



RESEARCH CENTER  
Lille - Nord Europe

FIELD

## Activity Report 2017

# Section Contracts and Grants with Industry

Edition: 2018-02-19



#### APPLIED MATHEMATICS, COMPUTATION AND SIMULATION

1. DOLPHIN Team .....	4
2. INOCS Team .....	5
3. MEPHYSTO Project-Team (section vide) .....	6
4. MODAL Project-Team .....	7
5. NON-A Project-Team .....	8
6. RAPSODI Project-Team .....	9
7. SEQUEL Project-Team .....	10

#### DIGITAL HEALTH, BIOLOGY AND EARTH

8. BONSAI Project-Team (section vide) .....	12
---	----

#### NETWORKS, SYSTEMS AND SERVICES, DISTRIBUTED COMPUTING

9. FUN Project-Team .....	13
10. RMOD Project-Team .....	14
11. SPIRALS Project-Team .....	15

#### PERCEPTION, COGNITION AND INTERACTION

12. DEFROST Project-Team .....	16
13. LINKS Project-Team (section vide) .....	17
14. MAGNET Project-Team .....	18
15. MINT2 Team .....	19
16. Mjolnir Team .....	20

## **DOLPHIN Team**

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

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

The Dolphin team has many bilateral contracts and grants with industry:

1. Beckman (2015-2018): the goal of this contract concerns the strategic and operational planning for medical laboratories (Phd of Sohrab Faramarzi).
2. PIXEO (2014-2018): the objective of this bilateral project is the predictive models and knowledge extraction for insurance web comparator (Phd of A-L. Bedenel).
3. Alicante (2014-2017): the objective of this CIFRE contract is the design of new optimization methods to extract knowledge from hospital data (Phd of M. Vandromme - defended in June 2017).
4. ONERA and CNES (2016-2020): this collaboration deals with the multi-disciplinary and multi-objective design of aerospace vehicles (Phd of J. Pelamatti and A. Hebbal).
5. Intel (2017) Bilateral academic and research partnership between Université Lille 1 and Intel. In this context, Intel provides Lille 1 with training (Dec 14<sup>th</sup>) and technical support help for the dissemination of its activities related to High Performance Computing.
6. Strat&Logic (2012-2017): the objective of this CIFRE contract is the optimization of economic decisions in a competitive business management simulator (Phd of S. Dufourny - Defended in October 2017).

## **INOCS Team**

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

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

Fluxys (2016-2018). Study of optimization problems arising in the management of gas networks.

HappyChic (2017). Study of optimization problems arising in the warehouse management context.

Keolis (2017). Study of optimization problems arising in the management of mediation officers in public transportation.

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

PARROT (Planning Adapter performing ReRouting and Optimization of Timing), part of BEWARE Fellowships Academia funded by the COFUND program of the European Union (FP7 - Marie Curie Actions). INFRABEL is the industrial partner of this project (2014-2018).

Design and Pricing of Electricity Services in a Competitive Environment within the Gaspard Monge Research Program (PGMO) funded by the Fondation Mathématiques Jacques Hadamard. EDF is the industrial partner (2015-2018).

BENMIP: A generic bender decomposition-based (mixed) integer programming solver within the Gaspard Monge Research Program (PGMO) funded by the Fondation Mathématiques Jacques Hadamard (2015-2017).

Robust Energy Offering under Market Equilibrium Constraints within the Gaspard Monge Research Program (PGMO) funded by the Fondation Mathématiques Jacques Hadamard. EDF is the industrial partner (2017-2018).

## **8.3. Inria Innovation Lab**

COLINOCS is an Inria Innovation Lab between Colisweb, a start-up company addressing last-mile delivery and INOCS, which was created at the end of 2016. This collaboration roots back to 2015, when a bilateral contract was devoted to optimization problems arising in courier scheduling. The main objective of this Innovation Lab is to model and solve optimization problems related to revenue management, transport mutualization, a better visibility on their activities for the couriers. See also: <https://www.inria.fr/innovation/transfert-technologique/labos-communs-inria-pme/inria-innovation-labs/colinocs>

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

## MODAL Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Florimond Desprez

**Participant:** Guillemette Marot.

Florimond Desprez is a company which breeds plant varieties and produces seeds, spreading its innovations across the different sectors of agriculture. This 2 months contract aimed at selecting candidate markers explaining the relationship between genotypes, organoleptic and nutritional qualities of chicory. It is a joint work with Quentin Grimonprez (InriaTech engineer).

## 8.2. Arcelor-Mittal

**Participants:** Christophe Biernacki, Vincent Vandewalle.

Arcelor-Mittal is a leader company in steel industry. This 11 months contract (which began in 2016) aims at optimizing predictive maintenance from mixed data (continuous, categorical, functional) provided by multiple sensors disseminated in steel production lines. Several thousands of sensors are simultaneously involved in this study, most of them providing functional (chronological) values.

It is a joint work with Quentin Grimonprez and Vincent Kubicki (InriaTech engineers).

## 8.3. Alstom

**Participants:** Christophe Biernacki, Benjamin Guedj, Vincent Vandewalle.

Alstom is a world leader company in integrated transport systems. This 10 months contract aims at optimizing predictive maintenance in rail switches from complex data, in particular chronological ones.

It is a joint work with Etienne Goffinet (InriaTech engineer).

## 8.4. Vallourec

**Participant:** Christophe Biernacki.

Vallourec is a world leader in premium tubular solutions for the energy markets and for other demanding industrial applications. This 9 months contract (which began in 2016) aims at predicting quality of tubular connections from mixed data (continuous, categorical, functional).

It is a joint work with Etienne Goffinet and Vincent Kubicki (InriaTech engineers).

## 8.5. Running Care

**Participant:** Christophe Biernacki.

Running Care is a young company providing sport and medical coaching, and personalized healthy advices, for injury prevention. It is based on a mobile and watch app that collects sports and medical data to make them smart. This 8 months contract aims at predicting injury risks for the runner based on past runs and planned ones. It uses also many other available information that the runner can provide through the app.

It is a joint work with Quentin Grimonprez (InriaTech engineer).

## **NON-A Project-Team**

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

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

Contract with Neotrope (Tourcoing, France), Technologies & Augmented Human UX. Subject: De-correlation of GSR measurements with acceleration, from March 2016 to September 2016, D. Efimov, R. Ushirobira.

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

Project of Autonomous control of clinic table with La Maison Attentive, 2016.

## **8.3. Bilateral Grants with Industry**

Collaboration with Safran Electronics & Defense (Massy-Palaiseau) in the framework of the CIFRE PhD thesis of Guillaume Rance on robust stabilization of gyrostabilized platforms (2014-2018).



## **RAPSODI Project-Team**

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

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

C. Cancès supervises the PhD Thesis of Nicolas Peton at IFPEN since October 15, 2015. The bilateral contract enters the framework agreement between Inria and IFPEN.

**SEQUEL Project-Team**

## 8. Bilateral Contracts and Grants with Industry

### 8.1. Bilateral Contracts with Industry

#### 8.1.1. *Lelivrescolaire.fr*

- contract with <http://Lelivrescolaire.fr>; PI: Michal Valko  
Title: Sequential Machine Learning for Adaptive Educational Systems  
Duration: Mar. 2018 – Feb. 2021

Abstract: Adaptive educational content are technologies which adapt to the difficulties encountered by students. With the rise of digital content in schools, the mass of data coming from education enables but also ask for machine learning methods. Since 2010, Lelivrescolaire.fr has been developing some learning materials for teachers and students through collaborative creation process. For instance, during the school year 2015/2016, students has achieved more than 8 000 000 exercises on its homework platform Afterclasse.fr. Our approach would be based on sequential machine learning: the algorithm learns to recommend some exercises which adapt to students gradually as they answer.

**Participants:** Julien Seznec, Alessandro Lazaric, Michal Valko.

#### 8.1.2. *OtherLang*

- contract with “OtherLang”; PI: Romaric Gaudel  
Title: Tool to support foreign language practice  
Duration: 2 months

Abstract: OtherLang develops an application to learn a foreign language by reading documents and interacting wit other people. During the time-line of the contract, SequeL brought his knowledge about Recommender Systems which may be used either to recommend documents to users or to recommend users to users.

**Participants:** Romaric Gaudel, Philippe Preux.

#### 8.1.3. *Sidexa*

- contract with “Sidexa”; PI: Jérémie Mary and then Philippe Preux  
Title: vision applied to the segmentation and recognition of car body parts parts  
Duration: 3 months

Abstract: We investigate deep learning to perform car body segmentation. The result being very good, a second contract will follow up this one in 2018.

**Participants:** Jérémie Mary, Philippe Preux.

#### 8.1.4. *Renault*

- contract with “Renault”; PI: Philippe Preux  
Title: State of the art in reinforcement learning regarding autonomous car control and path planning.  
Duration: 3 months (Jan–Mar 2017)

Abstract: This work has consisted in surveying the litterature related to autonomous car control, and reinforcement learning.

**Participants:** Alexis Martin, Odalric Maillard, Philippe Preux.

- contract with Renault; PI: Philippe Preux

Title: Control of an autonomous vehicle

Duration: 3 years (12/2017–11/2020)

Abstract: This contract comes along the CIFRE grant on the same topic. This work is done in collaboration with the NON-A team-project.

**Participants:** Édouard Leurent, Odalric Maillard, Philippe Preux.

#### 8.1.5. Critéo

- contract with “Criteo”; PI: Philippe Preux

Title: Computational advertizing

Duration: 3 years (12/2017–11/2020)

Abstract: This contract comes along the CIFRE grant on the same topic. The goal is to investigate reinforcement learning and deep learning on the problem of ad selection on the Internet.

**Participants:** Philippe Preux, Kiewan Villatell.

#### 8.1.6. Orange Labs

- contract with “Orange Labs”; PI: Philippe Preux

Title: Sequential Learning and Decision Making under Partial Monitoring

Duration: Oct. 2014 – Sep. 2017

Abstract: This contract comes along the CIFRE grant on the same topic. In applications such as recommendation systems, or computational advertising, the return collected from the user is partial: (s)he clicks on one item, or no item at all. We study this setting in which only a “partial” information is gathered in particular how to learn to behave optimally in such a setting.

**Participants:** Pratik Gajane, Philippe Preux.

#### 8.1.7. Orange Labs

- contract with “Orange Labs”; PI: Olivier Pietquin

Title: Inter User Transfer in dialogue systems

Duration: 3 years

Abstract: This contract comes along the CIFRE grant on the same topic. The research aims at developing new algorithms to learn fast adaptation strategies for dialogue systems when a new user starts using them while we collected data from previous interactions with other users. Especially, it addresses the cold-start problem encountered when a new user faces the system, before samples can be collected to optimize the interaction strategy.

**Participants:** Merwan Barlier, Nicolas Carrara, Olivier Pietquin.

#### 8.1.8. 55

- contract with “55”; PI: Jérémie Mary

Title: Novel Learning and Exploration-Exploitation Methods for Effective Recommender Systems

Duration: Oct. 2015 – Sep. 2018

Abstract: This contract comes along the CIFRE grant on the same topic. In this Ph.D. thesis we intend to deal with this problem by developing novel and more sophisticated recommendation strategies in which the collection of data and the improvement of the performance are considered as a unique process, where the trade-off between the quality of the data and the performance of the recommendation strategy is optimized over time. This work also consider tensor methods (one layer of the tensor can be the time) with the goal to scale them at RS level.

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

## **FUN Project-Team**

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

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

- Evolution

**Participants:** Gabriele Sabatino, Nathalie Mitton [correspondant].

This collaboration aims to set up a full RFID system on the basis of AspireRFID middleware and pre-existing RFID modules issued from FUN research in the Evolution company facility and to integrate them with their IS.

## RMOD Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *BlockChain*

Participants: Henrique Rocha, Marcus Denker, Stéphane Ducasse  
From 2016, ongoing.

We started a new collaboration with a local startup (UTOCAT) about tools and languages in the context of Blockchain systems. The collaboration started with a 2 month exploration phase involving an engineer at Inria Tech. A postdoc started in 2017.

### 8.1.2. *Pharo Consortium*

Participants: Esteban Lorenzano, Clément Béra, Marcus Denker, Stéphane Ducasse  
From 2012, ongoing.

The Pharo Consortium was founded in 2012 and is growing constantly. By the end 2017, it has 27 company members, 14 academic partners. Inria supports the consortium with one full time engineer starting in 2011. In 2018, the Pharo Consortium will join InriaSoft.

More at <http://consortium.pharo.org>.

## 8.2. Bilateral Grants with Industry

### 8.2.1. *Worldline CIFRE*

Participants: Vincent Blondeau, Anne Etien, Nicolas Anquetil  
From 2014 to 2017.

We are working on improving the testing behavior of the developers.

The PhD started in October 2014 and finished in 2017: Vincent Blondeau, *Test Selection Practices in a Large IT Company*, CIFRE WorldLine, November 8th, University Lille 1 (France),

### 8.2.2. *Thales CIFRE*

Participants: Brice Govin, Anne Etien, Nicolas Anquetil, Stéphane Ducasse  
From 2015, ongoing.

We are working on large industrial project rearchitecturization. PhD in progress: Brice Govin, *Support to implement a rejuvenated software architecture in legacy software*. CIFRE Thale started Jan 2015.

### 8.2.3. *Remodularization of Architecture*

Participants: Anne Etien, Nicolas Anquetil, Stéphane Ducasse  
From 2017, ongoing.

We started a new collaboration with the software editor Berger Levrault about software architecture remodularization. The collaboration started with an end study project exploring the architecture used in the company in order to later migrate from GWT to Angular JS since GWT will not be backward supported anymore in the next versions. An internship and a PhD CIFRE thesis will successively start in 2018.

## SPIRALS Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. ip-label

**Participants:** Romain Rouvoy [correspondant].

A software exploitation license of the APISENSE<sup>®</sup> crowd-sensing platform has been sold to the **ip-label** company. They use this platform as a solution to monitor the quality of the GSM signal in the wild. The objective is to provide developers and stakeholders with a feedback on the quality of experience of GSM connection depending on their location.

## 8.2. Scalair

**Participants:** Yahya Al-Dhuraibi, Philippe Merle [correspondant].

This collaboration (2015–18) aims at proposing a framework to deal with elasticity in cloud computing environments. This framework must cover all kinds of resources, IaaS, PaaS, SaaS, must provide a solution for interoperability between different clouds and virtualization technologies, and must enable the specification and composition of reactive and predictive strategies.

This collaboration is conducted in the context of the ongoing PhD thesis of Yahya Al-Dhuraibi.

## 8.3. Davidson

**Participants:** Romain Rouvoy [correspondant], Lionel Seinturier.

This collaboration (2017–20) aims at proposing new solutions for optimizing the energy footprint of ICT software infrastructures. We want to be able to measure and assess the energy footprint of ICT systems while preserving various quality of service parameters, such as performance and security. We aim at proposing a testbed for assessing the energy footprint of various programming languages. This testbed will also incorporate frameworks for web and mobile programming. Finally, we want to be able to issue recommendations to developers in order to assist them in improving the energy footprint of their programs. This collaboration will take advantage of the POWERAPI software library.

The PhD of Mohammed Chakib Belgaid will start in January 2018 in the context of this collaboration.

## 8.4. Orange Labs

**Participants:** Philippe Merle [correspondant], Lionel Seinturier.

This collaboration (2017–18) aims at defining a computational model for software infrastructures layered on top of virtualized and interconnected cloud resources. This computational model will provide application programming and management facilities to distributed applications and services. This computational model will define a pivot model that will enable the interoperability of various existing and future standards for cloud systems such as OCCI and TOSCA. This pivot model will be defined with the Alloy specification language [62]. This collaboration takes advantage of the expertise that we are developing since several years on reconfigurable component-based software systems [73], on cloud systems [67], and on the Alloy specification language [66].

This collaboration with Orange Labs is a joint project with Jean-Bernard Stefani from the **Spades** Inria project-team.

## **DEFROST Project-Team**

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

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

TDR group is a robotics integrator specialized on optimizing production chains, usually multiplexing robots to perform several activities. Hence, their interest in graspers and the time invested in this activity has been growing within the last years. To improve this aspect, we have been developing together a concept of "universal grasper", based on soft robotics technology and capable of grasping an object with an arbitrary shape, and partially misplaced or misoriented. The prototype developed complies with the specifications and allows for scalability, with flexibility between grasping force and shape tolerance, and the ability for replacing objects without the need of an external vision system. Relying in SOFA for physical simulation, we could validate the different prototypes proposed, put in place test scenarios and put in place a design tool to test generic, application-specific prototypes. A patent redaction is ongoing.



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

## **MAGNET Project-Team**

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

## **8.1. Product Name Disambiguation**

Optimix is a company that provides marketing campaign optimization services and pricing policies for companies. One of the OptiMix tools offers a competitive price comparison. In this collaboration with Magnet, the objective was to use machine learning approaches and natural language processing for product names disambiguation.

## **8.2. Coreference resolution**

In an ongoing collaboration with Orange, we develop a Natural Language Processing library for co-reference resolution. The library is based on a previous work (CorTeX) and will be extended in several ways. It will handle French language, it will include new features based on vectorial representations of words (word embeddings) and it will be more scalable. PASCAL DENIS is the local PI at Inria of this project.

## **8.3. Privacy preserving data mining for Mobility Data**

JAN RAMON is the local PI at Inria for the ADEME-MUST project (Méthodologie d'exploitation des données d'usage des véhicules et d'identification de nouveaux services pour les usagers et les territoires). We study machine learning and data mining methods for knowledge discovery from mobility data, which are time-stamped signals collected from cars, for example, GPS locations, accelerations and fuel consumption. We aim to discover knowledge that helps us to address important questions in the transportation system such as road safety, traffic congestion, parking, ride-sharing, pollution and energy consumption. As the mobility data contains a lot of personal information, for instance, driving styles and locations of the users, we hence also study methods that allow the users to keep their personal data and only exchange part of them to collaboratively derive the knowledge.

The project has four partners, including, Xee company, CEREMA, i-Trans and Inria. The Xee company is responsible for recruiting drivers and collecting the data. CEREMA and i-Trans function as domain experts who help us to form the questions and verify the analytical results. MAGNET is responsible for developing and applying data mining methods for analyzing the data. The developed methods and the discovered knowledge from the project will be transferred to Metropole Lille and ADEME.

In [17], we presented our preliminary idea for a decentralized and privacy-aware machine learning method for predicting traversal time in the Data Mining with Secure Computing workshop held in conjunction with the 2017 European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD-2017).

## **MINT2 Team**

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

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

- Hap2U SME is licensed two patents of MINT team.
- An InriaTech contract has been made with GoTouchVR SME for contributing to the company SDK.

## **Mjolnir Team**

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

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

- **Mock-up of a tool for dynamic media pre-production:** we did work with the HCOP holding company on the design of new tools for the pre-production of dynamic media such as videos, e-learning animations, etc. This work involved interviews of professional video producers, the identification of opportunities for tools that could help them, and the production of descriptions and mock-ups of these tools.