



RESEARCH CENTER

FIELD

**Digital Health, Biology and Earth**

Activity Report 2014

# **Section Contracts and Grants with Industry**

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**ABS Project-Team (section vide)**

**AMIB Project-Team (section vide)**

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**BEAGLE Project-Team (section vide)**



## **BIGS Project-Team**

# **6. Bilateral Contracts and Grants with Industry**

## **6.1. Bilateral Contracts with Industry**

*Start-up project by T. Bastogne:*

- Industrial partner: CYBERnano (Contract Research Organization in NanoMedicine).
- Status: SAS created in July 2013.
- Comments: a research engineer has been hired by CYBERnano since November 2014 to develop and implement new algorithms devoted to biological signal processing.

## **BONSAI Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

- The PhD thesis of Lea Siegwald is funded by a CIFRE contract with the biotechnology company Gene Diffusion.

**DYLISS Project-Team (section vide)**

## GENSCALE Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

### 7.1.1. *Kalray Company : Parallelization of bioinformatics algorithm on the MPPA Platform*

**Participants:** Charles Deltel, Dominique Lavenier.

The purpose was to investigate the performances of the Kalray MPPA architecture on scientific life science software. The collaboration started in 2013, and was aiming at implementing the PLAST software on the Kalray MPPA chip (256 cores). PLAST is a BLAST-like parallel implementation designed by GenScale. Experimentations have shown that for these kinds of applications that manage very huge volume of data, the MPPA chip memory capacity was a serious bottleneck.

### 7.1.2. *Sofiproteol Company : Detection of SNPs in the Pea genome*

**Participants:** Susete Alves Carvalho, Pierre Peterlongo.

The Peapol project is funded by Sofiproteol Company. Its mission is to develop the French vegetable oil and protein industry, open up new markets, and ensure an equal distribution of value among its members. The Peapol project counts two collaborators, Biogemma, and INRA, the latter working in collaboration with the GenScale team in charge of algorithmic research to detect SNPs in the pea genome.

## 7.2. Bilateral Grants with Industry

### 7.2.1. *Korilog: I-Lab KoriScale*

**Participants:** Sébastien Brillet, Erwan Drezen, Dominique Lavenier, Ivaylo Petrov.

In June 2013, GenScale and the Korilog Company created an Inria common research structure (I-LAB) called KoriScale. This is the outcome of a solid relationship, which has enabled the transfer of the PLAST software (bank to bank genomic sequence comparison) from GenScale to Korilog. The resulting commercial product (Klast) is now 5 to 10 times faster than the reference software (Blast). The main research axe of the I-LAB focuses on comparing huge genomic and metagenomic datasets.

### 7.2.2. *Rapsodyn project*

**Participants:** Dominique Lavenier, Claire Lemaitre, Pierre Peterlongo.

RAPSODYN is a long term project funded by the IA French program (Investissement d'Avenir) and several field seed companies, such as Biogemma, Limagrain and Euralis. The objective is the optimization of the rapeseed oil content and yield under low nitrogen input. GenScale is involved in the bioinformatics work package, in collaboration with Biogemma's bioinformatics team, to elaborate advanced tools dedicated to polymorphism.

## IBIS Project-Team

# 6. Bilateral Contracts and Grants with Industry

## 6.1. Genostar

**Participants:** François Rechenmann, Hidde de Jong, Michel Page.

Genostar, an Inria start-up created in 2004, provides bioinformatics solutions for the comparative analysis of bacterial genomes, proteomes and metabolomes. Genostar's software suite performs the annotation of sets of genomic sequences, *i.e.*, the identification of the coding sequences and other features, followed by the prediction of the functions of the gene products. The modules which make up the software suite were originally developed within the Genostar consortium and the HELIX project team at Inria Grenoble - Rhône-Alpes. The software suite also includes the modeling and simulation tool GNA developed by members of IBIS (Section 4.1). Genostar offers a comprehensive service line-up that spans genome sequencing, read assembly, annotation, and comparison. Genostar thus works with trusted subcontractors, each specialized in state-of-the-art sequencing technologies. François Rechenmann is CEO of the company. For more information, see <http://www.genostar.com>.

## 6.2. BGene

**Participants:** Johannes Geiselmann, Hidde de Jong, Corinne Pinel.

BGene is a start-up company of Université Joseph Fourier in the field of DNA engineering. BGene proposes efficient and custom-made modifications of bacterial genomes, leaving no scars or antibiotics resistance genes. The company has know-how and expertise at all stages of the development process, including the *in-silico* design of a desired construction, the choice of the appropriate genetic tools, and the delivery of the finished product. Former IBIS-member Caroline Ranquet and Johannes Geiselmann are co-founders of BGene, together with Marie-Gabrielle Jouan (Floralis, Université Joseph Fourier). Corinne Pinel works part-time at BGene, and Johannes Geiselmann and Hidde de Jong are members of its scientific advisory board. For more information on BGene, see <http://www.bgene-genetics.com/>.

## **LIFEWARE Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contract with General Electric Transportation**

Research contract on “Energy optimization in mass transport”. Accompanying contract for the CIFRE thesis of David Fournier [3] (2011-2014).

## **MAGNOME Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

MAGNOME and the company BioLaffort are contracted to develop analyses and tools for rationalizing wine starter strain selection using genomics.

MAGNOME and a consortium of academic (CNRS, INRA, INSA Toulouse) and industrial (Dassault Aviation, Airbus, Turbomeca, SNECMA, Air France, Total) partners coordinated by the French Institute for Petroleum and New Energies are contracted together on a large program of developing and testing alternative fuels for aviation, funded by the Civil Directorate for Aviation. MAGNOME's role is working with biological partners in developing genomic and genetic tools for oleaginous yeasts used in biofuel production.

**MORPHEME Project-Team (section vide)**



## **SERPICO Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Innopsys: Methods and algorithms for tissue microarrays image analysis**

In collaboration with Magellium company and Institut Gustave Roussy, Innopsys plans to develop new image analysis software to be included in the INGRID platform developed by Megellium company. New statistical methods and algorithms will be investigated by SERPICO for:

- segmentation and detection of deformable cell contours and cell nuclei in 2D fluorescence tissue microarray images;
- deconvolution and superresolution of fluorescence microarray imaging.

The three-year contract supports the PhD thesis of Hoai Nam Nguyen (2013-2016).

## **VIRTUAL PLANTS Project-Team**

# **6. Bilateral Contracts and Grants with Industry**

## **6.1. Bilateral Grants with Industry**

Maryline Lievre has been funded by Bayer grant. Guillaume Garin has been funded by ITK. The Hydroroot project is funded by Syngenta.

## ARAMIS Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

### 7.1.1. *Air-Liquide Medical Systems*

**Participants:** Mario Chavez [Correspondant], Xavier Navarro.

Project title: Real-time characterisation of respiratory states from EEG

Founded in 2014

Amount: 370 K€

Coordinator: Thomas Similowski

Other partners: UPMC, Inserm UMR 1158

Abstract: The project aims at developing a real-time brain computer interface (BCI) for the monitoring of respiratory states from scalp EEG data of healthy volunteers and patients, recorded at the laboratory, hospital ward, operating room or intensive care units..

## ASCLEPIOS Project-Team

# 6. Bilateral Contracts and Grants with Industry

## 6.1. CIFRE PhD Fellowships

### 6.1.1. General Electric

The work of Thomas Benseghir, *3D/2D Coronary Registration for Interventional Cardiology Guidance*, is supported by a PhD fellowship from the General Electric company.

### 6.1.2. Neurelec/Oticon Medical

The work of Thomas Demarcy, *Segmentation and anatomic variability of the cochlea and other temporal bone structures from medical images*, is supported by a PhD fellowship from the Neurelec/Oticon Medical company.

## 6.2. Inria - Mauna Kea Technologies I-Lab SIWA

**Participants:** Nicholas Ayache [correspondent], Xavier Pennec, Irina Vidal-Migallón, Marzieh Kohandani Tafreshi, Julien Dauguet, Tom Vercauteren, Barbara André.

*This I-lab involves the Mauna Kea Technologies company.*

The first focus of this I-lab is to develop efficient and friendly content-based image retrieval (CBIR) tools to help user to make a diagnosis. The resulting smart atlas has been published in 3 clinical [27], [28], [19] and one methodological [18] conferences. The second focus is on image registration to provide near real-time and robust image registration tools built on GPU implementations for image stabilization and super-resolution as it is a critical method for the smart atlas.

For more information, see <https://lisa.sophia.inria.fr/siwa-loasis-numerique-dinria-et-de-mauna-kea-706.html>.

## 6.3. Microsoft Research

Microsoft Research is funding through the Inria-Microsoft joint lab the projects "**4D Cardiac MR Images**" and "**Medilearn**" aiming at analyzing large databases of cardiac images to help the diagnosis of cardiac diseases and planning of therapy. This project involves A. Crimisi from MSR and partially funds the Phds of Loic Le Folgoc and Jan Margeta as well as the post doctoral stay of Hervé Lombaert.

## 6.4. Spin-off company Therapixel

**Therapixel** is a spin-off of the Asclepios (Inria Sophia Antipolis) and Parietal (Inria Saclay) project teams founded in 2013. Therapixel makes surgical information systems. It relies on depth sensing, advanced software processing and innovative user interfaces to provide touchless control of the computer. This technology allows for a direct control of the computer that sterility constraints made impractical in the past. Therapixel obtained in 2014 the CE marking of its product on touchless visualization of medical images.

## 6.5. Other contracts

The contracts with Philips and Siemens are described in our previous activity reports.

## 6.6. National Initiatives

### 6.6.1. Consulting for Industry

Nicholas Ayache is scientific consultant for the company Mauna Kea Technologies (Paris).

### **6.6.2. Collaboration with national hospitals**

Asclepios is collaborating with the following 3 IHU (University Hospital Institute) in France : the IHU-Strasbourg (Pr J. Marescaux and L. Soler) on image-guided surgery (N. Ayache serves as Chief Scientific Officer), the IHU-Bordeaux (Pr M. Haïssaguere and Pr P. Jaïs) on cardiac imaging and modeling and the IHU-Pitié Salpêtrière (Dr. O. Colliot and S. Durrleman) on neuroimaging.

We also have long term collaborations with the CHU Nice and Centre Antoine Lacassagne in Nice.

Asclepios is part of the EQUIPEX MUSIC with Bordeaux University Hospital in order to build an XMR interventional room equipped with a medInria workstation.

## ATHENA Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. CIFRE PhD contract with Neurelec

**Participants:** Maureen Clerc, Kai Dang, Théodore Papadopoulo, Jonathan Laudanski [Neurelec].

**Title:** Modeling and characterizing electrical conductivity for the placement of cochlear implants.  
Neurostimulation consists in applying an electrical current close to a nerve to trigger its activation. This is the principle of cochlear implants, which aim to stimulate the auditory nerve via an electrode coil inserted in the cochlea. The interplay between the stimulating electrodes and the bioelectrical medium is modeled by a partial differential equation whose main parameters are the electrical conductivity and geometry of the tissues. This equation also links active sources and electric potential measurements by electroencephalography. The objective of Kai Dang's PhD thesis is to propose models for efficiently representing tissues and their electrical conductivity within the auditory system (bone, cochlea, ganglia, auditory cortex). This will make it possible to optimize the stimulating current, thanks to a better knowledge of the current diffusion due to the anatomical conformation of the cochlea.

## 7.2. PACA PhD contract with Olea Medical

**Participants:** Marco Pizzolato, Rachid Deriche.

**Title:** Diffusion & Perfusion MRI : From bench to bedside  
The objectives of Marco Pizzolato's PhD thesis are to develop innovative techniques in diffusion and perfusion MRI in close collaboration with OLEA MEDICAL. A certain number of important issues related to dMRI and pMRI signal processing and modeling have been identified by ATHENA and OLEA MEDICAL. These technical issues will be tackled within the framework of this PhD thesis fully granted by the Region PACA and by OLEA MEDICAL.

## 7.3. dMRI@Olea-Medical

**Participants:** Aurobrata Ghosh, Théodore Papadopoulo, Rachid Deriche.

The ongoing collaboration with OLEA MEDICAL has allowed us to form a crucial link between academic research at ATHENA and the medical imaging industry, via OLEA MEDICAL. Since Auro's recruitment in May 2013 and following a planned road-map, we have been developing a generic and templated C++ core library comprised of the expert algorithms researched at ATHENA in the domain of diffusion MRI. This library and its functionalities are being integrated into OLEA MEDICAL's flagship product Olea Sphere. So far the following non-exhaustive list of estimation modules have been implemented – DTI (least squares (LS), weighted least squares (WLS) & Cholesky, which provides positivity constraint); Generalized DTI using tensors of order 4 (LS, WLS & Ternary Quartics (TQ) which provides positivity constraint) and DKI (LS, WLS, Cholesky + TQ for positivity). Further a number of biomarkers or scalar strains for each of these models have also been implemented, such as FA, MD, VR, RA, MK, etc. The external tools used consist of well known standard libraries and softwares such as C++ STL, LAPACK, NLOpt, CMake, Git, etc. Finally an externally callable C-interface is provided to wrap the core C++ library, which makes it useable from C++ and C programs.

The most recent milestones added on the road-map includes higher order models such as ODFs, FODs, EAPs, etc. This is currently followed up by tractography algorithms – both deterministic and probabilistic.

## 7.4. BESA GmbH

**Participants:** Maureen Clerc, Théodore Papadopoulo, Juliette Leblond [APICS], Christos Papageorgakis.

We are collaborating with the BESA company (Brain Electromagnetic Source Analysis) on modeling head tissue conductivity, and on forward and inverse problems of source localization. The PhD thesis of C. Papageorgakis, 50% funded by BESA, started in October 2014.

## **DEMAR Project-Team**

# **6. Bilateral Contracts and Grants with Industry**

## **6.1. Bilateral Contracts with Industry**

We have signed an industrial technological transfer and research contract with VIVALTIS company (Montpellier, France), on surface FES.

## **GALEN Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

- **Microsoft Research, Cambridge, UK:** Large Scale Diverse Learning for Structured Output Prediction [Ph.D. thesis D. Bouchacourt]
- **General Electric HealthCare, Buc, FR:** Patient-Specific Optimization of Computed Tomography Acquisition Protocols [Ph.D. thesis H. Pasquier]



**MNEMOSYNE Project-Team (section vide)**

**NEUROMATHCOMP Project-Team (section vide)**

**NEUROSYS Team (section vide)**

## PARIETAL Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. The LearnClues Labcomm

The LearnClues LabComm has been granted on Oct 2.

Statistical learning is a field of mathematics and computer science that enables the extraction of predictive models from data with weak signal to noise ratio. These techniques are behind the successes of Google or the progresses of automatic medical diagnostic. Combined with a knowledge of the field of application, they open the door to optimal decisions. Tynyclues is a start-up that applies statistical learning to e-commerce, adapting the marketing practice from customer databases. Parietal is an Inria research group that develops statistical learning for neurosciences and is the driving force behind the software tool "scikit-learn", that is a standard in statistical learning.

The goal of this proposed common lab is to transfer the expertise of Parietal on big data and to improve statistical learning techniques and implementation on distributed systems to open the door to faster analysis of very large datasets. Indeed, processing more data implies detecting smaller effects in the signals. Tynyclues already uses the tools developed par Parietal on the "cloud", and thus in distributed computing environments. The practical experience of Parietal enables us to plan substantial improvements to computational performance as well as to the amount of information extracted from big data.

From a strategical standpoint for Tynyclues, such progress are important to vary the number of domain scenarios that it can address, by analyzing jointly more data of a wider type, and to render fully automatic the data analysis platform that it is offering to its customers, replacing challenging tasks currently performed by experts. These developments are particularly important given that Tynyclues is developing at a very fast rate and is processing bigger and bigger datasets and an increasing number of different problems.

The project partners are:

- Parietal, Inria
- Tiny Clues

## 7.2. The Wendelin FUI project

The Wendelin project has been granted on December 3rd, 2014. It has been selected at the *Programme d'Investissements d'Avenir (PIA)* that supports "cloud computing et Big Data". It gives visibility and fosters the French technological big data sector, and in particular the scikit-learn library, the NoSQL "NEO" et the decentralized "SlapOS" cloud, three open-source software supported by the Systematic *pôle de compétitivité*.

Scikit-learn is a worldwide reference library for machine learning. Gael Varoquaux, Olivier Grisel and Alexandre Gramfort have been major players in the design of the library and Scikit-learn has then been supported by the growing scientific Python community. It is currently used by major internet companies as well as dynamic start-ups, including Google, Airbnb, Spotify, Evernote, AWeber, TinyClues; it wins more than half of the data science "Kaggle" competitions. Scikit-learn makes it possible to predict future outcomes given a training data, and thus to optimize company decisions. Almost 1 million euros will be invested to improve the algorithmic core of scikit-learn through the Wendelin project thanks to the Inria, ENS and Institut Mines Télécom teams. In particular, scikit-learn will be extended in order to ease online prediction and to include recent stochastic gradient algorithms.

NEO is the native NoSQL base of the Python language. It was initially designed by Nexedi and is currently used and embedded in the main software of company information systems. More than one million euros will be invested into NEO, so that scikit-learn can process within 10 years (out-of-core) data of 1 exabyte size.

Paris13 university and the Mines Télécom institute will extend the SlapOS distributed mesh cloud to deploy Wendelin in *Big Data as a Service* (BDaaS) mode, to achieve the interoperability between the Grid5000 and Teralab infrastructures and to extend the cloud toward smart sensor systems.

The combination of scikit-learn, NEO and SlapOS will improve the predictive maintenance of industrial plants with two major use cases: connected windmills (GDF SUEZ, Woelfel) and customer satisfaction in car sale systems (MMC Rus). In both cases it is about non-personal, yet profitable big data. The Wendelin project actually demonstrates that Big data can improve infrastructure and everyday-life equipment without intrusive data collection. For more information, please see [www.wendelin.io](http://www.wendelin.io).

The project partners are:

- Nexedi (leader)
- GDF SUEZ
- Abilian
- 2ndQuadrant
- Institut Mines Télécom
- Inria
- Université Paris 13

## **POPIX Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

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

POPIX has a contract with Lixoft (June 2011 - June 2015)

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## SHACRA Project-Team

# 6. Bilateral Contracts and Grants with Industry

## 6.1. Bilateral Contracts with Industry

InSimo is a startup we created in January 2013, after two years of thinking, maturation and incubation. Its founding members are all former or actual team members of SHACRA: Jeremie Allard, Juan Pablo de la Plata Alcalde and Pierre Jean Bensoussan have joined the operation team, while Stéphane Cotin and Christian Duriez serve as scientific advisors. The business model of the company is based on the SOFA platform and its community to transfer state-of-the-art simulation technologies into commercially-supported software components that medical simulator vendors can integrate into their products. The goal is to foster the creation of a new generation of medical simulators, highly realistic, faster to develop, allowing a broader commercial offer and novel uses. InSimo participated to the 2012 OSEO / MESR national innovative technology company creation competition (Emergence category) and was selected as the best project in the Alsace region as well as one of the three projects highlighted at the national level. InSimo also won the HelpMeSee contract (in partnership with Moog and SenseGraphics) and entered in February 2013 into a 3-year development phase to build a first batch of 100 MSICS simulators.

## 6.2. Bilateral Grants with Industry

The collaboration is set with INSERM - UMR-S 867 (minimal invasive and robotized otological surgery) Faculté de Médecine Paris Diderot Paris 7 and with the company Collin SA (Bagneux, France) which is developing some activities in the domain of the head and neck (surgical robot such as RobOtol, middle ear implants, surgical instruments, surgical navigation, ...). The objective of this project is to obtain a simulation tool applied to the ear surgery for both training and planning of conventional and robotized middle ear surgery. In addition, the aim of this work is to provide a tool able to explore, develop and assess new robotized procedures using a tele-operated device called RobOtol. Guillaume Kazmitcheff is doing his PhD in the context of this collaboration: he is paid by a CIFRE contract with Collin, he is mainly working with the INSERM team but the design of the simulation is done in collaboration with our group and he is enrolled in the university of Lille 1.

## **SISTM Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

Roche Institute, through the Vaccine Research Institute, funding one engineer over 2 years (2012-2014)

Cytheris (now RevImmune), through the ANRS, for the development of IL-7, as this is the only one company able to produce exogeneous IL-7 usable in Humans.



## VISAGES Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

### 7.1.1. Siemens

*duration: 5 years from 2011/10/26*

In the context of the Neurinfo imaging platform, a partnership between Siemens SAS - Healthcare and University of Rennes 1 was signed in October 2011 for 5 years. This contract defines the terms of the collaboration between Siemens and the Neurinfo platform. The Neurinfo platform has received work in progress (WIP) sequences from Siemens in the form of object code for evaluation in the context of clinical research. The Neurinfo platform has also received source code of selected MRI sequences. This is a major advance in the collaboration since it will enable the development of MRI sequences on site.

## 7.2. Bilateral Grants with Industry

### 7.2.1. MEDday

As part of its activities, MEDday led the final testing phase on patients diagnosed from Multiple Sclerosis in order to find treatment of progressive multiple sclerosis. This is done in partnership with several hospitals in France. The goal is to achieve an effective treatment for this disease. The role of the team in this industrial grant is to develop new algorithms to perform the processing and the analysis of the images from this study.

## **ANGE Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

- SAUR (company which manages water supplies): ANGE was involved in a 24.000 euro–contract with the Inria project-team BIOCORE (Sophia-Antipolis). This project relies on the optimisation of hydrodynamics in a lagoon in order to depollute it.
- ADEME (national agency for environment and resource management): ANGE participated to a study upon the contribution of algae in the production of energy in France till 2030.
- La Compagnie du Vent (subsidiary of GDF-Suez): in the framework of the “Salinalgue” project aiming at reducing greenhouse gas emission, ANGE and BIOCORE carried out a study upon microalgae production (10.000 euros for each team).

## **7.2. Grants with Industry**

The PhD thesis of P. Ung is granted by CNRS, by AMIES (French agency for mathematics in interaction with companies and the society), by EDF and by GeoHyd (now a part of ANTEA–group) whose mission is the management of integrated natural resources. The PhD comprises simulations of concrete cases by means of the EDF software Telemac.

## **CASTOR Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

IFPEN : Studies of coarsening strategies for the meshes used in reservoir simulations - H. Guillard

## CLIME Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

- Clime is partner with INERIS (National Institute for Environmental and Industrial Risks <http://www.ineris.com/en>) in a joint cooperation devoted to air quality forecast. This includes research topics in uncertainty estimation, data assimilation and ensemble modeling.

Clime also provides support to INERIS in order to operate the Polyphemus system for ensemble forecasting, uncertainty estimations and operational data assimilation at continental scale.

- Clime is partner with IRSN <http://www.irsn.fr/>, the French national institute for radioprotection and nuclear safety, for inverse modeling of emission sources and uncertainty estimation of dispersion simulations. The collaboration aims at better estimating emission sources, at improving operational forecasts for crisis situations and at estimating the reliability of forecasts. The work is derived at large scale (continental scale) and small scale (a few kilometers around a nuclear power plant).
- Clime takes part to a joint Ilab with the group SETH (Numtech <http://www.numtech.fr/>). The objective is to (1) transfer Clime work in data assimilation, ensemble forecasting and uncertainty estimation, with application to urban air quality, (2) identify the specific problems encountered at urban scale in order to determine new research directions, (3) carry out nowcasting rain events from radar images.

## **COFFEE Project-Team**

# **6. Bilateral Contracts and Grants with Industry**

## **6.1. Bilateral Contracts with Industry**

The project has industrial collaborations with Total, GDFSuez EP and Storengy on oil and gas recovery and gas storage.

The collaboration with Andra is concerned with the modelling and the simulation of mass and heat exchanges between porous media and ventilation channels. It leads to consider porous medium equations and hydrodynamic systems, coupled through intricate boundary conditions. Clearly one of the difficulties relies on the multiphase nature of the flows (at least water and air are present). We identify relevant physical scales, typical of the flows under consideration in nuclear waste engineering. We start by dealing with quite simple geometries, in order to discuss properly the order of magnitude of the different phenomena, and to design suitable schemes

## FLUMINANCE Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

### 7.1.1. Contrat CERSAT/IFREMER

**Participants:** Etienne Mémin, Valentin Resseguier.

*duration 36 months.* This partnership between Inria and Ifremer funds the PhD of Valentin Resseguier, which aims at studying image based data assimilation strategies for oceanic models incorporating random uncertainty terms. The goal targeted will consist in deriving appropriate stochastic version of oceanic model and on top of them to devise estimation procedures from noisy data to calibrate the associated subgrid models.

**KALIFFE Project-Team (section vide)**

## **LEMON Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

### ***7.1.1. Free surface hydraulics***

The finite volume-based, SW2D computational code (see Software section) is used by the **Cereg Ingénierie** company on a regular basis to carry out flood risk assessment studies. The code is constantly being developed on a work-for-hire basis depending on the company needs. The developments mostly concern pre- and post-processing functionalities, as well as specific hydraulic modules.



## **MAGIQUE-3D Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Contracts with TOTAL**

- Depth Imaging Partnership (DIP)  
Period: 2014 May - 2019 April , Management: Inria Bordeaux Sud-Ouest, Amount: 12000 euros/year.
- Propagateurs optimisés pour les ondes élastiques en milieux anisotropes  
Period: 2011 November - 2014 October, Management: Inria Bordeaux Sud-Ouest, Amount: 160000 euros.
- RTM en milieux hétérogènes par équations d'ondes élastiques  
Period: 2011 November - 2014 October, Management: Inria Bordeaux Sud-Ouest, Amount: 160000 euros.
- Construction de milieux équivalents en vue de la simulation d'ondes élastiques harmoniques en milieux fortement hétérogènes par des méthodes DG  
Period: 2012 October - 2015 October, Management: Inria Bordeaux Sud-Ouest, Amount: 165000 euros
- Simulation de la propagation d'ondes élastiques et visco-élastiques en régime harmonique par des méthodes Galerkin discontinues d'ordre élevé en maillage non structuré adaptées au calcul haute-performance.  
Period: 2012 October - 2015 October, Management: Inria Bordeaux Sud-Ouest, Amount: 165000 euros

## **MOISE Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

- A 1-year contract with NOVELTIS on the thematic “Développement de démonstrateurs avec AGRIF”: see [5.1](#)
- A 4-year contract named ReDICE (Re Deep Inside Computer Experiments) with EDF, CEA, IRSN, RENAULT, IFP on the thematic computer experiments.
- A 3-year contract (2015-2018) Projet à Partenariat Renforcé SIMBAD (SIMplified Boundary Atmospheric layer moDel for ocean modeling purposes) with the civil private company Mercator-Ocean (coordinator : F. Lemarié)
- A 3-year contract with ARTELIA Group: funding for the PhD thesis of M.P. Daou (CIFRE): see [4.4](#)

## POMDAPI Project-Team

# 6. Bilateral Contracts and Grants with Industry

## 6.1. Bilateral Contracts with Industry

**RTE** (Réseau de Transport de l'Électricité) and **ANRT** (Association Nationale de la Recherche et de la Technologie) are funding the PhD thesis of C. Josz (Cifre agreement).

**Andra** is funding the PhD thesis of S. Ali Hassan (an agreement that is part of an *accord Cadre* between Inria and Andra).

**IFP Énergies Nouvelles** (*Institut Français du Pétrole Énergies Nouvelles*) supports a collaboration on numerical methods for the flow simulation in porous media with fractures for modeling sedimentary basins or oil reservoirs. This collaboration concerns J. E. Roberts and J. Jaffré on the Inria side and I. Faille and A. Fumagalli on the IFPEN side.

**SAGE Project-Team (section vide)**

## **STEEP Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

The PhD thesis of Jean-Yves Courtonne is co-sponsored by ARTELIA and Inria, via a bilateral contract.

Related to the former computer vision research activities of team members, we still had one contract with EADS Astrium Satellites (now Airbus Defence and Space), where we appear as sub-contractor: DECSA (DGA).

## **TONUS Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

We are participating to a project with company AxesSim in Strasbourg. The objective is to help to the development of a commercial software for the numerical simulation of electromagnetic phenomena. The applications are directed towards antenna design and electromagnetic compatibility. This project is partly supported by DGA through "RAPID" (régime d'appui à l'innovation duale) funds. The CIFRE PhD of Thomas Strub is part of this project. Another CIFRE PhD will start in AxesSim on the same kind of subjects in March 2015.

## **BIOCORE Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

**La Compagnie du Vent:** the objective of the contract is to predict the impact of large scale raceway design on microalgal productivity using our Inalgae software platform.

**BioEnTech:** the contract with the BioEnTech start-up is aiming at developing new functionalities for ODIN in order to improve the advanced monitoring and control of industrial anaerobic digesters

**Enea Consulting:** the contract is dealing with the estimation of the potential overall microalgae production in France, using the light-temperature models that we have developed.

**CARMEN Team (section vide)**



## **DRACULA Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

The industrial connections of the Dracula team have been made through the "Modeling of the immune response" project. Contacts have been established with both large pharmaceutical companies (Sanofi-Pasteur and Merial) and SMEs (Altrabio and Cosmo). The current ANR PrediVac incorporates the two aforementioned SMEs and therefore strengthens the ties between Dracula and its industrial local ecosystem.

**M3DISIM Team (section vide)**

## **MAMBA Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Contracts with Industry**

Collaboration with Merrimack Pharmaceuticals on spatial-temporal modeling of drug action.

**MASAIE Project-Team (section vide)**

**MODEMIC Project-Team (section vide)**

**MYCENAE Project-Team (section vide)**

## **NUMED Project-Team**

# **6. Bilateral Contracts and Grants with Industry**

## **6.1. Bilateral Contracts with Industry**

- Annual contract with Sanofi Pasteur on vaccine fiability (third annual contract, including a 6 months temporary position.
- Four years framework contrat with Servier.

## **REO Project-Team**

# **7. Bilateral Contracts and Grants with Industry**

## **7.1. Bilateral Grants with Industry**

### **7.1.1. CIFRE convention**

**Participants:** Céline Grandmont, Nicolas Pozin, Irène Vignon-Clementel.

CIFRE convention and contract with Air Liquide Santé International in the context of the ANRT on “Multiscale lung ventilation modeling in health and disease”, for the PhD thesis of Nicolas Pozin (March 2014 - February 2017).



## SISYPHE Project-Team

# 6. Bilateral Contracts and Grants with Industry

## 6.1. SciWorks Technologies contract: development of K-Assessor

**Participants:** Habib Jreige, Michel Sorine.

*Development of K-Assessor.* This contract ended in November 2014. The software K-Assessor has been developed with SciWorks Technologies for the monitoring and supervision of *master GC*, a prototype system of Fresenius-Kabi dedicated to glycemic control assistance based on the control algorithm CGAO\_v2, we have previously developed [43].

*Distribution of ISTL.* ISTL is a software that we developed for numerical computation of the inverse scattering transform for electrical transmission lines. In addition to the inverse scattering transform, it includes a numerical simulator generating the reflection coefficients of user-specified transmission lines. With the aid of a graphical interface, the user can interactively define the distributed characteristics of a transmission line. ISTL is now distributed by **SciWorks Technologies**.