and Inria. This project aims at conducting common research activities in the areas of robotic mobile service and robotic assistance of human in different contexts of human life. French partners are Inria-emotion from Grenoble, Inria-IMARA from Rocquencourt and Institut Blaise Pascal from Clermont-Ferrand. Asian Partners are IRA-Lab from Taiwan, ISRC-SKKU from Suwon in Korea, ITS-Lab from Kumamoto in Japan and Mica Institute from Hanoi in Vietnam.

7.2.4.2. "Predimap"

[September 2011 - September 2013]
Predimap is an ICT-ASIA project accepted in 2011 for 2 years. It is funded by the French Ministery of Foreign Affair and Inria. This project aims at conducting common research activities in the area of perception in road environment. The main objective is the simultaneous use of local perception and Geographical Information Systems (GIS) in order to reach a global improvement in understanding road environment. Thus the research topics included in the project are: local perception, precise localization, map-matching and understanding of the traffic scenes. French partners are Inria-emotion from Grenoble, Heudiasyc team from CNRS/UTC, and Matis team from IGN. Foreign partners are Peking University and Shanghai Jiao Tong University in China, CSIS lab from Tokyo University in Japan and AIT Geoinformatics Center in Thailand.

7.3. International Research Visitors

7.3.1. Visits to International Teams

- In relation with the Bambi project, Emmanuel Mazer visited Dr. Vickash Masinghka at the Mit Computer science department to establish an academic collaboration around probabilistic computation (Bambi Project). On the same subject but more related to the industrial side, Emmanuel Mazer visited the research center of AMAZON in Berlin and the Microsoft research center in Cambridge to evaluate future collaboration.
- Chiara Troiani spent 6 month at the University of Zurich, in the Robotics and Perception Group (Switzerland).
- Gregoire Vignon spent 2 month at the iCeiRA lab (Taiwan).

FLOWERS Project-Team

8. Partnerships and Cooperations

8.1. Scientific Collaborations (outside consortium projects)

8.1.1. *Collaboration and technological transfer with Laboratoire de Physiologie de la Perception et de l'Action (LPPA)*

A collaboration is in progress with Jacques Droulez and Steve Nguyen from Laboratoire de Physiologie de la Perception et de l'Action (LPPA), Paris. Poppy represents for them a humanoid platform very interesting because it is relatively flexible and versatile, with more similar proportions to that of humans, which facilitate comparison with the experimental results obtained in humans. The laboratory will evaluate this platform probabilistic methods of control of balance and locomotion.

In the short term the first experimental project with Poppy will test methods of management support, in the case of restoration of balance, in the case of walking to correct or prepare a change of direction. This project will be initiated in the framework of a long internship of master 2 that starts in January. In the future, we would also like to evaluate motor controllers compliant, and learning algorithms. This collaboration involves Matthieu Lapeyre and Pierre-Yves Oudeyer.

8.1.2. *Collaborations with Gipsa-Lab, Laboratoire de Psychologie et de Neurocognition (LPNC) and Laboratoire de Physiologie de la Perception et de l'Action (LPPA)*

Clément Moulin-Frier is continuing his collaborative work with people he worked with during his PhD thesis at GIPSA-Lab, LPNC and LPPA. See the section entitled "COSMO (Communicating about Objects using Sensory-Motor Operations): a Bayesian modeling framework for studying speech communication and the emergence of phonological systems" for more information. He is also continuing his collaborative work with people he worked with during his post-doc in 2011 at LPPA. See the section entitled "Probabilistic optimal control: a quasimetric approach" for more information.

8.1.3. *Collaboration with the Computer Science Department of the University of Zaragoza*

A collaboration is in progress with Iñaki Iturrate and Luis Montesano at Zaragoza University, Spain. We aim a develliping a calibration free Brain Computer Interaction system through the use and extension of learning algorithm developped in the team [43], [45], [44]. We focus our effort on error related potentials that occur in the brain while observing or performing a task. They supposedly play a role in human learning as implicit feedback signals that evaluate the correctness or unexpectedness of received stimuli. Our goal is to automatically and reliably detect and classify these signals to provide feedback to artificial systems (e.g. a robot) that learn how to interact and adapt themselves to the user intentions and preferences.

8.2. Regional Initiatives

8.2.1. *FUI ROBOT POPULI*

This project leaded by Awabot (http://www.awabot.com) funded from 2012 to 2014 aims to investigate, prototype, and test new applications and interactions between the robot and the user to move from niche markets to the general public. This project builds on the theories of Geoffrey Moore (Crossing the Chasm), putting the user at the center of the product design and following the vision of a playful robot and connected to the cloud, where the robot is an interface for advanced interactive entertainment of the future. It brings together partners with complementary expertise to develop and / or adapt and integrate technological bricks missing to fulfill such a vision. Our goal in this project is to develop a robust and low cost navigation system based on RGB-D cameras.

Partners : ARTEFACTS STUDIO, LIRIS, ENSTA ParisTech, GAMAGORA (Université Lyon 2)

8.2.2. PSPC ROMEO 2

This project leaded by Aldebaran Robotics (http://www.aldebaran-robotics.com/) funded from 2012 to 2016 by OSEO aims at developing a humanoid robot for assisting people. The contribution of FLOWERS and ENSTA ParisTech are in the area of human-robot interaction, learning by demonstration, perception and semantic mapping.

Partners : ALL4TEC, Inria, CNRS, VOXLER, SPIROPS, ISIR, UVSQ, CEA LIST, ENSTA ParisTech, STRATE COLLEGE, TELECOM PARISTECH, ASSOCIATION APPROCHE

Web site: http://www.aldebaran-robotics.com/fr/Projets/romeo.html

8.3. National Initiatives

8.3.1. ANR MACSi

An ANR Project (MACSi, ANR Blanc 0216 02), coordinated by ISIR/Univesity Paris VI (Olivier Sigaud), on developmental robotics (motor learning, visual learning, and exploration algorithms on the ICub robot) continued. The MACSi project is a developmental robotics project based on the iCub humanoid robot and the Urbi open source software platform. It is funded an as ANR Blanc project from 2010 to 2013. The project addresses four fundamental challenges, led by four partners:

- How can a robot learn efficient perceptual representations of its body and of external objects given initially only low-level perceptual capabilities? Challenge leader : Inria-ENSTA-ParisTech FLOWERS (Paris).
- How can a robot learn motor representations and use them to build basic affordant reaching and manipulation skills? Challenge leader : ISIR-UPMC-Paris 6 (Paris). ISIR hosts the iCub humanoid robot on which the achievements will be evaluated.
- What guidance heuristics should be used to explore vast sensorimotor spaces in unknown changing bodies and environments? Challenge leader : Inria-ENSTA-ParisTech FLOWERS (Bordeaux).
- How can mechanisms for building efficient representations/abstractions, mechanisms for learning manipulation skills, and guidance mechanisms be integrated in the same experimental robotic architecture and reused for different robots? Challenge leader : GOSTAI company (Paris).

Web site: http://macsi.isir.upmc.fr/

8.4. European Initiatives

8.4.1. FP7 Projects

8.4.1.1. 3rd HAND

Type: COOPERATION

Defi:ICT-2013.2.1 Robotics, Cognitive Systems & Smart Spaces, Symbiotic Interaction

Instrument: Collaborative project

Objectif: Target a) Intelligent robotics systems

Duration: October 2013 - September 2017

Coordinator: Inria, France

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.

8.4.1.2. ERC EXPLORERS

Instrument: ERC Starting Grant

Duration: December 2009 - November 2014

Coordinator: Pierre-Yves Oudeyer, Inria.

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.

8.5. International Initiatives

8.5.1. Inria Associate Teams

8.5.1.1. NEUROCURIOSITY

Title: NeuroCuriosity

Inria principal investigator: Manuel Lopes

International Partner (Institution - Laboratory - Researcher):

Columbia Neuroscience (United States) - Jacqueline Goetlieb

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. This collaboration involves Pierre-Yves Oudeyer and Manuel Lopes on the Inria side, and Jacqueline Gottlieb and Adrien Baranes on Univ. Columbia side.

8.6. International Research Visitors

8.6.1. Visits of International Scientists

- Jan Peters, Technische Universitaet Darmstadt
- Marc Toussaint, Stuttgart University
- Justus Piater, University of Innsbruck
- Luis Montesano, University of Zaragoza
- Michael Mistry, Lecturer in Robotics, Intelligent Robotics Lab, University of Birmingham
- Andrej Gams, Post-doc, Biorobotics Laboratory, EPFL
- Adrien Baranes, Columbia University, NY, US
- Katharina Rohlfing, Bielefeld University, Germany
- Yannis Demiris, Imperial College, UK
- Andrew Barto, Univ. Massachussets at Amherst, US

8.6.1.1. Internships

- Jules Brochard, Emergent Proximo-Distal Maturation through Adaptive Exploration
- Axel Davy, Safe exploration in MDPs
- Julie Golliot, Experimental Platform for User Study of Curiosity-driven Exploration
- Brice Miard, Experimental Platform for User Study of Curiosity-driven Exploration
- Chloé Rozenbaum, Learning Simultaneously New Tasks and Feedback Models in Socially Guided Robot Learning
- Caio Tomazelli Da Silva Oliveira, Multimodal learning of speech-action-video primitives

8.6.2. Visits to International Teams

PY Oudeyer visited Gottlieb's Cognitive Neuroscience lab at Columbia University, NY, US; CITEC at Bielefeld University, Germany.

F. Stulp visited the Max Planck Institute for Intelligent Systems (Stefan Schaal) in Tuebingen, Germany.

In May 2013, Matthieu Lapeyre visited the Bristol Robotic Lab to present the Poppy robot. A close collaboration will begin in 2014, in particular they will hire an engineer to design grasping hand for Poppy.

In May 2013, Jonathan Grizou visited Iñaki Iturrate and Luis Montesano at Zaragoza University, Spain.

In July 2013, Manuel Lopes visit the lab of Andrea Thomaz at Georgia Tech.

In August 2013, Clément Moulin-Frier visited the Honda Research Center in Tokyo as well as Pr. Sawada at Kagawa University, Japan. He gave talks in both labs. He also visited the Intelligent Robotics Laboratory directed by Prof. Hiroshi Ishiguro and Asada Laboratory directed by Prof. Minoru Asada, in Osaka. In October 2013 he visited the Developmental Neuromechanics & Communication Lab at Princeton University, USA.

In August 2013, Fabien Benureau, Olivier Mangin, Mai Nguyen and Jonathan Grizou, visited the Intelligent Robotics Laboratory directed by Prof. Hiroshi Ishiguro, Osaka; the Humanoid Robotics Institute directed by Prof. Atsuo Takanishi, Tokyo; Intelligent Systems and Informatics Laboratory directed by Prof. Yasuo Kuniyoshi, Tokyo; and Asada Laboratory directed by Prof. Minoru Asada, Osaka.

In October 2013, Manuel Lopes, Clément Moulin-Frier and Mai Nguyen visited the Cognitive Neuroscience lab of Jacqueline Gottlieb in New York.

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. i-Lab ExtAR

Participants: Clément Samson, Eric Marchand.

duration: 24 months.

ExtAR is an Inria i-Lab with Artefacto that started in March 2011. Its goal was to develop an augmented reality library for smartphones.

8.1.2. Oseo Apash project

Participants: François Pasteau, Marie Babel.

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

Started in September 2012, the Apash project is supported by the Images & Réseaux cluster. It involves three laboratories connected to INSA Rennes, namely Irisa/Inria, IETR and LGCGM. Two industrial partners take part into this project: AdvanSEE and Ergovie. It aims 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 6.3.4 .

8.1.3. ARED NavRob

Participants: Suman 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 Bista's Ph.D. about visual navigation of a humanoid robot (see Section 8.2.4).

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: 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. It aims is to develop vision-based localization and navigation techniques for an 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 with the Novadem, Sirehna, Spot Image and Magellium companies, and with the Inria Lagadic and Steep groups. 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 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 Bista's Ph.D. about visual navigation of a humanoid robot (see Section 8.2.4), 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 significative 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: François Pasteau, Vishnu Narayanan, Cyril Joly, 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. 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 6.2.3 , 6.3.4 , 6.3.5 and 6.4.4 .

Furthermore, the annual three-day PAL workshop has been organized in Rennes by François Pasteau, Marie Babel and Céline Gharsalli in July 2013.

8.3. European Initiatives

8.3.1. FP7 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 6.1.1) 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. Participation In other International Programs

- 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, joint 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. In the context of the project MuNave, funded by the Inria/CNPq Collaboration framework (2010-2012), Geraldo Silveira, researcher at CTI, has spent a one-week visit in Sophia Antipolis in May 2013.

- Alexandre Krupa started a collaboration with Nassir Navab from the Technische Universität München by beginning since September 2013 the joint supervision of Pierre Chatelain's Ph.D.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

8.5.1.1. Internships

- Raul Orlando Alvarado Lara and Francisco-Javier Rangel Butanda from the University of Guanajuato in Mexico did a 4-month master internship in Rennes. It was granted by Conacyt and their work was about visual servoing and 3D localization respectively.

- Ivan Markovic, Ph.D. student 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 6.3.6).

- Eduardo Moral-Fernandez, Ph.D. student at the Universidad de Malaga, Spain, visited our group in Sophia Antipolis from March to December 2013. He worked on dense SLAM using omnidirectional RGB-D sensors.

8.5.2. Visits to International Teams

- Manikandan Bakthavatchalam spent a three-month visit at ISR in Coimbra, Portugal, for collaborating with Omar Tahri about visual servoing based on photometric moments (see Section 6.2.1).

- Rafiq Sekkal spent a two-month visit at UPC in Barcelona, Spain, to collaborate with Ferran Marques on contour-based spatio-temporal segmentation (see Section 6.1.6).

- Pierre Chatelain spent a four-month visit in Nassir Navab'slab at TUM, Germany, in the scope of his Ph.D.

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

- Paula Craciun and Josiane Zerubia have been in contact with Antoine Mangin, Scientific Director at ACRI-ST (http://www.acri-st.fr/English/index.html), in Sophia Antipolis to discuss Paula Craciun's research on boat detection and counting in Mediterranean harbors using marked point processes.

- Zhao Liu and Josiane Zerubia met 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) to discuss Ayin's research on semi-automatic acne detection.

8.2. European Initiatives

8.2.1. 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.

8.3. International Initiatives

8.3.1. Informal International Partners

Qiyin Fang.

> Subject: New optical sensors for skin imaging and their biomedical applications.
> Institution: McMaster University (Canada).

Zoltan Kato.

> Subject: Multi-layer Markovian models for change detection in aerial and satellite images.
> Institution: Szeged University (Hungary).

Gabriele Moser, 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).

Zoltan Kato.

> Subject: Random field models of shape.
> Institution: Szeged University (Hungary).

Jochen Einbeck, Stuart Jones.

> Subject: Statistical shape modelling for geology.
> Institution: Durham University (UK).

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- Qiyin Fang (McMaster University, Canada, one week in May 2013).
- Zoltan Kato (Szeged University, Hungary, from Jul 2013 until Aug 2013).
- Gregoire Mercier (Telecom Bretagne, Brest, one week in June 2013 and one week in December 2013).
- Gabriele Moser (Genoa University, Italy, one week in July 2013).

8.4.2. Internships

Claudio Price González (from January 2013 until March 2013)

Subject: Graph-based model for multitemporal segmentation of sea ice floes from satellite data.

Institution: Federico Santa Maria Technical University and Inria Chile.

LEAR Project-Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. QUAERO Project
Participants: Matthijs Douze, Dan Oneata, Danila Potapov, Jerome Revaud, Cordelia Schmid, Franck Thollard, Heng Wang.

Quaero is a French-German search engine project supported by OSEO. It runs from 2008 to 2013 and includes many academic and industrial partners, such as Inria, CNRS, the universities of Karlsruhe and Aachen as well as LTU, Exalead and INA. LEAR/Inria is involved in the tasks of automatic image annotation, image clustering as well as large-scale image and video search. See http://www.quaero.org for more details.

8.1.2. 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.

8.1.3. 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.

8.1.4. 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].

Several inverse problems in genomics involve retrieving meaningful DNA sequences from observed data. This is for example the case of the isoform deconvolution problem of RNA-Seq data, which is currently of utmost importance in genomics. The problem can be cast as a sparse feature selection problem, where the features are mapped to the paths of a graph called "splicing graph". Even though the number of paths is exponential in the graph size, we investigate network flow optimization techniques to efficiently solve the inverse problem in polynomial time [36]. The project involves researchers in machine learning, optimization, bio-informatics, and biology, from Inria Rhone-Alpes, Institut Curie in Paris, and the LBBE laboratory in Lyon.

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. 2013

8.1.6. Equipe-action ADM du Labex Persyval (Grenoble) "Khronos"

Participant: Zaid Harchaoui.

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 will start in Jan. 2014 and end in Dec. 2016.

8.1.7. Project Math-STIC "Gauge"

Participant: Zaid Harchaoui.

The project is concerned with statistical learning with gauge regularization penalty, a project funded by the Math-STIC "pôle" of the Université Joseph Fourier (Grenoble University). The partners are Inria Rhone-Alpes, CREST-ENSAE, Université Paris-Est. Principal investigator/leader: Zaid Harchaoui
Dates: Jan 2012-Dec 2013.

8.2. European Initiatives

8.2.1. FP7 European Project AXES

Participants: Ramazan Cinbis, Matthijs Douze, Zaid Harchaoui, Dan Oneata, Danila Potapov, Cordelia Schmid, Jakob Verbeek, Clement Leray.

This 4-year project started in January 2011. 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. FP7 European Network of Excellence PASCAL 2

Participants: Zeynep Akata, Adrien Gaidon, Zaid Harchaoui, Cordelia Schmid, Jakob Verbeek.

PASCAL (Pattern Analysis, Statistical Modeling and Computational Learning) is a 7th framework EU Network of Excellence that started in March 2008 for five years. It has established a distributed institute that brings together researchers and students across Europe, and is now reaching out to countries all over the world. PASCAL is developing the expertise and scientific results that will help create new technologies such as intelligent interfaces and adaptive cognitive systems. To achieve this, it supports and encourages collaboration between experts in machine learning, statistics and optimization. It also promotes the use of machine learning in many relevant application domains such as machine vision. The project ended in February 2013.

8.2.3. ERC Advanced grant Allegro

Participants: Cordelia Schmid, Karteek Alahari, Jerome Revaud.

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.** Inria principal investigator: Zaid Harchaoui. International Partner (Institution - Laboratory - Researcher): University of California Berkeley (United States) - Electrical Engineering and Computer Science Department. Duration: 2012 - 2014. The goal of the associated team "Hyperion" is to take up the challenges of large-scale statistical learning for image interpretation and video understanding. Despite the ever-increasing number of large annotated image and video datasets, designing principled and scalable statistical learning approaches from such big computer vision datasets remains a major scientific challenge.

  The associated team consists of researchers from the LEAR project team of Inria and two teams of University of California Berkeley (resp. the Pr. Jitendra Malik and the Pr. Nourredine El Karoui teams). It allows the three teams to effectively combine their respective strengths in areas such as large-scale learning theory and algorithms, high-level feature design for computer vision, and high-dimensional statistical learning theory. It will result in significant progress in domains such as large-scale image classification, weakly-supervised learning for classification into attributes, and transfer learning.

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. Adam Bloniarz, who is pursuing his PhD under the supervision of Prof. Bin Yu, visited LEAR duing the summer 2013.

- **University of Edinburgh:** C. Schmid collaborates with V. Ferrari, associate professor at university of Edinburgh. Our initial collaboration (co-supervision of A. Prest 2009-2012) was renewed this year. 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. This resulted in two ICCV'13 publications: one on modeling pose with flexible human puppets [32] and one on measuring the impact of low, intermediate and high-level descriptions on action recognition [22]. C. Schmid plans to continue this collaboration in 2014.

8.3.3. Participation In other International Programs

- **France-Berkeley fund:** The LEAR team was awarded in 2012 a grant from the France-Berkeley fund for the project with Pr. Jitendra Malik (EECS, UC Berkeley) on "Large-scale learning for image and video interpretation". The award amounts to 10,000 USD for a period of one year, from September 2012 to September 2013. 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 of International Scientists

- Jitendra Malik, Professor in UC Berkeley, visited LEAR during the summer 2013 as part of the associated team "Hyperion" and a project from the France-Berkeley fund. The goal of his visit was to develop new approaches for human action classification and localization in videos.

8.4.2. Internships

- Georgia Gkioxari, a PhD student from UC Berkeley, visited LEAR during the summer 2013 as part of the associated team "Hyperion" and a project from the France-Berkeley fund. The goal of her visit was to develop new approaches for human action localization in videos.

- Hyun Oh Song, a PhD student from UC Berkeley, visited LEAR during the fall 2013 as part of the associated team "Hyperion". The goal of his visit was to develop efficient approaches for part-based models in computer vision.

- Miles Lopes, a PhD student from UC Berkeley, visited LEAR during the spring 2013 as part of the associated team "Hyperion". The goal of his visit was to develop efficient approaches for estimating statistical functionals using convex optimization.

- Adam Bloniarz, a PhD student from UC Berkeley, visited LEAR during the summer 2013 as part of the associated team "Hyperion". The goal of his visit was to develop video representations adapted to neuroscience, based upon computer vision principles.

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

P. F Villard received fundings from the regional council to develop research about realistic simulation of organ dissection. The internship of Nicolas Koenig dealt with this subject and the results will be published in a communication at MMVR 2014.

8.2. National Initiatives

8.2.1. ANR

- ANR ARTIS (2009-2013)
  Participants: M.-O. Berger, M. Loosvelt, P.-F. Villard.
  The main objective of this fundamental research project is to develop inversion tools and to design and implement methods that allow for the production of augmented speech from the speech sound signal alone or with video images of the speaker's face. The Magrit team is especially concerned with the development of procedures allowing for the automatic construction of a speaker's model from various imaging modalities.

- ANR Visac (2009-2013)
  Participants: M.-O. Berger, B. Wrobel-Dautcourt.
  The ANR Visac is about acoustic-visual speech synthesis by bimodal concatenation. The major challenge of this project is to perform speech synthesis with its acoustic and visible components simultaneously. Within this project, the role of the Magrit team is to build a stereovision system able to record synchronized audio-visual sequences at a high frame rate [12].

- 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. 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 two years, we have also been collaborating with the Shacra team about real time augmentation of deformable organs

8.2.3. Institut Pascal, Université de Clermont-Ferrand

Participants: 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.

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Informal International Partners

Pierre-Frédéric Villard has a Honorary Research Fellow contract with Imperial College. The collaboration has involved 1 research visit in London in summer to mainly discuss about the writing of a common article [14]. He also participated as an activity leader in two one-week summer schools on Haptic Technology (to give the basics of computer haptics, including visual and haptics rendering, force feedback, haptic interfaces, collision detection, collision response and deformation modeling).

8.4. International Research Visitors

8.4.1. Visits to International Teams

Pierre-Frédéric Villard spent one month at Bangor University as a visiting researcher. This visiting fellowship was supported by the Wales Research Institute for Visual Computing (RIVIC). The aim was to improve existing solutions of respiration models based on optimization-driven models. Four parts have been studied: the meshing method, the deformation method, the boundary condition choice and the optimization method. A M.Sc. student was working on this subject and he has been remotely supervised by Pierre-Frédéric Villard until end of August.

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. *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). The PhD thesis of Georges Nader is part of the 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 phenotyping 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.

8.3. European Initiatives

8.3.1. FP7 Projects

8.3.1.1. Re@ct

> Type: COOPERATION
>
> Challenge: IMMERSIVE PRODUCTION AND DELIVERY OF INTERACTIVE 3D CONTENT
>
> Instrument: Specific Targeted Research Project
>
> Objective: Networked Media and 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-Sébastien 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 Associate Teams

The Morpheo team is associated with the Matsuyama lab. at the University of Kyoto (http://morpheo.inrialpes.fr/Kyoto/). Both entities are working on the capture of evolving shapes using multiple videos and the objective of the collaboration is to make progress on the modeling of dynamic events using visual cues with a particular emphasize on human gesture modeling for analysis purposes. To this aim, the collaboration fosters exchanges between researchers in this domain, in particular young researchers, through visits between the two teams. In the frame of this collaboration, a workshop was organized in November 2013 at the Inria Grenoble (http://morpheo.inrialpes.fr/kyoto/inria-kyoto-workshop-on-4d-modeling/).

8.4.2. Inria International Partners

8.4.2.1. Informal International Partners

8.4.2.1.1. Collaboration with Forest Research, UK

A common work with an ecophysiologist from Forest Research, Eric Casella, is currently carried out to recover useful geometric information from unorganized point clouds of plants and trees, obtained with a terrestrial laser scanning device. Preliminary results have been presented this year at the FSPM conference [4].

8.4.2.1.2. 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 [7] that was published at 3DV this year and received a best paper award. The work contributes with an approach that recovers both the shape and the articulated pose of a human body, over time sequences, using multiple videos.

8.5. International Research Visitors

8.5.1. Visits of International Scientists

- Prof. Matsuyama, Kyoto University, Matsuyama Lab, Japan.
- Associate Prof. Shohei Nobuhara, Kyoto University, Matsuyama Lab, Japan
- Assistant prof. Tony Tung, Kyoto University, Matsuyama Lab, Japan.

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

7. Partnerships and Cooperations

7.1. European Initiatives

7.1.1. FP7 Projects

7.1.1.1. HUMAVIPS

Title: Humanoids with audiovisual skills in populated spaces

Type: COOPERATION (ICT)

Defi: Cognitive Systems and Robotics

Instrument: Specific Targeted Research Project (STREP)

Duration: February 2010 - January 2013

Coordinator: Inria (France)

Others partners: CTU Prague (Czech Republic), University of Bielefeld (Germany), IDIAP (Switzerland), Aldebaran Robotics (France)

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

Abstracrt: Humanoids expected to collaborate with people should be able to interact with them in the most natural way. This involves significant perceptual and interactive skills, operating in a coordinated fashion. Consider a social gathering scenario where a humanoid is expected to possess certain social skills. It should be able to analyze a populated space, to localize people, and to determine whether they are looking at the robot and are speaking to it. Humans appear to solve these tasks routinely by integrating the often complementary information provided by multi-sensory data processing, from 3D object positioning and sound-source localization to gesture recognition. Understanding the world from unrestricted sensorial data, recognizing people's intentions and behaving like them are extremely challenging problems. The objective of HUMAVIPS has been to endow humanoid robots with audiovisual (AV) abilities: exploration, recognition, and interaction, such that they exhibit adequate behavior when dealing with a group of people. Developed research and technological developments have emphasized the role played by multimodal perception within principled models of human-robot interaction and of humanoid behavior. An adequate architecture has implemented auditory and visual skills onto a fully programmable humanoid robot (the consumer robot NAO). A free and open-source software platform has been developed to foster dissemination and to ensure exploitation of the outcomes of HUMAVIPS beyond its lifetime.

7.2. International Initiatives

7.2.1. Inria International Partners

7.2.1.1. Declared Inria International Partners

- Bielefeld University (Germany),
- The Czech Technical University of Prague (Czech Republic),
- IDIAP Institute (Switzerland),
- Aldebaran Robotics (France).
- University of Patras (Greece).

7.2.1.2. Informal International Partners

- The Technion (Israel Institute of Technology),

- Bar Ilan University.

7.3. International Research Visitors

7.3.1. Visits of International Scientists

- Professor Sharon Gannot (Bar Ilan University),
- Professor Yoav Schechner (The Technion),
- Professor Michael Bronstein (University of Lugano),
- Professor Vasek Hlavac (Czech Technical University),
- Professor Geoff McLachlan (University of Queensland, Australia),
- Professor Josep Ramon Casas, (Technical University of Catalonia).

7.3.1.1. Internships

- Dionyssos Kounades-Bastien, University of Patras (Master student),
- Israel Dejene-Gebru, University of Trento (Master student).

7. Partnerships and Cooperations

7.1. National Initiatives

7.1.1. *EquipEx AmiQual4Home - Ambient Intelligence for Quality of Life*

Participants: Stan Borkowski, Sabine Coquillart, Joëlle Coutaz, James Crowley [correspondant], Alexandre Demeure, Thierry Fraichard, Amaury Nègre, 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) [35] 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.

7.1.2. FUI PRAMAD

Participants: Claudine Combe, Lucas Nacsa, Maxime Portaz, Amaury Nègre, 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.

7.1.3. Inria Project-Teams PAL

Participants: Rémi Barraquand, Thierry Fraichard, Patrick Reignier, Amaury Nègre, 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.

7.2. European Initiatives

7.2.1. Collaborations in European Programs, except FP7

7.2.1.1. CATRENE AppsGate

Participants: Jean-René Courtois, Rémy Dautriche, Alexandre Demeure [correspondant], Cédric Gérard, Camille Lenoir, Kouzma Petoukhov, Patrick Reignier.

AppsGate is a project about End User Development in the context of SmartHomes. There are seven partners:

- R&D/industry:
  - ST Microelectronics, NXP, PACE, Technicolor, ARD, Ripple Motion, 4MOD, HI-HIERIA, VSN+UAB, SoftKinetic, Optrima, Vsonix, Evalan, Vestel, Turkcell, Immotronics.
- Academic labs:
  - Inria/PRIMA, Institut télécom.

The objectives of this project are to design and evaluate a new generation of set-top box, PRIMA is involved in designing End User Development tools dedicated for the Smart Home.

7.3. International Initiatives

7.3.1. Inria International Partners

7.3.1.1. Declared Inria International Partners

The Prima team participates in the project "Visually impaired people assistance using multimodal technologies". The project leader is the Mica laboratory of Hanoi University of Science and Technology (HUST), the project is financed for three years, starting in july 2012, by the Flemish Interuniversity Council (VLIR UOS http://www.vliruos.be/en). The other partners are Danang University, Ghent University, and Imep-Lahc (Grenoble Inp). The overall objective of the project is to provide visually impaired children (in the Nguyen Dinh Chieu School in Hanoi) with helpful devices. The contact person in the Prima team is Augustin Lux. Prima contributed to the design and testing of a system for Visual Object Recognition.

Since the PERSPOS project (BQR Grenoble INP 2008-2009), the MICA center (UMI 2954 CNRS) and PRIMA has a long time collaboration on the concept of "large-scale" perceptive space. This space is an intelligent environment which will be deployed on a large surface containing several buildings (as a university campus for example). The user is wearing one or many mobile intelligent wireless devices (smartphone or wearable computer). By combining the concepts of large-scale perceptive environments and mobile computing, we can create intelligent spaces to propose services adapted to individuals and their activities, manage energy of building, etc. Our collaboration is focusing on user identification and localization within such a smart space. Tracking people in smart environments remains a challenging fundamental problem when tackling multiple users localization. Whether it is at the scale of a campus, of a building or more simply of a room, we can dynamically combine several localization levels (and several technologies) to allow a more accurate and reliable users localization system. In September 2013, a new co-supervised Ph.D. Thesis started on multiple users localization in large-scale perceptive spaces.

7.4. International Research Visitors

7.4.1. Internships

Participant: Carlos Di Pietro.

Subject: Design of a Robot Companion

Date: from March 2013 until August 2013

Institution: University of Buenos Aires (Argentina)

Participant: Muhamamd Amine Bouguerra.

Subject: Viability and Guaranteed Motion Safety

Date: from Sep. 2013 until Oct. 2013

Institution: University of Annaba (DZ)

Participant: Marceau Thalgott.

> Subject: Bibliographical study of Brain Like Artificial Intelligence, Mini-Kit prototype development for a smart home.
>
> Date: from February 2013 until August 2013
>
> Institution: ENSIMAG

Participant: Adrien Czerny.

> Subject: Software environment for life long learning and debugging of a cortical learning algorithm.
>
> Date: from February 2013 until August 2013
>
> Institution: ENSIMAG

Participant: Luiza Cicone.

> Subject: Tools to support creative and design processes of interactive systems
>
> Date: from March 2013 until August 2013
>
> Institution: ENSIMAG

Participant: Simon Chalumeau.

> Subject: Pico-Projector based Interaction
>
> Date: from February 2013 until August 2013
>
> Institution: Grenoble INP, UJF Grenoble

Participant: Maxime Portaz.

> Subject: Supervised and unsupervised learning for intention recognition
>
> Date: from March 2013 until August 2013
>
> Institution: Université de Grenoble (Grenoble, France)

Participant: Martin Poirrier.

> Subject: Robotics and Multimodal Sensor Fusion for detecting Human Social interaction
>
> Date: from January 2013 until June 2013
>
> Institution: Suppinfo (Grenoble, France)

7.4.2. *Visits to International Teams*

Dominique Vaufreydaz, June 2013, MICA research center of Hanoi University of Science and Technology (HUST), in Hanoi Vietnam.

<div align="center">**SIROCCO Project-Team**</div>

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR-PERSEE

Participants: Christine Guillemot, Laurent Guillo, Olivier Le Meur.

- Title : Perceptual coding for 2D and 3D images.
- Research axis : § 6.2.1 , 6.1.1 .
- Partners : IRCCYN-Polytech Nantes, INSA-Rennes, Telecom Paris Tech.
- Funding : ANR.
- Period : Oct.2009-Aug.2013

The objective of the project is to develop perceptually driven coding solutions for mono-view and multi-view video. The SIROCCO project-team contributes on different problems for mono-view and multi-view video coding: visual attention modeling (see Section 6.1.1), texture synthesis and inpainting for both 2D and 3D content. Several methods for 2D image inpainting and 2D/3D inpainting to handle disocclusions in virtual view synthesis have been developed (see Sections 6.2.1 . A computational model for 3D content has also been studied (see Section 6.1.1).

8.1.2. ANR-ARSSO

Participants: Mounira Ebdelli, Christine Guillemot, Ronan Le Boulch, Olivier Le Meur, Aline Roumy.

- Title : Adaptable, Robust, Streaming SOlutions.
- Research axis: 6.2.1 , 6.4.1
- Partners : Inria/Planète, TESA-ISAE, CEA-LETI/LNCA, ALCATEL LUCENT BELL LABS, THALES Communications, EUTELSAT SA.
- Funding : ANR.
- Period : 06/2010-11/2013

The ARSSO project focuses on multimedia content communication systems, characterized by more or less strict real-time communication constraints, within highly heterogeneous networks, and toward terminals potentially heterogeneous too. It follows that the transmission quality can largely differ in time and space. The solutions considered by the ARSSO project must therefore integrate robustness and dynamic adaptation mechanisms to cope with these features. The overall goal is to provide new algorithms, develop new streaming solutions and study their performances. The SIROCCO project-team contributes on the development of loss concealment methods based on video inpainting. The solutions developed in 2012 have been studied in the context of a video compression and transmission chain using the emerging HEVC coding standard and have been integrated in the project demonstrator.

8.2. European Initiatives

8.2.1. 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 proposal SHIVPRO (Saliency-aware High-resolution Video Processing) submitted to the call FP7-PEOPLE-2011-IIF (funding scheme: MC-IIF International Incoming Fellowships (IIF)) has been accepted. Dr. Z. Liu, from Beijing University, has joined the team since August 2012 for two years. The objective of this project is 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.

8.3. International Research Visitors

8.3.1. *Visits of International Scientists*

Dr. Zhi Liu, from Shanghai University, has been visiting the team since August 2012 for two years. His stay is funded by the FP7-PEOPLE-2011-IIF program. The funding scheme is the MC-IIF International Incoming Fellowships (IIF).

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

8. Partnerships and Cooperations

8.1. Regional Initiatives

8.1.1. Collaborations

- Stars has a strong collaboration with the CobTek team (CHU Nice).
- G. Charpiat works with Yuliya Tarabalka (AYIN team) and with Björn Menze (Computer Vision Laboratory at ETH Zurich, Medical Vision group of CSAIL at MIT, and collaborator of Asclepios team) on the topic of shape growth/shrinkage enforcement for the segmentation of time series.
- G. Charpiat worked with former members from the Ariana team: Ahmed Gamal Eldin (LEAR team), Xavier Descombes (MORPHEME team) and Josiane Zerubia (AYIN team) on the topic of multiple object detection.
- A. Ressouche has a strong collaboration with the Rainbow team (I3S, UNS).

8.2. National Initiatives

8.2.1. ANR

8.2.1.1. 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.

8.2.1.2. 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.

8.2.2. Investment of future

8.2.2.1. 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.

8.2.3. Large Scale Inria Initiative

8.2.3.1. 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.

8.2.4. 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.

8.3. European Initiatives

8.3.1. FP7 Projects

8.3.1.1. CENTAUR

Title: Crowded ENvironments moniToring for Activity Understanding and Recognition

Type: POEPLE

Defi: Computer Vision

Instrument: Industry-Academia Partnerships and Pathway

Duration: January 2013 - December 2016

Coordinator: Honeywell (CZE)

Other partners: 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.

8.3.1.2. SUPPORT

Title: Security UPgrade for PORTs

Type: SECURITE

Defi: Port Security

Instrument: Industry-Academia Partnerships and Pathway

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.

8.3.1.3. Dem@Care

Title: Dementia Ambient Care: Multi-Sensing Monitoring for Intelligent Remote Management and Decision Support

Type: ICT

Defi: Cognitive Systems and Robotics

Instrument: Industry-Academia Partnerships and Pathway

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.

8.3.1.4. VANAHEIM

Title: Autonomous Monitoring of Underground Transportation Environment

Type: ICT

Defi: Cognitive Systems and Robotics

Instrument: Industry-Academia Partnerships and Pathway

Duration: February 2010 - November 2013

Coordinator: Multitel (Belgium)

Other partners: Inria Sophia-Antipolis (FR); Thales Communications (FR); IDIAP (CH); Torino GTT (Italy); Régie Autonome des Transports Parisiens RATP (France); Ludwig Boltzmann Institute for Urban Ethology (Austria); Thales Communications (Italy).

Inria contact: François Brémond

See also: http://www.vanaheim-project.eu/

Abstract: The aim of this project is to study innovative surveillance components for the autonomous monitoring of multi-Sensory and networked Infrastructure such as underground transportation environment.

8.3.2. Collaborations in European Programs, except FP7

8.3.2.1. PANORAMA

Program: ENIAC

Project acronym: PANORAMA

Project title: Ultra Wide Context Aware Imaging

Duration: April 2012 - March 2015

Coordinator: Philips Healthcare (NL)

Other partners :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).

See also: http://www.panorama-project.eu/

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.

8.4. International Initiatives

8.4.1. Inria International Partners

8.4.1.1. 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.

8.4.1.2. Collaboration with U.S.

Stars collaborates with the University of Southern California.

8.4.1.3. Collaboration with Europe

Stars collaborates with Multitel in Belgium, the University of Kingston upon Thames UK, and the University of Bergen in Norway.

8.4.2. Participation In other International Programs

- EIT ICT Labs is one of the first three Knowledge and Innovation Communities (KICs) selected by the European Institute of Innovation & Technology (EIT) to accelerate innovation in Europe. EIT is a new independent community body set up to address Europe's innovation gap. It aims to rapidly emerge as a key driver of EU's sustainable growth and competitiveness through the stimulation of world-leading innovation. Among the partners, there are strong technical universities (U Berlin, 3TU / NIRICT, Aalto University, UPMC - Université Pierre et Marie Curie, Université Paris-Sud 11, Institut Telecom, The Royal Institute of Technology); excellent research centres (DFKI, Inria, Novay , VTT, SICS) and leading companies (Deutsche Telekom Laboratories, SAP, Siemens, Philips, Nokia, Alcatel-Lucent, France Telecom, Ericsson). This project is largely described at http://eit.ictlabs.eu.

  Stars is involved in the EIT ICT Labs - Health and Wellbeing .

8.5. International Research Visitors

8.5.1. Visits of International Scientists

8.5.1.1. Internships

Narjes Ghrairi

> Subject: Primitive Event Generation in an Activity Recognition Platform
>
> Date: from Apr 2013 until Sep 2013
>
> Institution: Ecole Nationale d'Ingénieurs de Tunis (Tunisia)

Mohammed Cherif Bergheul

> Subject:Adaptive composition and formal verification of software in ubiquitous computing. Application to ambient health care systems.
>
> Date: from Apr 2013 until Sep 2013
>
> Institution: Ecole Polytech'Nice Cairo (Egypt)

Kartick Subramanian

Subject: People Tracking

Date: from Mar 2013 until Aug 2013

Institution: Nanyang Technological University, Singapore

Augustin Caverzasi

Subject:Trajectory fusion of multi-camera RGB-Depth tracking in partial overlapped scenes.

Date: from Aug 2013 until Dec 2013

Institution: Universidad Nacional de Córdoba, Facultad de Ciencias Exactas Físicas y Naturales, Argentina

Stefanus Candra

Subject: Evaluation of activity recognition system using RGB-Depth camera (e.g. Kinect)

Date: from Aug 2013 until Dec 2013

Institution: University of California, Berkeley CA, Usa

Sahil Dhawan

Subject: Assment of people detection using RGB-Depth sensors (e.g. Kinect), for apathetic patients to improve activity recognition systems.

Date: from Jan 2013 until Jul 2013

Institution: Birla institute of technology and Science, Pilani , India

Marco San Biagio

Subject: People detection using the Brownian descriptor.

Date: from Apr 2013 until Sep 2013

Institution: Italian Inst. of Tech. of Genova

Michal Koperski

Subject: 3D Trajectories for Action Recognition Using Depth Sensors

Date: from Apr 2013 until Dec 2013

Institution: Wroclaw University of Technology

TEXMEX Project-Team

8. Partnerships and Cooperations

8.1. National Initiatives

8.1.1. ANR 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.

8.1.2. ANR Secular

Participants: Laurent Amsaleg, Teddy Furon, Benjamin Mathon, Hervé Jégou, Ewa Kijak.

Duration: 3 years, started in September 2012.
Partners: Morpho, Univ. Caen GREYC, Telecom ParisTech, Inria Rennes

Content-based retrieval systems (CBRS) need security and privacy. CBRS become the main multimedia security technology to enforce copyright laws (content monetization) or to spot illegal contents (detection of copies, paedophile images, ...) over the Internet. However, they 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. It 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.

8.2. European Initiatives

8.2.1. Collaborations in European Programs, except FP7

Program: Eurostars

Project title: Forensic Image Identifier and Analyzer

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.

8.2.2. Quaero

Participants: Laurent Amsaleg, Sébastien Campion, Vincent Claveau, Julien Fayolle, Guillaume Gravier, Patrick Gros, Gylfi Gudmundsson, Carryn Hayward, Hervé Jégou, Ewa Kijak, Fabienne Moreau, Christian Raymond, Pascale Sébillot.

Duration: 5 years, starting in May 2008.
Prime: Technicolor.

Quaero is a large research and applicative program in the field of multimedia description (ranging from text to speech and video) and search engines. It groups 5 application projects, a joint Core Technology Cluster developing and providing advanced technologies to the application projects, and a Corpus project in charge of providing the necessary data to develop and evaluate the technologies. The large scope of QUAERO's ambitious objectives allows it to take full advantage of Texmex's many areas of research, through its tasks on: Indexing Multimedia Objects, Term Acquisition and Recognition, Semantic Annotation, Video Segmentation, Multi-modal Video Structuring, Image and video fingerprinting.

In 2013, a key fact is the best paper award obtained by Cédric Penet at CBMI 2013.

8.3. International Initiatives

8.3.1. Inria International Partners

8.3.1.1. Informal International Partners

- Intelligent Systems Lab Amsterdam (ISLA), University van Amsterdam
- Pontifical Catholic Univeristy of Minas Gerais, Brazil
- National Institute for Informatics, Japan
- Prague Technical University, Czech Republic
- National Technical University of Athens, Greece

8.4. International Research Visitors

8.4.1. Visits of International Scientists

- Michael Rabbat

    Dates: November 2013 (1 month)

    Subject: Continuous Associative Memories

    Institution: Mc Gill University, Canada

8.4.2. Internships

- Giorgos Tolias

    Dates: October 2012–January 2013 (5 months)

    Subject: Large scale visual search

    Institution: National Technical University of Athens (Greece)

8.4.3. Visits to International Teams

- Mihir Jain

    Dates: June 2013–September 2013

    Subject: Action Recognition and Event Retrieval

    Institution: Intelligent Systems Lab Amsterdam (ISLA), University van Amsterdam

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. *QUAERO (Inria)*
Participant: Ivan Laptev.

QUAERO (AII) is a European collaborative research and development program with the goal of developing multimedia and multi-lingual indexing and management tools for professional and public applications. Quaero consortium involves 24 academic and industrial partners leaded by Technicolor (previously Thomson). Willow participates in work package 9 "Video Processing" and leads work on motion recognition and event recognition tasks.

8.2.2. *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).

8.2.3. *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.

8.2.4. *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.

8.2.5. *European Research Council (ERC) Starting Grant: "Leap" - Josef Sivic*

Participant: Josef Sivic.

The contract is to be signed and will begin during 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.

8.3. International Initiatives

8.3.1. IARPA FINDER Visual geo-localization (Inria)

Participants: Josef Sivic, Petr Gronat, Nicolas Maisonneuve.

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). 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 in November 2013 for a week to begin a lasting collaboration.

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 six months in 2013. Aude Oliva (Principal investigator, Massachuesetts Institute of Technology) visited Willow for three months in 2013. Prof. John Canny (UC Berkeley) has visited Willow for a week in fall 2013 to begin a long term collaboration.

8.4.2. Visits to International Teams

Vincent Delaitre has visited the Robotics Institute, Carnegie Mellon University during November 2012 — January 2013, within the scope of the Inria associate team VIP. Maxime Oquab has done a 3 months internship at Microsoft Research in New York City, U.S.A.