Activity Report 2012

Section Contracts and Grants with Industry

AMIB Project-Team (section vide)

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

7. Bilateral Contracts and Grants with Industry

7.1. Google Research Award

Participants: Jean-Daniel Fekete [correspondant], Petra Isenberg, Jeremy Boy, Heidi Lam.

Offering data access to the public is a strong trend of the recent years. Several free data providers or repositories are now online (e.g. http://data.gov.uk, http://stats.oecd.org, http://publicdata.eu, http://opendata.paris.fr, http://www.google.com/publicdata, http://www.data-publica.com), offering a rich set of data to allow citizens to build their own understanding of complex political and economic information by exploring information in its original form. However, these initiatives have had little impact directly on the public since working with this open data is often cumbersome, requires additional data wrangling, and the spreadsheets themselves take a long time to understand before useful further work can be done with them. This proposal focuses on public data visualization to offer more engaging environments for exploration of public data and to enable stronger democratic discourse about the data contents.

The goal of this proposed research project is to bridge the gap between generic visualization sites for public data and engaging content-specific visualization of this data which can be used and individually adapted to tell a story about public data. Through the design and deployment of rich and engaging interactive visualizations from public data sources we want to truly reach the goal of the public data movement: empowering the citizens and social actors by allowing them to better understand the world they are living in, to make informed decisions on complex issues such as the impact of a medical treatment on a dangerous illness or the tradeoffs offered of power plant technologies based on facts instead of assumptions.

For more information, see http://peopleviz.gforge.inria.fr/www.

<p style="text-align:center">BYMOORE Exploratory Action</p>

5. Bilateral Contracts and Grants with Industry

5.1. Grants with Industry

- **ANR MHANN** (Memristive Hardware Artificial Neural Networks Accelerators): The purpose of this project is to build a medium scale prototype of such a bio inspired architecture, by using long life and nanometric-ferroelectric memristors. The area, performance and power benefits of this approach will be evaluated to define its interest for embedded systems. The MHANN project is multi disciplinary in the sense that it proposes new physical concepts for devices (physics) and aims at integrating them into on chip bio inspired architectures (micro electronics, computer science and architectures).

- **ANR NEMESIS** (NEuroMorphic hardwarE for Smart vIsion Sensor): This project aims at exploring the potential of biologically-inspired spike-based image processing supported by the realization of massively parallel yet scalable hardware thanks to 3D stacking of integrated circuits.

- **ANR Arch2Neu** (Neuromorphic hardware and software environment for versatile computing): Arch2Neu aims at investigating the potential of neuromorphic architectures for computing purposes, and particularly for signal-processing applications. We develop analog neural hardware, interconnections architectures, libraries, and compilers to provide to the user a versatile and efficient computing machine. You can learn more about our research through the dedicated webpages.

5.2. European Initiatives

5.2.1. FP7

- **European Network of Excellence HiPEAC2 and HiPEAC3:** HiPEAC is a network of excellence on High-Performance Embedded Architectures and Compilers. It involves more than 70 European researchers from 10 countries and 6 companies, including ST, Infineon and ARM. The goal of HiPEAC is to steer European research on future processor architectures and compilers to key issues, relevant to the European embedded industry.

5.3. International Initiatives

5.3.1. Inria Associate Teams

- **YOUHUA**: ICT-Inria associate team. The goal of the team is to investigate a programming approach for heterogeneous multi-cores.

  The likely path forward for architectures are heterogeneous multi-cores composed of a mix of cores and hardware accelerators (ASICs or reconfigurable circuits). Now, whether the architectures are homogeneous multi-cores or heterogeneous multi-cores, the difficulty to efficiently program such architectures remains the key issue. We propose a programming approach that is pragmatic and capable of letting non-expert users take advantage of the performance of homogeneous and heterogeneous multi-cores. Rather than asking programmers to understand architectures and write parallel or RTL (for accelerators) versions of their code, we ask programmers to explicit the algorithms they are using within their codes, and we rely on expert programmers to provide efficient parallel or RTL implementations of these algorithms. Not only this approach can make it possible for non-expert users to take advantage of complex architectures, but it also makes programs portable across a broad range of architectures, and furthermore, it considerably expands the opportunities for automatically tuning applications and architectures.

5.3.2. Visits of International Scientists

- Jing Huang sent by ICT and Chinese Academy of Science for 12 months in France, for cooperation on reconfigurable accelerator.

5.3.3. Visits to International Teams

- Numerous stays in China by Olivier Temam (about once per month on average).

5.3.4. Participation In International Programs

- **YOUHUA at LIAMA:** LIAMA is (originally) an Inria-Chinese Academy of Sciences lab (now Europe-China CS lab), and we just established a joint team at LIAMA, also called YOUHUA. Unlike YOUHUA, this joint team is Inria-ICT-EPFL. The goal is both the design of reconfigurable accelerators, and programming approaches for heterogeneous multi-cores.

- **Joint lab with ICT.** Set up of a joint lab with ICT, Beijing, China on *Accelerators for Emerging Applications*.

COMETE Project-Team (section vide)

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

7. Bilateral Contracts and Grants with Industry

7.1. Renault

Participants: Frédéric Bonnans, Giovanni Granato, Hasnaa Zidani.

This contract has supported the PhD thesis of Giovanni Granato. The purpose of this collaboration is to apply optimal control techniques to enhance the performance of the power management of hybrid vehicles. More precisely, the techniques concerned are viscosity solutions of Hamilton-Jacobi (HJ) equations, level set methods in reachability analysis, stochastic dynamic programming (SDP), stochastic dual dynamic programming (SDDP) and chance constrained optimal control. These are relatively sophisticated optimal control techniques, presenting a rupture (from the application point of view) of more classical techniques (e.g. dynamic programming, maximum principle and heuristic algorithms) found in the literature. The outcome of the PhD work is to assess the general interest in applying such techniques to the power management of hybrid vehicles. This includes stating the relevant modeling choices, implementing a research-level code of the algorithms for simulations and providing a proper interpretation of the simulations results.

The research undertaken in this contract have lead to four submitted patents (Renault-Inria), a numerical platform for simulations of the studied technics, 1 accepted conference paper (CDC), 2 submitted papers in peer-reviewed journals, and 2 preprints in preparation.

7.2. Astrium-Eads

Participant: Hasnaa Zidani.

This collaboration aims at analysing the sensitivity properties of a trajectory optimisation problem under probabilistic constraints (on modelling errors, component failure, ...etc). This includes a modeling of the problem, and implementation of efficient algorithms supportting the theoretical study. The collaboration started in 2012 and will last three years.

DAHU Project-Team (section vide)

DEFI Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Gregoire Allaire is in charge of the RODIN project. This is a consortium of various companies and universities which has been sponsored by the FUI AAP 13 for 3 years, starting on July 2012. The industrial partners are: Renault, EADS, ESI, Eurodecision, Alneos, DPS. The academic partners are: CMAP at Ecole Polytechnique, Laboratoire J.-L. Lions at Paris 6 and 7 Universities, centre de recherches Bordeaux Su-Ouest at Inria. The goal of the RODIN project is to perform research and develop a computer code on geometry and topology optimization of solid structures, based on the level set method. RODIN is the acronym of "Robust structural Optimization for Design in INdustry".

- Grègoire Allaire has a contract with IFPEN on multiscale finite elements for two-phase flows in porous media (in the framework of the PhD thesis of F. Ouaki, to be defended in 2013).

- Grègoire Allaire has a contract with EADS/IW on topology optimization for composite panels drapping (in the framework of the PhD thesis of G. Delgado, to be defended in 2013).

- Grègoire Allaire has a contract with Renault on geometry and topology optimization of structures (in the framework of the two PhD theses of Ch. Dapogny, with the co-advising of P. Frey, to be defended in 2013, and G. Michailidis, with the co-advising of F. Jouve, to be defended in 2013).

- Houssem Haddar is in charge of DEFI part of the FUI project Nanolytix. This three years project started in October 2012 and involves Xenocs (coordinator), imXPAD, Arkema, Inria (DEFI) and CEA-Leti. It aims at building a compact and easy-to use device that images nonaparticles using X-ray diffraction at small or wide angles (SAXS and WAXS technologies). We are in charge of direct and inverse simulation of the SAXS and WAXS experiments.

- Houssem Haddar is in charge of the electormagnetic simulation work package of the FUI project Tandem. This three years project started in December 2012 and involves Bull-Amesys (coordinator), BOWEN (ERTE+SART), Ecole Polytechnique (CMAP), Inria, LEAT et VSM. It aims at constructing a radar system on a flying device capable of real-time imaging mines embedded in dry soils (up to 40 cm deep). We are in charge of numerical validation of the inverse simulator.

- Houssem Haddar has a contract with EDF R&D on non destructive testing of concrete materials (in the framework of the PhD thesis of Lorenzo Audibert, to be defended in 2015)

- Houssem Haddar has a contract with EDF R&D on data assimilation for temprature estimates in nuclear reactors (in the framework of the PhD thesis of Thibault Mercier, to be defended in 2015)

- Houssem Haddar is coordinating the contract EDF R&D on non eddy current non destructive testing. This contract involves Zixian Jiang (PhD to be defended in 2013) and a two years PostDoc, Kamel Riahi.

7.2. Bilateral Grants with Industry

- Grègoire Allaire is a scientific adviser at the DM2S department of CEA Sacaly.

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

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

As a part of his research actions in the Control Department of Supélec, Guillaume Sandou has numerous collaborations with Industry (Renault, Astrium, Sagem, Valeo). This may lead to relevant opportunities for the DISCO project.

Guillaume Sandou is in particular the head of the RISEGrid Institute (Resaerch Institut for Smarter Electric Grids), joint institute between Supelec and EDF R&D.

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

7. Bilateral Contracts and Grants with Industry

7.1. General Electric HealthCare

- Compressed Sensing Digital Subtraction Rotational Angiography [PhD thesis H. Langet: 2009-2012]:
- Guide-wire Segmentation and Tracking of in interventional Imaging [PhD thesis N. Honnorat: 2008-2012]

7.2. Intrasene

Modeling, segmentation and registration of low gliomas brain tumors [PhD thesis S. Parisot: 2010-2013]

7.3. Siemens

Graph-based Knowledge-based Segmentation of the Human Skeletal Muscle in MR Imaging [PhD thesis P-Y. Baudin: 2009-2012]

GECO Team (section vide)

GEOMETRICA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. Geometry Factory

The initial development phase of the CGAL library has been made by a European consortium. In order to achieve the transfer and diffusion of CGAL in the industry, a company called GEOMETRY FACTORY has been founded in January 2003 by Andreas Fabri (http://www.geometryfactory.com).

The goal of this company is to pursue the development of the library and to offer services in connection with CGAL (maintenance, support, teaching, advice). GEOMETRY FACTORY is a link between the researchers from the computational geometry community and the industrial users.

It offers licenses to interested companies, and provides support. There are contracts in various domains such as CAD/CAM, medical applications, GIS, computer vision...

GEOMETRY FACTORY is keeping close contacts with the original consortium members, and in particular with GEOMETRICA.

In 2012, GEOMETRY FACTORY had the following new customers for CGAL packages developed by GEOMETRICA: Archivideo (GIS, 2D Constrained Delaunay), Gamesim (games, 2D Constrained Delaunay), Medicm (medical imaging, 2D Constrained Delaunay, BE), Tecosim(CAD/CAM, 3D Delaunay, Germany). Midland Valley (Surface mesher, UK)

Moreover, research licenses (in-house research usage for all of CGAL) have been purchased by: ROI Bologna (medical imaging, Italy), Technicolor (France), U Southampton (medical imaging, UK), ZIB (medical imaging, Germany).

7.1.2. Astrium

Participants: Pierre Alliez, Florent Lafarge, Sven Oesau.

The main goal of this collaboration is to develop indoor models more accurate, meaningful and complete than existing methods. The conventional way for modeling indoor scenes is based on plane arrangements. This type of representation is particularly limited and must be improved by developing more complex geometric entities adapted to a detailed and semantized description of scenes.

- Starting date: April 2012

- Duration: 3 years

7.2. National Initiatives

7.2.1. ADT CGALmesh

Participants: Pierre Alliez, Mariette Yvinec, Clement Jamin, Jean-Daniel Boissonnat.

In collaboration with Jane Tournois from Geometry Factory.

CGALmesh is an Inria technological development action started in March 2009, in collaboration with Geometry Factory. Building upon components from CGAL, we are implementing a generic mesh generation framework for surfaces and 3D domains. We primarily target applications which involve data acquired from the physical world: geology, medicine, 3D cartography and reverse engineering. In 2012 we devised a new parallel 3D mesh generation and optimization algorithm for multi-core architectures with shared memory, and an algorithm for anisotropic mesh generation.

- Starting date: March 2009

- Duration: 3 years

7.2.2. ANR Présage

Participants: Olivier Devillers, Marc Glisse, Ross Hemsley, Monique Teillaud, Rémy Thomasse.

Web site: http://webloria.loria.fr/~goaoc/ANR-Presage/

We participate in the PRÉSAGE project funded by the ANR. The project involves:

- the Inria VEGAS team,
- Univeristy of Rouen, and
- the GEOMETRICA team.

This project brings together computational and probabilistic geometers to tackle new probabilistic geometry problems arising from the design and analysis of geometric algorithms and data structures. We focus on properties of discrete structures induced by or underlying random continuous geometric objects. This raises questions such as:

- What does a random geometric structure (convex hulls, tessellations, visibility regions...) look like?
- How to analyze and optimize the behavior of classical geometric algorithms on *usual* inputs?
- How can we generate randomly *interesting* discrete geometric structures?

- Starting date: 31 December 2011

- Duration: 4 years

- Year publications: [55], [50], [57].

7.2.3. ANR GIGA

Participants: Pierre Alliez, Jean-Daniel Boissonnat, Frédéric Chazal, David Cohen-Steiner, Mariette Yvinec, Steve Oudot, Marc Glisse.

GIGA stands for Geometric Inference and Geometric Approximation. GIGA aims at designing mathematical models and algorithms for analyzing, representing and manipulating discretized versions of continuous shapes without losing their topological and geometric properties. By shapes, we mean sub-manifolds or compact subsets of, possibly high dimensional, Riemannian manifolds. This research project is divided into tasks which have Geometric Inference and Geometric Approximation as a common thread. Shapes can be represented in three ways: a physical representation (known only through measurements), a mathematical representation (abstract and continuous), and a computerized representation (inherently discrete). The GIGA project aims at studying the transitions from one type to the other, as well as the associated discrete data structures.

Some tasks are motivated by problems coming from data analysis, which can be found when studying data sets in high dimensional spaces. They are dedicated to the development of mathematically well-founded models and tools for the robust estimation of topological and geometric properties of data sets sampled around an unknown compact set in Euclidean spaces or around Riemannian manifolds.

Some tasks are motivated by problems coming from data generation, which can be found when studying data sets in lower dimensional spaces (Euclidean spaces of dimension 2 or 3). The proposed research activities aim at leveraging some concepts from computational geometry and harmonic forms to provide novel algorithms for generating discrete data structures either from mathematical representations (possibly deriving from an inference process) or from raw, unprocessed discrete data. We target both isotropic and anisotropic meshes, and simplicial as well as quadrangle and hexahedron meshes.

This project coordinated by GEOMETRICA also involves researchers from the Inria team-project ABS, CNRS (Grenoble), and a representative from the industry (Dassault Systèmes).

- Starting date: October 2009.

- Duration: 4 years.

7.2.4. DIGITEO Chair C3TTA: Cell Complexes in Computational Topology: Theory and Applications

Participants: Claire Caillerie, Frédéric Chazal, David Cohen-Steiner, Marc Glisse, Steve Oudot, Amit Patel.

The primary purpose of this project is to bring about a close collaboration between the chair holder Dr Vin de Silva and Digiteo teams working on the development of topological and geometric methods in Computer Science. The research program is motivated by problems coming from the increasing need of studying and analyzing the (often huge) data sets that are now available in many scientific and economic domains. Indeed, due to the improvements of measurement devices and data storage tools, the available data about complex shapes or complex systems are growing very fast. These data being often represented as point clouds in high dimensional (or even infinite dimensional) spaces there is a considerable interest in analyzing and processing data in such spaces. Despite the high dimensionality of the ambient space, one often expects them to be located around an unknown, possibly non linear, low dimensional shape. It is then appealing to infer and analyze topological and geometric characteristics of that shape from the data. The hope is that this information will help to process more efficiently the data and to better understand the underlying complex systems from which the data are generated. In the last few years, topological and geometric approaches to obtain such information have encountered an increasing interest. The goal of this project is to bring together the complementary expertises in computational topology and geometry of the involved Digiteo teams and in applied geometry and algebraic topology of V. de Silva to develop new topological approaches to the previous mentioned domain. The project intends to develop both the theoretical and practical sides of this subject. The other partners of the project are the Ecole Polytechnique (L. Castelli-Aleardi and F. Nielsen) and the CEA (E. Goubault).

- Starting date: January 2009.

- Duration: 3 years.

7.2.5. GDR ISIS young researcher project on "scene analysis from Lidar"

Participant: Florent Lafarge.

The GDR ISIS young researcher project on "scene analysis from Lidar" consists in reconstructing in 3D large-scale city models from airborne Lidar scans. This project is in collaboration with Clément Mallet and Bruno Vallet from MATIS Laboratory, IGN [http://www.ign.fr].

- Starting date: January 2010

- Duration: 3 years

7.2.6. Grand emprunt Culture 3D Clouds

Participants: Pierre Alliez, Florent Lafarge, Thijs van Lankveld.

Culture 3D Clouds is a cloud computing platform for 3D scanning, documentation, preservation and dissemination of cultural heritage. The motivation stems from the fact that the field of 3D scanning artifacts heritage evolves slowly and only provides resources for researchers and specialists. The technology and equipment used for 3D scanning are sophisticated and require highly specialized skills. The cost is thus significant and limits the widespread practice. Culture 3D Clouds aims at providing the photographers with a value chain to commercialize 3D reproductions demand for their customers and expand the market valuation of business assets (commercial publishers, general public).

- Starting date: September 2012

- Duration: 3 years

7.3. European Initiatives

7.3.1. FP7 Projects

7.3.1.1. CG-Learning

Title: Computational Geometric Learning

Type: COOPERATION (ICT)

Defi: FET Open

Instrument: Specific Targeted Research Project (STREP)

Duration: November 2010 - October 2013

Coordinator: Friedrich-Schiller-Universität Jena (Germany)

Others partners: National and Kapodistrian University of Athens (Greece), Technische Universität Dortmund (Germany), Tel Aviv University (Israel), Eidgenössische Technische Hochschule Zürich (Switzerland), Rijksuniversiteit Groningen (Netherlands), Freie Universität Berlin (Germany)

See also: http://cgl.uni-jena.de/

Abstract: The Computational Geometric Learning project aims at extending the success story of geometric algorithms with guarantees to high-dimensions. This is not a straightforward task. For many problems, no efficient algorithms exist that compute the exact solution in high dimensions. This behavior is commonly called the curse of dimensionality. We try to address the curse of dimensionality by focusing on inherent structure in the data like sparsity or low intrinsic dimension, and by resorting to fast approximation algorithms.

7.3.1.2. ERC IRON

Title: Robust Geometry Processing

Type: IDEAS

Instrument: ERC Starting Grant (Starting)

Duration: January 2011 - December 2015

Coordinator: Pierre Alliez, Inria Sophia Antipolis - mediterranee (France)

See also: http://www-sop.inria.fr/geometrica/collaborations/iron/

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.

7.4. International Initiatives

7.4.1. Inria Associate Teams

7.4.1.1. COMET

Title: Computational Methods for the analysis of high-dimensional data

Inria principal investigator: Steve Y. Oudot

International Partner:

Institution: Stanford University (United States)

Laboratory: Computer Science Department

Researcher: Leonidas J. Guibas

International Partner:

Institution: Ohio State University (United States)

Laboratory: Computer Science and Engineering

Researcher: Yusu Wang

Duration: 2011 - 2013

See also: http://geometrica.saclay.inria.fr/collaborations/CoMeT/index.html

CoMeT is an associate team between the Geometrica group at Inria, the Geometric Computing group at Stanford University, and the Computational Geometry group at the Ohio State University. Its focus is on the design of computational methods for the analysis of high-dimensional data, using tools from metric geometry and algebraic topology. Our goal is to extract enough structure from the data, so we can get a higher-level informative understanding of these data and of the spaces they originate from. The main challenge is to be able to go beyond mere dimensionality reduction and topology inference, without the need for a costly explicit reconstruction. To validate our approach, we intend to set our methods against real-life data sets coming from a variety of applications, including (but not restricted to) clustering, image or shape segmentation, sensor field monitoring, shape classification and matching. The three research groups involved in this project have been active contributors in the field of Computational Topology in the recent years, and some of their members have had long-standing collaborations. We believe this associate team can help create new synergies between these groups.

7.4.2. Visits of International Scientists

7.4.2.1. Exterior research visitors

Misha Belkin (Ohio State University).

Mikhail Bessmeltsev (University of British Columbia).

Mark Blome (Zuse-Institut Berlin).

Benjamin Burton (School of Mathematics and Physics, University of Queensland, Brisbane).

Dengfeng Chai (Zhejiang University).

Mathieu Desbrun (Caltech).

Paweł Dłotko (Jagiellonian University, Krakow).

Leo Guibas (Stanford University).

Sun Jian (Tsinghua University, Beijing).

Leif Kobbelt (RWTH Aachen).

Sylvain Lazard (EPI VEGAS).

Michael Lesnick (Stanford University).

Jeff Phillips (University of Utah).

Alla Sheffer (University of British Columbia).

Vin de Silva (Pomona College).

Gert Vegter (Johan Bernoulli Institute, Groningen University).

Yusu Wang (Ohio State University).

7.4.2.2. Visiting Phd students

Ricard Campos (six months)

 Topic: Reconstruction of 3D underwater scenes

 Institution: University of Girona (Spain)

Andrea Tagliasacchi (three months)

 Topic: surface reconstruction through optimal transportation

 Institution: Simon Fraser University (Canada)

GRACE Team

6. Bilateral Contracts and Grants with Industry

6.1. Alcatel Lucent

In September, D. Augot and F. Levy-dit-Vehel submitted a proposal to fund a joint PhD thesis with Abdullatif Shikfa (Alcatel Lucent), on local codes for distributed storage and related cloud-like issues.

6.2. Cryptoexperts

A research agreement between Cryptoexperts and Grace has been made, to establish foundations for the DGA DIFMAT contract (see below). D. Augot is collaborating with M. Finiasz from Cryptoexperts.

GRAND-LARGE Project-Team (section vide)

HIPERCOM Project-Team (section vide)

IN-SITU Project-Team (section vide)

MACS Project-Team (section vide)

MAXPLUS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Contrats avec l'Industrie/Bilateral Contracts with Industry

- Optimisation de services en ligne: CRE avec Orange Labs (responsable du suivi Orange Labs: Mustapha Bouhtou), de février 2009 à février 2012, portant sur l'application de l'optimisation à la tarification et à l'amélioration de services en ligne. Ce travail applique des techiques d'optimisation (processus de décision markoviens) et d'analyse non-linéaire (généralisations d'algorithmes de classement de type "pagerank") dans un but notamment d'amélioration du référencement, et étudie les problèmes de tarification reliés. Ce contrat a financé la thèse d'Olivier Fercoq, soutenue en Septembre 2012.

- Thèse CIFRE de J-B. Dumont, financée par Orange Labs (encadrant Orange Labs: Mustapha Bouhtou, directeur de thèse: S. Gaubert), démarrée en septembre 2010. Sujet: tarification de services data et gestion des ressources dans les réseaux mobiles 3G et LTE.

MEXICO Project-Team (section vide)

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

A collaboration grant is ongoing with DataPublica, which started based on our common work on Linked Data for Digital Cities.

PARIETAL Project-Team (section vide)

PARSIFAL Project-Team (section vide)

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

7. Bilateral Contracts and Grants with Industry

7.1. Contract POEMS-CEA-LIST-2

Participant: Anne-Sophie Bonnet-Ben Dhia.

Start : 09/01/2010, End : 07/31/2013. Administrator : ENSTA.
This contract is about the scattering of elastic waves by a stiffener in an anisotropic plate.

7.2. Contract POEMS-CEA-LIST-3

Participants: Laurent Bourgeois, Eric Lunéville.

Start : 10/01/2011, End : 09/30/2012. Administrator : ENSTA.
This contract is about the linear sampling methods for elastic waveguides.

7.3. Contract POEMS-CEA-LIST-DIGITEO

Participants: Anne-Sophie Bonnet-Ben Dhia, Sonia Fliss, Antoine Tonnoir.

Start : 10/01/2011, End : 09/30/2014. Administrator : ENSTA.
This contract is about the scattering of elastic waves by a local defects in an anisotropic plate. It consists on the funding of Antoine Tonnoir's Phd.

7.4. Contract POEMS-DGA

Participants: Anne-Sophie Bonnet-Ben Dhia, Bérangère Delourme, Sonia Fliss, Patrick Joly.

Start : 09/01/2011, End : 12/31/2013. Administrator : ENSTA.
This contract is about the waveguide in photonic crystals : we want to develop new mathematical and numerical tools for the characterization, the study and the computation of the guided modes in photonic crystals.

POPIX Exploratory Action

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

POPIX has a contract with Astrazeneca (November 2011 - November 2014)

POPIX has a contract with LIXOFT (June 2011 - June 2013)

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

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

CSDL (Complex Systems Design Lab) project of the Pôle de Compétitivité SYSTEM@TIC PARIS-REGION (11/2009-10/2012). The goal of the project is the development of a scientific plateform of decisional visualization for preliminary design of complex system. Industrial partners include Dassault Aviation, EADS, EDF, MBDA and Renault. Academic partners include ECP, Ecole des Mines de Paris, ENS Cachan, Inria ands Supelec.

SECSI Project-Team (section vide)

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

7. Bilateral Contracts and Grants with Industry

7.1. Contracts with EDF

Participants: Gilles Celeux, Jean-Michel Poggi.

- SELECT has a contract with EDF regarding modelling uncertainty in deterministic models.
- SELECT has a contract with EDF regarding wavelet analysis of the electrical load consumption for the aggregation and desaggregation of curves to improve total signal prediction.

7.2. Other contracts

Participants: Gilles Celeux, Rémy Fouchereau, Patrick Pamphile.

- SELECT has a contract with SAFRAN - SNECMA, an high-technology group (Aerospace propulsion, Aicraft equipment, Defense Security, Communications),regarding modelling reliability of Aircraft Equipment (collaboration with Patrick Pamphile (Université Paris-Sud).

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

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- The ILAB *Metis* is a close partnership with the **SME ARTELYS** whose aim is to develop a generic optimisation platform for sequential decision making that could be used for different applications. See Section 5.1 for a detailed description.

7.2. Bilateral Grants with Industry

- **PSA** – 2009-2012 (45 kEur). , side-contract to Mouadh Yagoubi's CIFRE Ph.D.;
  Participants: Marc Schoenauer, Mouadh Yagoubi.

- **THALES** – 2011-2014 (40 kEur). , side-contract to Gaetan Marceau-Caron's CIFRE Ph.D.;
  Participants: Marc Schoenauer, Gaetan Marceau-Caron.

- **EXQIM** – 2011-2014 (40 kEur). , side-contract to Moez Hammami's CIFRE Ph.D.;
  Participants: Michèle Sebag, Moez Hammami.

TOCCATA Team

7. Bilateral Contracts and Grants with Industry

7.1. Airbus contract

Participant: Sylvain Conchon [contact].

This 2 years support contract has started in Sep 10, between Inria and Airbus France at Toulouse. This is to support our efforts for the DO-178B qualification of Alt-Ergo.

7.2. CIFRE contract with Adacore

Participants: Claude Marché [contact], Andrei Paskevich, Claire Dross.

Jointly with the thesis of C. Dross, supervised in collaboration with the Adacore company, we established a bilateral collaboration contract, that started in January 2012 for 3 years.

The aim is to strengthen the usability of the *Alt-Ergo* theorem prover in the context of the GnatProve environment for the verification of safety-critical Ada programs [32]. A focus is made on programs involving Ada containers [80].

TYPICAL Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Common Research Agreements in the MSR–Inria Joint Centre

Assia Mahboubi, Enrico Tassi and Cyril Cohen are part of the *Mathematical Components* effort in the Inria and Microsoft Research joint centre. The goal is to investigate the design of large-scale, modular and reusable libraries of formalized mathematics. Developed using the Coq proof assistant. This project successfully formalized the proof of the Feit–Thompson theorem, resulting in a corpus of libraries related to various areas of algebra.

Project *Coquelicot*, funded jointly by the Fondation de Coopération Scientifique "Campus   Paris-Saclay" and Digiteo.

Goal: Create a new Coq library for real numbers of mathematics.
Leader: S. Boldo (INRIA Saclay, Toccata). Participant: A. Mahboubi.
Website: http://coquelicot.saclay.inria.fr/.