

*Inria*

RESEARCH CENTER

FIELD

**Digital Health, Biology and Earth**

Activity Report 2019

# **Section Contracts and Grants with Industry**

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

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

## **BIGS Project-Team**

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

## **8.1. Bilateral Contracts with Industry**

Bruno Scherrer has done some consulting for EDF. This was a skill transfer activity involving training and consulting on the theory and algorithms for reinforcement learning, for the Research & Development team of EDF lead by Lorenzo Audibert. This R&D team wants to apply reinforcement learning to several EDF problems: optimizing maintenance of uranium rods in the cores of nuclear power plants, optimization of load profiles for a network of electric vehicles. Bruno Scherrer's role was to give them the basics of reinforcement learning theory, and help them to use the algorithms of the literature. It was a one-shot action, running in 2018 and 2019, and contractualized via a "framework agreement" Inria-EDF. This contract brings in approximately 12,000 euros to BIGS team (among which 2,000 for mission expenses).

R. Azaïs, A. Gégout-Petit, F. Greciet collaborated with SAFRAN Aircraft Engines (through a 2016-2019 contract). SAFRAN Aircraft Engines designs and products aircraft engines. For the design of pieces, they have to understand the mechanism of crack propagation under different conditions. BIGS models crack propagation with Piecewise Deterministic Markov Processes (PDMP).

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



## DYLISS Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *SANOFI: co-supervised PhD*

**Participant:** Emmanuelle Becker.

This collaboration project is focused on the implementation of an integrative analysis framework based on semantic web technologies and reasoning in the framework of systemic lupus erythematosus pathology [42].

**CIFRE co-supervised Grant: Ph.D. funding. 2017-2020**

### 8.1.2. *Theranexus: co-supervised internship*

**Participant:** Pierre Beaudier.

This collaboration project was focused on assessing public databases' relevance for predicting potential drug combinations in central nervous system's pathologies [32]. It opened the perspective of a CIFRE PhD with Insilience (under review by ANRT) **Theranexus funding. 2019**

## ERABLE Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Grants with Industry

### 7.1.1. Spock

- Title: characterization of hoSt-gut microbiota interactions and identification of key Players based on a unified reference for standardized quantitative metagenOmics and metaboliC analysis framework
- Industrial Partner: MaatPharma (Person responsible: Lilia Boucinha).
- ERABLE participants: Marie-France Sagot (ERABLE coordinator and PhD main supervisor with Susana Vinga from IST, Lisbon, Portugal, as PhD co-supervisor), Marianne Borderes (beneficiary of the PhD scholarship in MaatPharma).
- Type: ANR Technology (2018-2021).
- Web page: <http://team.inria.fr/erable/en/projects/#anr-technology-spock>.

## GENSCALE Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *Tank milk analysis*

**Participants:** Dominique Lavenier, Jacques Nicolas.

The Seenergi company has developed a biotechnology protocol to detect cow mastitis directly by analyzing the DNA in the milk of the tanks. Cows are first genotyped. Since cows with mastitis produce a high level of lymphocytes, a DNA milk analysis can point out infested cows. Currently, DNA chips are used to support this analysis. We are currently investigating the possibility to use sequencing technologies in order to both reduce cost analysis and to extend the detection to larger herds.

## 8.2. Bilateral Grants with Industry

### 8.2.1. *Rapsodyn project*

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

RAPSODYN is a long term project funded by the IA ANR French program (Investissement d'Avenir) and several field seed companies, such as Biogemma, Limagrain and Euralis (<http://www.rapsodyn.fr>). The objective is the optimization of the rapeseed oil content and yield under low nitrogen input. GenScale is involved in the bioinformatics work package to elaborate advanced tools dedicated to polymorphism detection and analysis.

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

## **LIFEWARE Project-Team**

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

## **8.1. Bilateral Contract with Institut de recherche Servier**

In the framework of the Cifre PhD thesis of Jeremy Grignard at Servier, we work on the coupling between computational modeling and biological experiment design, and on chemical reaction network inference methods from data time series.

## **8.2. Bilateral Grant with Johnson&Johnson France**

In the framework of the Cifre PhD thesis of Eléa Greugny at Johnson&Johnson Santé Beauté France, we work on the computational modeling of inflammatory process in the skin, using multi-scale modeling and multi-agent simulation.

## **MORPHEME Project-Team**

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

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

General Electric Healthcare: a 2 months (from feb. 2019 to mar. 2019) for the end of the thesis of E. Poulain.

Bayer, Lyon: a 36 months (from aug. 2018 to jul. 2021) companion contract for the Cifre thesis of S. Laroui.

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

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



## SERPICO Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral grants with industry

### 8.1.1. *Contract with Fourmentin-Guilbert Foundation: Macromolecule detection in 3D cellular cryo-electron tomograms*

**Participants:** Emmanuel Moebel, Charles Kervrann.

*Duration: 5 months (Dec 2019 – Apr 2020).*

The objective of the project is to improve the DeepFinder software dedicated to the detection and identification of macromolecules within 3D cellular cryo-electron tomograms. In collaboration with Fourmentin-Guilbert Foundation, the goal is to build cellular atlases of several organisms from localizations of macromolecules (see Software DeepFinder in Section 6.9).

**Funding:** Fourmentin-Guilbert Foundation.

**Collaborators:** D. Larivière & E. Fourmentin (Fourmentin-Guilbert Foundation), A. Martinez & W. Baumeister (Max Planck Institute, Martinsried, Germany).

### 8.1.2. *Contract with DGA: Motion saliency analysis in videos*

**Participants:** Léo Maczyta, Patrick Bouthemey.

*Duration: 36 months (Oct 2017 – Sep 2020).*

This project funded by the DGA (Ministry of defense) and Région-Bretagne concerns the PhD thesis (co-funding) carried out by Léo Maczyta. The goal is to develop motion saliency methods along three axes: temporal motion saliency detection, saliency map estimation, trajectory-based saliency detection (see Section 7.10).

**Funding:** DGA (National Defense Agency) and Région-Bretagne.

### 8.1.3. *Contract with GATACA Systems: Super-resolution microscopy and in live cell imaging*

**Participants:** Jean Salamero, Ludovic Leconte, Charles Kervrann.

*Duration: 36 months (Jan 2017 – Dec 2019).*

The objective of the project is to transfer innovations for Multi-Angle TIRFM (using Azimuthal TIRFM from Ila2) and collaborate as “ $\beta$ -Test site” for SIM in Nipkow disk microscopy (product: Live-SR).

**Funding:** GATACA Systems company.

**Collaborators:** C. Gueudry (GATACA Systems), J. Boulanger (MRC Laboratory of Molecular Biology, Cambridge Biomedical Campus, UK).

### 8.1.4. *Contract with CryoCapCell SA: 3D LIVE CLEM (Correlative Light and Electron Microscopy) to decipher fates and functions of exosomes in vivo*

**Participant:** Jean Salamero.

*Duration: 24 months (Oct 2018 – Sep 2020).*

The objective of the project is to link dynamic biogenesis of intracellular membrane compartments with their ultrastructures. It combines fast high resolution photonic imaging (MA-TIRFM and fast high pressure freezing for 3D cryoEM). It requires adapted registration methods in 3D, in order to navigate through the multiple scales.

**Funding:** DIM-ELICIT Empowering Life sCiencies with Innovative Technologies (Région Ile de France).

**Collaborators:** G. Van Niel (coordinator, Institute of Psychiatry and Neuroscience of Paris), G. Raposo (CNRS-UMR 144 Institut Curie PSL Research), X. Heiligenstein (CryoCapCell SA).

## ARAMIS Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Grants with Industry

### 8.1.1. Carthera

**Participants:** Stéphane Epelbaum [Correspondant], Alexandre Carpentier, Anne Bertrand, Marie Odile Habert.

Project title: Open label phase 1/2 study evaluating the safety and usefulness of transient opening of the blood-brain barrier using low intensity pulsed ultrasounds generated by the implantable device SONOCLOUD in patients with mild Alzheimer's disease

Started in 2016

Amount: 400 K€

Coordinator: Stéphane Epelbaum

Other partners: UPMC, AP-HP

Abstract: This project aims at opening the blood brain barrier (BBB) in 10 mild Alzheimer's disease patients in order to improve the clearance of beta-amyloid and tau deposits in their brain as suggested in mice models of the disease. This first in man study will evaluate the safety and efficacy of an implanted device, SONOCLOUD, to open the BBB 7 times in each participant. Efficacy will be evaluated on the ability of the method to decrease the amyloid load evidenced by AV45 Positron Emission Tomography (PET), increase the brain metabolism analyzed by Fluorodeoxyglucose PET and improve cognition. If successful, this study will pave the way for future trials in which drugs can be used in addition to BBB opening to maximize their effect.

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

## BIOVISION Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *Helping visually impaired employees to follow presentations in the company: Towards a mixed reality solution*

Participants: Riham Nehmeh [InriaTech], Carlos Zubiaga [InriaTech], Julia-Elizabeth Luna [InriaTech], Arnaud Mas [EDF], Alain Schmid [EDF], Aurélie Calabrèse, Pierre Kornprobst

Duration: 2 months

The objective of the work is to develop a first proof-of-concept (PoC) targeting a precise use-case scenario defined by EDF (contract with InriaTech, supervised by Pierre Kornprobst). The use-case is one of an employee with visual impairment willing to follow a presentation. The idea of the PoC is a vision-aid system based on a mixed-reality solution. This work aims at (1) estimating the feasibility and interest of such kind of solution and (2) identifying research questions that could be jointly addressed in a future partnership.

APP Deposit (on-going)

## **CAMIN Project-Team**

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

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

NEURINNOV startup finances half of the PhD thesis salary of Lucie William.

## EMPENN Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. Siemens

**Participants:** Elise Banner, Christian Barillot, Emmanuel Caruyer, Olivier Commowick, Isabelle Corouge, Jean-Christophe Ferré, Jean-Yves Gauvrit.

In the context of the Neurinfo imaging platform, a master research agreement between Siemens SAS - Healthcare and University of Rennes 1 defines the terms of the collaboration between Siemens, Empenn and the Neurinfo platform. Relying on this research agreement contract, Neurinfo 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. As an example, the diffusion sequence code was modified to load arbitrary diffusion gradient waveforms for the FastMicroDiff project led by E. Caruyer. This is crucial in the collaboration since it enables the development of MRI sequences on site. The MR Diffusion pulse sequence source code was modified in collaboration with our Siemens clinical scientist as part of our Master Research Agreement, Marc Lapert, in order to play arbitrary gradient waveforms. This was done on the Syngo VB17 software version and again VE11C (nearly finished).

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## EPIONE Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

### 7.1.1. Microsoft Research

Microsoft Research is funding through the Inria-Microsoft joint lab the projects "[4D Cardiac MR Images](http://www.msr-inria.fr/projects/4d-cardiac-mr-images)"<sup>0</sup> and "[Medilearn](http://www.msr-inria.fr/projects/medilearn)"<sup>0</sup> which aim 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 Pawel Mlynarski.

### 7.1.2. Spin-off company inHEART

[inHEART](https://www.inheart.fr/)<sup>0</sup> is a spin-off of the Epione team and IHU Liryc founded in 2017. inHEART provides a service to generate detailed anatomical and structural meshes from medical images, that can be used during ablation interventions. inHEART received 2 awards, one from Aquitaine region and one i-LAB from the BPI. It currently employs 10 people.

### 7.1.3. Live Anatomy

A 3 month InriaTech contract was performed with the Live Anatomy start-up between January and March 2019 in order to develop a remote viewer and to optimise image segmentation.

### 7.1.4. Siemens HealthCare

Siemens Healthcare, Medical Imaging Technologies, Princeton, NJ (U.S.A). is funding the PhD work of Julian Krebs which aims at developing robust medical image registration methods

### 7.1.5. Quantificare

The company [Quantificare](#) is funding the PhD of Florent Jousse through a CIFRE grant, on the statistical analysis of shapes, deformations and appearance of anatomical surfaces for computer-aided dermatology and plastic surgery. The primary purpose is to model complex face deformations such as natural aging, facial expressions, surgical interventions and posture motions.

### 7.1.6. Oticon Medical

Oticon Medical, Vallauris, France, is co-funding the PhD work of Zihao Wang which aims at developing robust medical image algorithms for cochlea image segmentation.

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<sup>0</sup><http://www.msr-inria.fr/projects/4d-cardiac-mr-images>

<sup>0</sup><http://www.msr-inria.fr/projects/medilearn>

<sup>0</sup><https://www.inheart.fr/>

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



## **MIMESIS Team**

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

## **8.1. Bilateral Contracts with Industry**

- **Siemens:** A global leader in healthcare industry. Via IHU, we collaborate with Siemens in the context of the IHU project CIOS Alpha Fusion dealing with augmentation of the intra-operative image provided by a fluoroscopic imaging modality with pre-operative data.
- **Naviworks:** A South Korean company specialized in ICT convergence simulation/IoT smart controlling. We collaborate on simulation and visualization in the context of interventional radiology.
- **Marion surgical:** we have continued our interactions with the start-up Marion Surgical based in Canada through the transfer of our technology related to the simulation of needle insertion.

## MNEMOSYNE Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *Contract with CEA Cesta*

**Participants:** Frédéric Alexandre, Guillaume Padiolleau.

In the context of the PhD of Guillaume Padiolleau, we are working with the CEA on possible interactions between model-based and model-free approaches of reinforcement learning, based on cognitive consideration. Particularly, to decrease the complexity of exploration of a large data space in model-free approaches, we aim at considering introducing a priori knowledge coming from a model and we also propose to consider motivation as another way to orient the search in the learning space. This is applied in the robotic domain to manipulations by a robotic arm.

### 8.1.2. *Contract with Ubisoft*

**Participants:** Frédéric Alexandre, Pramod Kaushik.

Together with the Inria Project-team Flowers, we are working with the video game editor Ubisoft to define original bio-inspired learning methods, to qualify the behavior of human players observed during runs of games. Such learning algorithms will be specifically considered in the PhD of Pramod Kaushik.

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

## OPIS Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

- PhD Contract with IFP Energies Nouvelles  
Project title: Polynomial optimization for sparse signal recovery  
Duration: 2018-2020  
Leaders: M. Castella and J.-C. Pesquet
- PhD Contract with IFP Energies Nouvelles  
Project title: Seismic signal analysis by using neural networks  
Duration: 2019-2022  
Leaders: A. Fraysse and J.-C. Pesquet
- PhD Contract with Thales Group  
Project title: Neural network solutions for safety of complex systems  
Duration: 2019-2022  
Responsible: J.-C. Pesquet and F. Malliaros
- PhD Contract with General Electric Healthcare  
Project title: Minimally invasive assessment of coronary disease  
Duration: 2018-2021  
Leader: Hugues Talbot
- PhD Contract with General Electric Healthcare  
Project title: Optimization methods for breast tomosynthesis  
Duration: 2017-2020  
Leader: J.-C. Pesquet and E. Chouzenoux
- PhD Contract with General Electric Healthcare  
Project title: Reconstruction 3D interventionnelle  
Duration: 2019-2022  
Leader: J.-C. Pesquet and E. Chouzenoux
- PhD Contract with IFP Energies nouvelles  
Project title: Graph-based learning from integrated multi-omics and multi-species data  
Duration: 2019-2022  
Leader: F. Malliaros and J.-C. Pesquet
- Contract with Schneider Electric  
Project title: Neural network modeling of electrical motors  
Duration: 2019  
Leader: J.-C. Pesquet
- Contract with SNCF  
Project title: SIARA project: Developing an automatic system based on deep learning which monitors different types of defects in the current railway network of France.  
Duration: 2018-2019  
Leader: M. Vakalopoulou
- Contract with SNCF  
Project title: SNCF Platipus: Examining the potential of machine learning algorithms in the analysis of scouring reports of aquatic foundations.  
Duration: 2019-2020  
Leader: F. Malliaros, M. Vakalopoulou.

## PARIETAL Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

In 2019, a CIFRE PhD thesis was launched with Siemens-Healthineers France. This contract supports the PhD thesis of Guillaume Daval-Fr erot.

## 8.2. Scikit-learn Consortium

Scikit-learn is a machine-learning library in Python. It is the engine that powers many applications of artificial intelligence and data science.

Scikit-learn is used on a regular basis by more than half a million people in the world, with applications ranging from medical imaging to product recommendation.

Scikit-learn is an open-source software, under BSD license that facilitates commercial usage. It is developed by a world-wide community, gathering many different expertise on statistics, algorithms and software production.

The quality of scikit-learn, its algorithms, its interfaces, its documentation, are universally acclaimed. Its development follows a strict process to ensure this quality.

The goal of the foundation is to enable maintaining scikit-learn's high standards addressing new challenges.

The foundation employs central contributors to the project, to support scikit-learn's community and to develop new ambitious features. The priorities of the foundation are set jointly by the community and its sponsors.

More information can be found here <http://scikit-learn.fondation-inria.fr/home>.

The consortium is supported by 8 companies and has an annual budget of about half a million euros.

## AIRSEA Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

A 3-year contract (from June 2016 to June 2019) named ALBATROSS with Mercator-Ocean on the topic « Interaction océan, vagues, atmosphère à haute résolution» (PI: F. Lemarié).

A 2-year contract with Mercator-Ocean on the thematic "The AGRIF software in the NEMO European ocean model": see [5.1](#)

Contract with IFPEN (Institut Français du pétrole et des énergies nouvelles), for the supervision of a PhD (Adrien Hirvoas). Research subject: Development of a data assimilation method for the calibration and continuous update of wind turbines digital twins

The Chair OQUAIDO – for "Optimisation et QUAntification d'Incertitudes pour les Données Onéreuses" in French – is the chair in applied mathematics held at Mines Saint-Étienne (France). It aims at gathering academical and technological partners to work on problems involving costly-to-evaluate numerical simulators for uncertainty quantification, optimization and inverse problems. This Chair, created in January 2016, is the continuation of the projects DICE and ReDICE which respectively covered the periods 2006-2009 and 2011-2015. Reda El Amri's PhD thesis [1] has been funded by OQUAIDO. The Chair is reconducted for one year in 2020 and then a new contract should be approved by all partners for a new 4-years period.

## **ANGE Project-Team**

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

## **8.1. Bilateral Contracts with Industry**

- A contract between Institut Carnot SMILES and the corporation GTT involving (Jacques Sainte-Marie, Cindy Guichard, Yohan Penel and Julien Salomon) of 78 k€ has been approved. The aim is to improve the numerical modelling tool to simulate gas flows in the insulation spaces of LNG tankers. A Ph. D. thesis should start next year on that topic.

## **8.2. Bilateral Grants with Industry**

- The ANR project Hyflo-Eflu relies on a collaboration with the company "HydroTube Energie", that ended in December has given rise to deep collaboration with Hydotube Energy.
- The ANR project Firecaster supports the Ph. D. Thesis of F. Allaire on the development of a fire decision support system at the national scale to estimate upcoming fire risk. The collaborations are CERFACS and CNRM (recherche de Météo-France).
- The ANR project Cense supports the Ph. D. Thesis of A. Lesieur on the development of a new methodology for the production of more realistic noise maps. The industrial collaborations include:
  - Bouygues Énergies & Services
  - Wi6Labs
  - Bruitparif (association)

We refer to

<https://cense.ifsttar.fr/partenaires/entreprises-privees/>

<https://cense.ifsttar.fr/partenaires/associations/>

for more details.

## **8.3. Other collaborations with Industry**

- On the public operational side, ANGE team works with IRSN and its Modelling Bureau environmental transfers for the study of consequences of accidents (BMCA). This collaboration led to Bao Le's thesis. For more details, we refer to <https://www.irsn.fr/FR/Larecherche/Organisation/equipes/radioprotection-homme/BMCA/Pages/bureau-modelisation-transferts-environnement-etude-consequences-accidents.aspx>
- On the corporate side, ANGE collaborates with NUMTECH for pollution modelling. We mention also the long term collaboration with Ambiciti- co-founded by V. Mallet. In particular, the newspaper Ouest-France uses Ambiciti's air quality forecasts since the summer, so with the algorithms that come from ANGE. <https://www.ouest-france.fr/meteo/>
- Y. Penel obtained a partial support from EDF for the organisation of the project SGN-Num at CEMRACS 2019.

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



## **COFFEE Project-Team**

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

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

- Contract with Andra financing the two year postdoctoral position of Joubine Aghili (october 2017 - september 2019) and dealing with the simulation of compositional liquid gas Darcy flows in highly heterogeneous porous medium with network of fractures using Discrete Fracture Matrix models (DFM). It is applied to the simulation of the desaturation of the nuclear waste storage in the neighbourhood of the galleries. Supervision Roland Masson and Konstantin Brenner from LJAD-Inria, Jean-Raynald de Dreuzy from Geosciences Rennes and Laurent Trenty from Andra.
- The team has also on-going collaboration with Storengy (post-doc of Daniel Constantin-Quiroz).

## FLUMINANCE Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

### 7.1.1. Contract ITGA

**Participants:** Dominique Heitz, Etienne Mémin.

*duration 36 months.* This partnership between Inria, Irstea and ITGA funds the PhD of Romain Schuster. The goal of this PhD is to design new image-based flow measurement methods for the study of industrial fluid flows. Those techniques will be used in particular to calibrate industrial fume hood.

### 7.1.2. Contract CSTB

**Participants:** Mohamed Yacine Ben Ali, Dominique Heitz, Etienne Mémin.

*duration 36 months.* This partnership between Inria, Irstea and CSTB funds the PhD of Yacine Ben Ali. This PhD aims to design new data assimilation scheme for Reynolds Average Simulation (RANS) of flows involved in wind engineering and buildings construction. The goal pursued here consists to couple RANS models and surface pressure data in order to define data driven models with accurate turbulent parameterization.

## LEMON Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. IRT

In late 2019, we started a new collaboration with **IRT Saint-Exupéry** for the hybridization of numerical models and large amount of data for the modeling of urban floods.

## 7.2. Berger-Levrault

A research collaboration convention was signed with Berger-Levrault company (Montpellier) for three years, in the framework of Yassine Bel-Ghaddar thesis (CIFRE ANRT France/Maroc).

## 7.3. CEREG/GERIMU

The GERIMU project entered its second phase in 2019. The industrial version of the SW2D computational code was parallelized and tested by ASA Company (subcontractor). Integration of all software components into the final software product will take place during the first half of 2020.

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

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

## **8.1. Contracts with TOTAL**

- Depth Imaging Partnership (DIP)
- Depth Imaging Partnership (DIP2)  
Period: 2014 May - 2019 April , Management: Inria Bordeaux Sud-Ouest, Amount: 120000 euros/year.
- Depth Imaging Partnership (DIP3)  
Period: 2019 May - 2021 December , Management: Inria Bordeaux Sud-Ouest, Amount: 120000 euros/year.
- Tent Pitcher algorithm for space-time integration of wave problems Period: 2019 November - 2022 October, Management: Inria Bordeaux Sud-Ouest, Amount: 165000 euros.
- Isogeometric analysis of sharp boundaries in fullwaveform inversion Period: 2019 January - 2021 December, Management: Inria Bordeaux Sud-Ouest, Amount: 55000 euros.
- FWI (Full Waveform Inversion) dans le domaine temporel utilisant des méthodes numériques hybrides pour la caractérisation de milieux élasto-acoustiques. Period: 2017 October - 2020 December , Management: Inria Bordeaux Sud-Ouest, Amount: 180000 euros.
- Petrophysics in pre-salt carbonate rocks  
Period: 2019 November - 2021 June, Management: Inria Bordeaux Sud-Ouest, Amount: 142000 euros.

## SERENA Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

One new two-part contract with **EDF** accompanying the PhD thesis of Idrissa Niakh.

One new two-part contract with **CEA** accompanying the postdoc of Guillaume Delay.

One new two-part contract with **IFP Energies Nouvelles** accompanying the PhD thesis of Joëlle Ferzly.

Three-part contract Inria-**EDF-Sciworks Technologies** (2017–2020) on “Form-L for the formalization of constraints of complex systems”. SERENA representants are François Clément, Sébastien Furic and Pierre Weis.

**AMIES** contract with **ITASCA**, January 10, 2019 - March 10, 2020. SERENA representants are François Clément, Sébastien Furic, Florent Hédin, Michel Kern, Géraldine Pichot.

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## STEEP Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

Contract with **ADEME** (French Environment and Energy Management Agency<sup>0</sup>), within a collaboration with FCBA<sup>0</sup>, Arvalis<sup>0</sup>, Terres Univia<sup>0</sup>, and Terres Inovia<sup>0</sup>. Design and development of an interactive spreadsheet application for scenarizing non-food biomass flows in France, from production to consumption (energy and non-energy uses). Visualization in the form of Sankey diagrams.

Contract with **Aura-EE** (Energy and Environment Agency of the Auvergne–Rhône-Alpes Region<sup>0</sup>), within the Interreg Alpine Region program. Estimation of material flows within the wood supply chain in the Alps European Region.

Contract with **Aura-EE** within the European project IMEAS. Estimation of wood flows between the Vercors Regional Natural Parc and the Grenoble metropolitan area.

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<sup>0</sup><https://www.ademe.fr/en>

<sup>0</sup><https://www.fcba.fr>

<sup>0</sup><https://www.arvalisinstitutduvegetal.fr/gis-@/view-607-arvstatiques.html>

<sup>0</sup><http://www.terresunivia.fr>

<sup>0</sup><https://www.terresinovia.fr>

<sup>0</sup><https://en.auvergnerhonealpes-ee.fr>

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**TONUS Project-Team**

## 8. Bilateral Contracts and Grants with Industry

### 8.1. Bilateral Contracts with Industry

We collaborate with EDF Chatou in the context of L. Quibel PhD. The objective is to design new Equations Of States (EOS) for the simulation of multiphase flows. The EOS cannot be chosen arbitrarily if one wants to ensure the stability of the fluid model. We are also interested to apply our palindromic method for computing low-Mach liquid-vapor flows.

We are involved in a common project with the 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 was partly supported by DGA through "RAPID" funds. A CIFRE PhD has started in AxesSim on the same kinds of subjects in March 2015 (Bruno Weber). The new project is devoted to the use of runtime system in order to optimize DG solvers applied to electromagnetism [33]. The resulting software will be applied to the numerical simulation of connected devices for clothes or medicine. The project is supported by the "Banque Publique d'Investissement" (BPI) and coordinated by the Thales company.

## **BIOCORE Project-Team**

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

## **8.1. Bilateral Contracts with Industry**

**BioEnTech:** the collaboration 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.

**Inalve:** with the Inalve start-up we develop a breakthrough process that we patented, in which microalgae grow within a moving biofilm. The objective of the collaboration is to optimize the process by enhancing productivity, while reducing environmental footprint.

## **8.2. Bilateral Grants with Industry**

**Exactcure:** in the collaboration with the start-up Exactcure (Nice), the goal of the project is to study pharmacokinetic models. Exactcure and Biocore agreed for a transfer of intellectual property concerning the work of former intern L. Dragoni.



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

## COMMEDIA Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *Notocord Systems*

**Participants:** Damiano Lombardi, Fabien Raphel.

This work is devoted to the investigation on new approaches and efficient algorithms in the context of safety pharmacology and the analysis of biological signals.

### 8.1.2. *Casis*

**Participants:** Mucia Agbalessi, Miguel Ángel Fernández Varela, Damiano Lombardi.

This work is devoted to the combination of 4D-MRI data and fluid-structure interaction models of blood flow to assess indicators of aneurysm rupture.

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

## **M3DISIM Project-Team**

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

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

- Technical contract with CEA-LIST on the modelling of rough interfaces in the context of wave scattering (10k€)

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

## **MONC Project-Team**

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

## **8.1. Bilateral Contracts with Industry**

- Research contract between Roche and the MONC team.
- Collaboration contract with Sophia Genetics in the context of the Pimiento project.

## **8.2. Bilateral Grants with Industry**

Pimiento project from MSDAvenir (<http://www.msdatenir.fr/>) through Inria Foundation.

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

## **REO Team**

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

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

**Participants:** Lazaros Papamanolis, Irene Vignon-Clementel [local coordinator].

Contract with ESIEE (H. Talbot, L. Najman) for collaboration with the Heartflow company.



## **SISTM Project-Team**

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

## **8.1. Contracts and Grants with Industry**

Implication in research for the development of Ebola vaccine has lead to several indirect contracts with industry:

- The EBOVAC1, EBOVAC2 and EBOVAC3 project, collaboration with Janssen from Johnson et Johnson.
- The Prevac trial vaccine trial (legal sponsors: Inserm, NIH, London School of Hygiene and Tropical Medicine) involves collaborations with Merck and Janssen. The purpose of this study is to evaluate the safety and immunogenicity of three vaccine strategies that may prevent Ebola virus disease (EVD) events in children and adults. Participants will receive either the Ad26.ZEBOV (rHAd26) vaccine with a MVA-BN-Filo (MVA) boost, or the rVSV $\Delta$ G-ZEBOV-GP (rVSV) vaccine with or without boosting, or placebo. The EDCTP-2 funded Prevac-UP project is set as a continuation of Prevac trial in the same framework.

A new collaboration has started with the pharma company Ipsen on the integration of OMICS data into an in-silico trials pipeline (Cifre Phd to start in January 2020)

## **XPOP Project-Team**

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

## **8.1. Bilateral Contracts with Industry**

Contract with Dassault Systèmes

Contract with Lixoft