



RESEARCH CENTER  
Grenoble - Rhône-Alpes

FIELD

# Activity Report 2017

## Section Highlights of the Team

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## **ARIC Project-Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

H2020 project Prometheus (on privacy-preserving quantum-resistant cryptographic primitives, coordinated by Benoît Libert and hosted by ENS de Lyon). 4-year project (accepted in August 2017) starting from January 2018.

Publication of the book [48] “Algorithmes Efficaces en Calcul Formel.”

J.-M. Muller was elected Fellow member of the IEEE in Jan. 2017.

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

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

## **DATASPHERE Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

### **5.1.1. Awards**

Kavé Salamatian has been awarded in 2018 a President's International Fellowship of the Chinese Academy of Sciences.

## **PRIVATICS Project-Team**

### **4. Highlights of the Year**

#### **4.1. An Privacy Risk Analysis of the TES system**

The decree of 28 October 2016 authorising the creation of a centralised file of “secure electronic documents” (TES) has raised a certain number of questions and concerns. The main aim put forward by the French government is the fight against identity fraud. However, the text of the decree also authorises certain accesses to the database by officers of the national police, national Gendarmerie and intelligence. Many voices have been raised to highlight the risks that such a centralised file could represent with regard to individual freedom, and particularly the invasion of citizens’ privacy. The strengthening of the means to fight fraud (and, more generally, criminality) and the requirement to protect privacy are not necessarily in contradiction. However, in order to be able to reach a decision on the advantages and disadvantages of a management system for electronic documents, it seemed necessary to: (1) Clearly define the desired functionalities and the advantages that can be expected from them, in particular with respect to the current situation and other solutions. (2) Describe the technical solution chosen in a sufficiently precise way to enable its analysis. (3) Rigorously analyse the risks of an invasion of privacy with regard to the expected benefits.

As a contribution to this debate, we have analyzed several architectures and alternative solutions which are described in an Inria Analysis Note [15]. This note received a lot of attention, and was partially covered by several high-audience media.

#### **4.2. A Novel Authentication Scheme based on Implicit Memory**

Selecting and remembering secure passwords puts a high cognitive burden on the user, which has adverse effects on usability and security. Authentication schemes based on implicit memory can relieve the user of the burden of actively remembering a secure password. In [8], we propose a new authentication scheme (MooneyAuth) that relies on implicitly remembering the content of previously seen Mooney images. These images are thresholded two-tone images derived from images containing single objects. Our scheme has two phases: In the enrollment phase, a user is presented with Mooney images, their corresponding original images, and labels. This creates an implicit link between the Mooney image and the object in the user’s memory that serves as the authentication secret. In the authentication phase, the user has to label a set of Mooney images, a task that gets performed with substantially fewer mistakes if the images have been seen in the enrollment phase. We applied an information-theoretical approach to compute the eligibility of the user, based on which images were labeled correctly. This new dynamic scoring is substantially better than previously proposed static scoring by considering the surprisal of the observed events. We built a prototype and performed three experiments with 230 and 70 participants over the course of 264 and 21 days, respectively. We show that MooneyAuth outperforms current implicit memory-based schemes, and demonstrates a promising new approach for fallback authentication procedures on the Web. This work was published at ISOC NDSS’ 17, one of top conferences in security and privacy.

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

## BIPOP Project-Team

# 5. Highlights of the Year

## 5.1. Highlights of the Year

### 5.1.1. Awards

- Gilles Daviet has been awarded the 2017 PhD award of the national GdR IG-RV, <http://www.af-rv.fr/blog/2017/07/10/resultats-du-prix-de-these-du-gdr-ig-rv-2017/>, for his PhD thesis entitled 'Modèles et algorithmes pour la simulation du contact frottant dans les matériaux complexes, application aux milieux fibreux et granulaires'.

## MISTIS Project-Team

# 5. Highlights of the Year

## 5.1. Highlights of the Year

- Veronica Munoz Ramirez supervised by F. Forbes, J. Arbel (MISTIS) and M. Dojat (Grenoble Institute of neuroscience) was granted a PhD grant from the IDEX **NeuroCoG** project. The PhD project is part of a work package, dedicated to Parkinson's Disease (PD), which aims at identifying multidimensional cognitive and neurophysiological biomarkers for early diagnosis, outcome prediction and novel neurorehabilitation methods for de novo PD patients.
- In the context of another IDEX project named **Grenoble Data Institute**, two 2-years multi-disciplinary projects were granted in November 2017 to Mistis in collaboration respectively with Team Necs from Inria and Gipsa-lab (DATASAFE project: understanding Data Accidents for Traffic SAFETY) and with IPAG and Univ. Paris Sud Orsay (Regression techniques for Massive Mars hyperspectral image analysis from physical model inversion).

**NANO-D Project-Team (section vide)**

## **NECS Project-Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

- M. L. Delle Monache received the prize “France -Berkeley Fund Award” for young researcher awarded by the College de France for her works in collaboration with United States
- P. Frasca published the book “Introduction to averaging dynamics over networks”, with F. Fagnani.
- P. Frasca has been selected as a member of the “Comité de Direction du GdR MACS ”, term 2019-2023.
- The team organized the international ERC Scale-free Back workshop on “Modelling reduction tools for large-scale complex networks”, Grenoble, September 2017

## **AIRSEA Project-Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

### **5.1.1. Awards**

M. Nodet and J. Erhel won the first prize of the second Imaginary Mathematics for Planet Earth competition with their web module entitled "Simulating the melting of ice caps" [26].

E. Arnaud was granted by a CRCT (Congé pour recherches ou conversions thématiques) by the CNU in 2016/2017.

## BEAGLE Project-Team

# 4. Highlights of the Year

## 4.1. ECAL Conference

In September 2017 Beagle organized the 14th European Conference on Artificial Life in Lyon (<https://project.inria.fr/ecal2017/>). ECAL is a biannual scientific meeting supported by the International Society for Artificial Life (ISAL). Carole Knibbe was scientific chair of the conference and Guillaume Beslon was local chair. We welcomed 200 researchers from various disciplines (computer science, biology, physics, humanities...) for 5 days of conferences (including 7 keynotes) in the domain of modelling and simulation of life. The scientific program was completed by an amazing social program (vineyard visits, old city visit, wine&cheese, banquet dinner, sport activities...). The proceedings of the conference have been published by MIT Press (<http://cognet.mit.edu/journal/ecal2017>).

### 4.1.1. Awards

Guillaume Beslon was awarded the 3rd price at the international innovation academy of the International conference on prevention and infection control. Geneva, Juin 2017. Project presented: ISEE-Resistance, using in silico experimental evolution to sensitize providers on antibiotic resistance [13].

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

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

## IBIS Project-Team

# 4. Highlights of the Year

## 4.1. Highlights of the Year

Three new projects coordinated by IBIS started this year: the IPL COSY, the ADT CoSoft, and the ANR project Maximic (Section 8.2 ). A paper based on the PhD thesis of Manon Morin was published in *mBio* this year [20]. The techniques used for the analysis of flux data were presented at ISMB/ECCB 2017 and published in a special issue of *Bioinformatics* [17]. Hidde de Jong organized a **workshop on growth control in microorganisms**, as a side event of the yearly meeting of the special interest group in systems and synthetic biology GDR BioSynSys, in La Grande Motte.

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

## STEEP Project-Team

# 5. Highlights of the Year

## 5.1. Highlights of the Year

The STEEP research team has initiated in 2016 a series of conferences-debates entitled “Understanding & Acting” (« Comprendre et agir ») that examines sustainability issues in order to help researchers and citizens to increase their awareness of the various issues at stake in order to initiate relevant individual and collective actions. The presentations are captured on video and then made directly accessible on the YouTube Channel “Comprendre et Agir”. At the end of 2017 the YouTube channel reached almost **45,000 views with a rate of integral viewings remaining at above 25%.** This rate is quite important since the YouTube videos of the conferences last between 35 and 45 minutes.

## **AGORA Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

- Hervé Rivano was appointed as a Full Professor at INSA Lyon, starting from September 2017.
- Oana Iova was appointed as an Associate Professor at INSA Lyon and joined the team, starting from September 2017.

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

**CTRL-A Project-Team (section vide)**

## DANTE Project-Team

## 5. Highlights of the Year

### 5.1. Highlights of the Year

#### 5.1.1. *Official launch of Dylnet:*

The aim of DyLNet<sup>0</sup> is to observe and characterise the relations between child socialisation and oral language learning during the preschool period by means of an innovative multidisciplinary approach that combines work in the fields of language acquisition, sociolinguistics and network science.

It is implemented through the 3-year follow-up of all the children and teaching staff ( $\approx 220$ ) at a socially mixed preschool. The social interactions between individuals are recorded using wireless sensor technology which will record inter-individual proximity data at 5 second intervals. These sensors will be worn for one week every month for a period of 3 years. The children's language development is monitored on the basis of their results in general language tests and the recording of their social use of language in natural interactions, through microphones implemented on the sensors. Finally, the children's social profiles is identified by means of questionnaires sent to their families.

Thanks to the analytical power of the network science, the social interaction data will be matched against the children's linguistic performances and sociolinguistic usage. The task, in particular, will be to examine the influence of the children's social relations on their language development (if individuals stay in the same peer community between two observation times, does the linguistic distance between them falls over the same period?) and, equally, the influence of language on these social relations (if two individuals belong to the same linguistic group at time  $T$ , does the probability that they will be in the same peer community increase at time  $T + n$ ?). We shall also examine the interactions between the pupils and the teaching staff – teachers and classroom assistants – in order to observe whether their frequency has an impact on the children's language development. Finally, DyLNet will result in the provision to the scientific community of a database indicating the relations between the recorded interaction frequencies and the language descriptions of a broad school community of children and adults followed up over three years.

Because preschool is the first step in a child's school career, it is necessary to understand how children from different social backgrounds integrate and adapt to it. Oral language plays a key role in this process because it is the mean and result of socialisation at school. Social inequalities are a key factor in this chain since, as of age 2, children from different backgrounds do not exhibit the same level of language skills and do not all use, to the same extent, the linguistic codes that are encouraged at school. These early differences, which are transmitted within the family, have given rise to numerous studies that have revealed the influence of the nature and quantity of the speech addressed to children in different social environments. However, these works tell us little about the influence of peers, which may modulate the impact of the family given that peer groups give rise to a certain social mix. The DyLNet project will bring an important insight to this under-researched issue.

#### 5.1.2. *Official launch of the Blaise Pascal Foundation*

The foundation Blaise Pascal (hereafter denoted by FBP) has been created on the 14th of November 2016. Its founders are the CNRS and the University of Lyon. The objectives of the foundation are to promote mathematics and computer science and to attract young people to scientific fields like computer science and mathematics. The FBP closely pays attention to gender issues in these scientific domains and to the difficulties for disadvantaged public to embrace scientific careers.

The actions of the FBP focus on: - a support to actors that promote mathematics and computer science via allocated funding based on call of proposals; - a structuring of actors to increase the impacts of their actions, to coordinate the efforts and to share experiences; - a development of innovative experiences via summer camps and clubs of mathematics and computer science.

<sup>0</sup><https://dylnet.univ-grenoble-alpes.fr/dylnet-project?language=en>

The FBP has received an initial funding from the French government and its founders. To maintain its activities in the long term, external funding must be raised. Additional information on the FBP can be found here: <http://fondationblaisepascal.strikingly.com>.

Isabelle Guérin Lassous is the managing director of the foundation Blaise Pascal.

### 5.1.3. *Books on Dynamic Networks by Márton Karsai*

After a book chapter on *Control Strategies of Contagion Processes in Time-varying Networks* in Temporal Network Epidemiology in collaboration with Nicola Perra [57], a full book on *Bursty Human Dynamics* was just released at the end of the year in collaboration with Hang-Hyun Jo and Kimmo Kaski [56].

### 5.1.4. *Public Data Lab and Fake News Field Guide*

In February 2017, Tommaso Venturini has founded the Public Data Lab in collaboration with researchers from King's College London, the University of Amsterdam, the Politecnico di Milano, the University of Aalborg and other European research centres.

The PDL (<http://publicdatalab.org>) a network of young European researchers working on digital data and public interventions. The Public Data Lab seeks to facilitate research, engagement and debate around the future of the data society. We want to develop and disseminate innovative research, teaching, design and participation formats for the creation and use of public data. We work in collaboration with an interdisciplinary network of researchers, practitioners, journalists, civil society groups, designers, developers and public institutions across the world. Our approach is characterized by:

- Intervention around social, political, economic and ecological issues;
- Participation through involving different publics in the co-design of our work;
- Artisanship in advancing the craft of developing data projects and experiences;
- Openness in sharing our research, data and code for all to use.

In 2007, The Public Data Lab has published Field Guide on Fake News (<http://fakenews.publicdatalab.org>), which exemplifies our empirical approach to public debate inquiry and the way in which we mobilize digital methods in collaboration with stakeholders. The field guide has been selected as one of the project to be showcased during the celebration of the 50 years of the Inria.

More recently the PDL has received a small funding by the OrganiCities programme (<http://organicity.eu/open-call/>) to “develop a prototype service to support people in experimentation with urban data”. In the Save Our Air project we will experiment combining air quality data and discursive inscriptions about urban environment.

### 5.1.5. *Inria 50th anniversary*

This year Inria has celebrated its 50th anniversary. In [19] the authors reflect on Inria's evolution through the decades and present its vision for the future.

## DATAMOVE Project-Team

# 5. Highlights of the Year

## 5.1. Highlights of the Year

### 5.1.1. Startup Company

Creation of the Ryax company <sup>0</sup> by two former PhD students, Yiannis Georgiou, David Glesser. Ryax Technologies builds software to enable the seamless execution of Big Data and IoT applications upon Hybrid computing infrastructures, distributed across Edge, Fog and Cloud environments. The core software named Ryax is a new generation resource manager.

### 5.1.2. Best Paper Nominee

Danilo Carastan-Santos, DataMove, Univ ABC, Brazil, was nominated for the Best Paper and Best Student Paper at Supercomputing 2017 for his paper *Obtaining Dynamic Scheduling Policies with Simulation and Machine Learning* [11].

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<sup>0</sup><http://ryax-technologies.com/>

## **POLARIS Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

### **5.1.1. Publications**

The paper *On the robustness of learning in games with stochastically perturbed payoff observations* (Panayotis Mertikopoulos and Mario Bravo) has been selected to appear in the John Nash Memorial Special Issues of GEB (Games and Economic Behavior), May 2017.

### **5.1.2. Grants**

Patrick Loiseau has been granted the “Chaire d’excellence” on *Human-aware learning in the digital society* from IDEX Grenoble.

## **ROMA Project-Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

- Anne Benoit was the program co-chair of ICPP'17 and of SC'17 (technical papers).
- Altair, EDF, Michelin, LSTC, and Total have renewed for three years their memberships in the MUMPS consortium.

### **5.1.1. Awards**

- Aurélien Cavelan was awarded an accessit award for the Gilles Kahn 2017 PhD thesis award.

## SOCRATE Project-Team

# 4. Highlights of the Year

## 4.1. Highlights of the Year

### 4.1.1. Awards

Florent de Dinechin obtained the *community award* of the 27th International Conference on Field-Programmable Logic and Application (FPL17) for his software **Flopoco, Parameterized Floating-Point Core Generator**, see: <https://www.fpl2017.org/awards/>

### 4.1.2. Others

#### 4.1.2.1. FIT/Grid5000 fusion

The mid-term evaluation of the FIT project was very well evaluated (excerpt of the report: “It is really hard to identify weaknesses of the equipment project”), FIT has also been promoted as national “**Instrument de Recherche**” and it is discussing with Grid5000 to apply to the status of TGIR (*Très grande infrastructure de recherche*). A ESFRI proposal has already been proposed (ESFRI is the european instrument for European Strategy on Research Infrastructures).

#### 4.1.2.2. INSA-Lyon/Spie IoT Chair

Spie-ICS funds a chair with the Citi-lab on IoT, Jean-Marie Gorce was the initiator of this big project (approximately 1M€ over 5 years) dedicated to Internet of Things, the Socrate team is highly involved in the Spie-IoT Chair

## **CHROMA Project-Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

- Chroma was created as EP Inria on December 1st, 2017.
- Christian Wolf, Associate Professor HDR at INSA Lyon and LIRIS Lab, obtained a full Inria delegation to join the Chroma team. He joined Chroma on September 2017.
- Laetitia Matignon, Associate Professor at Université de Lyon and LIRIS Lab, obtained a second-year half Inria delegation in Chroma.
- Vincent Le Doze joined the Chroma team in Lyon as Expert Inria Engineer, for 2 years, after we obtained the Inria ADT 'CORDES' project, focusing on UAVs control and planning (since Oct. 2017).
- We qualified to the international RobocupHome competition, after creating the 'LyonTech' team, which is composed of teacher-researchers from Chroma along with two engineers from LIRIS/CNRS lab. and CPE Lyon (we are the only french team qualified, the final is organized on June 2018 at Montreal).

## IMAGINE Project-Team

### 4. Highlights of the Year

#### 4.1. Highlights of the Year

- We had two papers accepted to Eurographics [23], [20] and a third paper was accepted by Computer Graphics Forum and also presented at Eurographics [18]. We had one paper accepted for publication in ACM transactions on Graphics and presented at Siggraph [16].
- Our paper "Shape from sensors: Curve networks on surfaces from 3D orientations" received the best paper award at SMI 2017 and was published in a special issue of Computers and Graphics .
- We co-organized the third Eurographics workshop on intelligent cinematography and editing, at the institut Lumière in Lyon on April 24, 2017.
- Three students defended their PhD within the team.
- ERC ADG EXPRESSIVE was successfully terminated in April 2017.
- We started three new ANR projects Anatomy 2020, E-Roma and Foldyn, and a new FUI project Collodi 2.

BEST PAPERS AWARDS :

[] **Computers and Graphics**. T. STANKO, S. HAHMANN, G.-P. BONNEAU, N. SAGUIN-SPRYNSKI.

## **MAVERICK Project-Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

### **5.1.1. Presentations at Siggraph**

The paper “Programmable 2D Arrangements for Element Texture Design” co-authored by Joëlle Thollot and Romain Vergne was presented at SIGGRAPH 2017 [3] (see Section 7.5.1 ).

The paper “A Two-Scale Microfacet Reflectance Model Combining Reflection and Diffraction” co-authored by Nicolas Holzschuch was presented at SIGGRAPH 2017 [2] (see Section 7.3.2 ).

The work on “Direct 3D stylization pipelines” co-authored by Joëlle Thollot and Romain Vergne was presented at SIGGRAPH 2017 real-time live! [13] (see Section 7.1.2 )

### **5.1.2. Awards**

The paper "Shape from sensors: Curve networks on surfaces from 3D orientations" [6], co-authored by Tibor Stanko, Stefanie Hahmann, Georges-Pierre Bonneau and Nathalie Saguin-Sprinsky, published in the journal Computer and Graphics, has received the "Best Paper Award" during the conference Shape Modeling International in June 2017.

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

## **MORPHEO Project-Team**

### **5. Highlights of the Year**

#### **5.1. Highlights of the Year**



*Figure 2. The president Macron's visit of the Kinovis platform in May 2017*

## PERCEPTION Project-Team

## 4. Highlights of the Year

### 4.1. Highlights of the Year

- In collaboration with several partners, PERCEPTION completed the three year EU STREP project EARS (2014-2017). PERCEPTION contributed to audio-source localization using microphone arrays and to the disambiguation of audio information using vision, in particular to discriminate between speaking and silent persons.  
Website: <https://robot-ears.eu/>
- PERCEPTION started and completed a one year collaboration (December 2016 – November 2017) with **Samsung Electronics Digital Media and Communications R&D Center**, Seoul, Korea. The topic of this collaboration, fully funded by Samsung, was *multi-modal methodologies for human-robot interaction* (a central topic of the team) and is part of a strategic partnership between Inria and Samsung Electronics. A follow-up of this collaboration is under preparation and it is planned to start soon (February 2018).
- As an ERC Advanced Grant holder, Radu Horaud was awarded a Proof of Concept grant for his project Vision and Hearing in Action Laboratory (VHIALab). The project will develop software packages enabling companion robots to robustly interact with multiple users.  
Website: <https://team.inria.fr/perception/projects/poc-vhialab/>

#### 4.1.1. Awards

- Israel Dejene Gebru (PhD student) and his co-authors, Christine Evers, Patrick Naylor (both from Imperial College London) and Radu Horaud, received the best paper award at the IEEE Fifth Joint Workshop on Hands-free Speech Communication and Microphone Arrays, San Francisco, USA, 1-3 March 2017, for their paper Audio-visual Tracking by Density Approximation in a Sequential Bayesian Filtering Framework.
- Yutong Ban (PhD student) and his co-authors, Xavier Alameda-Pineda, Fabien Badeig, and Radu Horaud, were among the five finalists of the “Novel Technology Paper Award for Amusement Culture” at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vancouver, Canada, September 2017, for their paper Tracking a Varying Number of People with a Visually-Controlled Robotic Head.

BEST PAPERS AWARDS :

[41] **IEEE Workshop on Hands-free Speech Communication and Microphone Arrays.** I. GEBRU, C. EVERS, P. NAYLOR, R. HORAUD.

[38] **IEEE/RSJ International Conference on Intelligent Robots and Systems.** Y. BAN, X. ALAMEDA-PINEDA, F. BADEIG, S. BA, R. HORAUD.

**PERVASIVE INTERACTION Project-Team (section vide)**

## **THOTH Project-Team**

# **5. Highlights of the Year**

## **5.1. Highlights of the Year**

### **5.1.1. Awards**

- Cordelia Schmid was elected to the German National Academy of Sciences, Leopoldina, in 2017.
- Cordelia Schmid was a Highly Cited Researcher in 2017 (Clarivate Analytics former Thomson Reuters).
- Julien Mairal received the IEEE PAMI young researcher award.
- Gregory Rogez and Cordelia Schmid received an Amazon Academic Research Award.
- Gregory Rogez received an CVPR 2017 outstanding reviewer award.

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