

Activity Report 2019



Inria

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STRATEGY



Bruno Sportisse

Inria's CEO



Inria has been spearheading digital research for over 50 years. And what are its ambitions now? To work with its partners to make France a scientific, technological and industrial leader within the European dynamics and to strengthen our digital sovereignty.

2019 confirmed Inria's vitality, as illustrated by the 4 ERC grants and the prestigious prizes won by our scientists.

And the setting up of *Inria Startup Studio* with *Bpifrance* has laid the foundations for the Institute to scale up its support for the creation of startups: 25 projects in 2019 (double the number of the year before!).

Inria is an agile institute which has the culture of impact-focused partnership projects in its blood. The partnership it has formed with *Naval Group*, for example, reflects its support for strategic sectors of the French industrial ecosystems and has set Inria on a new path, that of forming joint teams with companies. The partnership with the Ministry of Education and Youth for the "1 scientist-1 class" project positions us as a driving force in public research seeking to give high school students, girls especially, a taste for science and technology.

2019 also saw some organisational changes, the most of which was the creation of a single Information Systems Department (DSI): Inria has a duty to set an example with its own digital transformation, which remains to be done. With the launch of a new website, the Institute has also sought to update its image: more coherent, impact-focused, at the heart of an ecosystem of partners.

Finally, 2019 enabled us to ratify our Objectives and Performance Contract (COP) for 2019-2023 and to embark upon a new strategic cycle. We are clear about

our ambitions: together with our partners, we wish to achieve scientific, technological and industrial leadership in the digital sector and to strengthen our digital sovereignty through research and innovation!

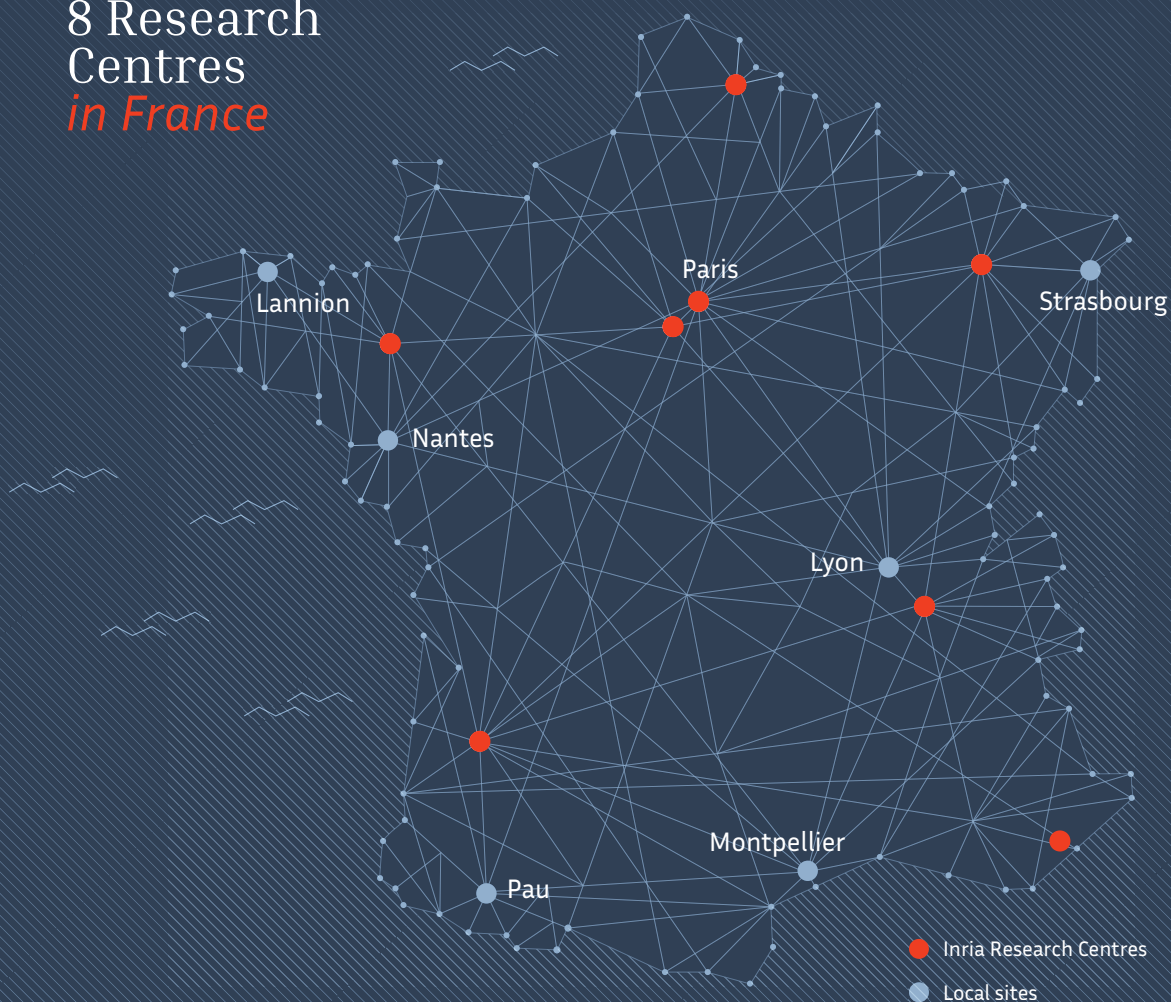
This ambition for 2023 lays the path for our future.

Our institute must be a place where risky scientific work is done on core digital projects, covering areas ranging from cybersecurity to quantum computer science. It must also be capable of providing answers, along with other actors and drawing on our digital skills, to the great challenges our society faces in health, energy, sustainable development and education.

It must think about the economic impact it can have by irrigating our industrial companies and through bilateral partnerships, the creation of startups or the dissemination of software. And, more than ever, we must support public policies: coordination of the research component of the *AI Plan*, partnerships in the Security-Defence sphere, actions in schools - there is no shortage of examples. Finally, we are firmly committed to the development of the major university research sites.

Continuing to be bold and to break new ground, that is what should be the motivation behind all that we do, in 2020 and beyond. We must all work together to make sure we live up to the challenge set for 2023 and the trust put in us by the State.

8 Research Centres *in France*



59

ERC

4350

collaborators
(2500 Inria's
employees)

170

startups

240

million euros
budget, 25% of which
is self-funded

1420

PhD researchers

200

project teams

The Activity Observatory builds dynamic dashboards with the objective of readability, interaction and consultation in one click. They present in a clear and structured manner the indicators linked to the institutional and contractual objectives of COP 2019-2023.

The COP: an ambition for 2023... and beyond

2019 was marked by the State's approval of our Inria *Objectives and Performance Contract* (COP), which is translated in concrete terms into our *Ambition Inria 2023* plan. This sets out the Institute's priorities, aims to reassert its unique organisational model and to boost its impact in all areas, from research to innovation.

A new strategic cycle has begun for Inria, with the approval of its Objectives and Performance Contract (COP) for 2019-2023.

FIVE STRATEGIC AREAS

In return for the State's support, Inria has undertaken to develop five major areas:

- 1 TO MAINTAIN SCIENTIFIC EXCELLENCE**
accepting the need for risk-taking in the research subjects selected, making informed choices and aiming to extend its international reach.
- 2 TO REINFORCE THE INSTITUTE'S ECONOMIC IMPACT**
in particular by developing bilateral agreements with economic actors and through increased support for the creation of tech startups.
- 3 TO DEVELOP OUR CONTRIBUTION TO PUBLIC POLICY**
in particular with the two ministries we depend on.
- 4 TO SERVE THE DEVELOPMENT OF MAJOR WORLD-LEVEL UNIVERSITY**
research sites through a new site policy.
- 5 TO TRANSFORM AND CREATE AN EFFECTIVE**
serene organisation capable of carrying through this ambition.

Clearly identified milestones

To measure Inria's progress in each of these strategic areas, a series of indicators and operational milestones (over thirty of them) have been created. For example, by June 2020, the Institute will develop a framework for the qualitative analysis of its scientific impact since the number of publications is no longer an indicator of the Institute's impact. Inria will continue to roll out the startup development support scheme to all its sites, with *Inria Startup Studio*. The scenarios for the creation of a research centre in Lyon will be presented in 2020 and the satellite units in Montpellier and Strasbourg be will strengthened as part of a strategic vision shared with the partners of each of these sites.

The Ambition Inria 2023 plan thus defines the steps to be followed to give Inria and its original model its rightful place in the French research and innovation ecosystem.

How we support public policy: AI

In 2020, Artificial Intelligence is just the latest wave in digital technology, which rests on the maturity of algorithms (which closely ties together digital simulation, statistical data processing and sometimes embedded systems), data availability, often big data and computational capacities. It is accelerating digital transformation in every field: science, the economy and society.

Inria is mobilising its expertise and leveraging its different methods of action to support the national research and innovation strategy in this area.

Inria: a triple presence

The heart of what Inria does, of course, consists of the activities of the Institute's 200 project teams, who are all working in one way or another in this field defined by the close coupling of data and algorithms. Based on this research excellence, one of Inria's major challenges is to foster the creation of tech startups and the construction of structural partnerships with companies embarking on their digital transformation.

Another channel for the Institute's actions is the national artificial intelligence programme *AI for Humanity*, for which Inria is coordinating the scientific component

with the aim of making France one of the world leaders in the digital field.

One of the programme's flagship actions has been the setting up of four consortia of actors, known as "Interdisciplinary Institutes for Artificial Intelligence (3IA)", which are part of the drive to develop major university research sites and are helping to give greater visibility to the French digital ecosystem:

MIAI@Grenoble-Alpes (Multidisciplinary Institute in Artificial Intelligence), which is central to the dynamics of the University of Grenoble-Alpes, 3IA Côte d'Azur, a vital part of the University of Côte d'Azur, PRAIRIE (PaRis Artificial Intelligence Research Institute) in Paris (with Paris Sciences et Lettres and the University of Paris, in particular), and ANITI (Artificial and Natural Intelligence Toulouse Institute), which is sponsored by the Federal University of Toulouse Midi-Pyrénées. Funded for four years, in particular these projects

are able to finance research chairs and are expected to contribute to strengthening training. Inria is involved in three of these projects.

Finally, the Institute is actively involved in the "Global Partnership for AI", a multi-lateral initiative to build the IPAI (International Panel on Artificial Intelligence). The Institute will be responsible for the construction of one of the two Centres of expertise on AI, a task entrusted to it by the French President on the occasion of the Global Forum for Artificial Intelligence at the end of October 2019.



Jean-Frédéric Gerbeau

Deputy CEO for Science



2019 will go down as a successful year for our cryptology teams. In the post-quantum field, after two rounds in the selection process in the worldwide competition organised by the National Institute of Standards and Technology, over a quarter of the projects selected come from Inria teams. We will come back to that in the pages that follow. In the field of asymmetric cryptography, the Caramba joint project team contributed a new record for RSA key factorisation and discrete logarithm computation. Last but not least, the Inria-French Academy of Science Young Researcher Prize rewarded María Naya-Plasencia's work on symmetric cryptanalysis with quantum algorithms.

Another cause for satisfaction is the Institute's place in the world machine learning rankings, which was already excellent in 2018 and was confirmed in 2019. A recent study based on articles accepted at two flagship conferences, ICML and NeurIPS, has only three institutions in continental Europe in the world's Top 20 academic institutions: Inria is second, just behind ETHZ (Swiss Federal Institute of Technology in Zurich), and is the only institution in the European Union.

In research promotion, the selection of 16 exploratory actions in 2019 illustrates the Institute's desire to support creativity and scientific risk-taking. We believe that with long-term research, research on disruptive subjects is the privilege and a requirement of public research. These 16 exploratory actions follow a very flexible format, with resources being adapted to

the project proposed and comparable to those of an ANR Young Researcher project, whilst covering a wide range of very varied fields: core issues in IT and applied mathematics (for example image and video compression algorithms, algorithms combining digital simulation and machine learning) or societal subjects (in particular in conjunction with legal experts for privacy issues or on search engine bias), and multidisciplinary subjects - in sustainable agriculture and biodiversity or in biology and medicine, with a project on artificial blood, or on the diagnosis of mental illness at the interface between psychiatry, linguistics and formal semantics. Not all of these subjects will necessarily be carried through to their conclusion, and that is normal, but they do bear witness to the remarkable vitality and creativity of our researchers, and they may well be preparing themes the Institute will focus on in the future.



Vincent Hayward

The Inria - French Académie des sciences Grand Prize

A specialist in robotics, Vincent Hayward, a professor at Sorbonne Université, has been a pioneer in the field of haptic perception since the early 1990s. The aim of his research is to identify methods for reproducing the sense of touch in order to create innovative sensory stimulation systems and to enhance our theoretical knowledge of what is an often overlooked sense.

Aside from being a researcher, Hayward is also an entrepreneur, with 38 patents and four startups to his name. The most recent of these, the Paris-based Actronika, is developing a technological platform compatible for use with human-machine interfaces in the automotive industry, in medical devices, in virtual and augmented reality, in mobile phones and in video games.



Inria Awards 2019

The Inria Awards honour major contributions in digital sciences and technologies, made by scientists whether or not they are part of Inria project teams.



Maria Naya-Plesancia

The Inria - French Académie des sciences Young Researcher Award



Researcher in the Secret project team of the Inria Paris research centre, María Naya-Plasencia specialises in the security of cryptographic algorithms. Her work has led to a new field of research: symmetric cryptography (where the same key is used to encrypt and decrypt information) in a post-quantum world (studying resistance to attackers with quantum capabilities).

Her research into different types of attacks has been precious in furthering our understanding of the security of algorithms. In order to develop reliable systems,

Maria looks to identify any potential weaknesses, and has successfully broken a whole host of primitives put forward in the relevant literature and in standardisation competitions. She has also proposed secure new cryptographic algorithms, including Quark, Kreyvium and Saturnin.

The scikit-learn initiative

The Inria - French Académie des sciences - Dassault Systèmes Award

Loïc Estève, Alexandre Gramfort, Olivier Grisel, Bertrand Thirion and Gaël Varoquaux, of the Parietal project team, a joint venture between Inria and the CEA at the Inria Saclay Île-de-France research centre, are developing the software scikit-learn, third most-used machine learning software in the world. Written in Python programming language, it was designed to make it easier for non-specialists to tackle the machine learning problems forming the basis of the artificial intelligence revolution.

The software has been developed since 2010 and is compatible for use in all experimental sciences, from neuroscience to chemistry, in addition to industrial applications. Evidence of its success can be found in its 1,400 contributors worldwide, the 42 million visits it had in 2018 and the consortium of user companies set up to fund its development through Inria's Foundation.

Other scientific awards and honours



Fabrizio De Vico Fallani
ERC Consolidator Grant

Fabrizio De Vico Fallani, researcher at the Inria Paris research centre within the Aramis project team, a joint venture between Inria, ICM, Sorbonne Université, INSERM and CNRS, is focused on improving brain-computer interfaces. His aim is to develop a new rehabilitation system capable of modifying functional connections in the brains of stroke victims.

Etienne Mémín
ERC Synergy Grant



Head of the Fluminence project team, a joint team between Inria, INRAE, the University of Rennes 1 and CNRS, within the Inria Rennes Bretagne Atlantique research centre, Etienne Mémín's goal is to develop models for forecasting the state of the earth's oceans in the context of global warming. The aim of her project is to design models that are both dynamic and stochastic in order to predict changes to the upper ocean in terms of temperature, water level, acidity and CO₂/O₂ concentration.



Marie Kerjean
L'Oréal - UNESCO Award

Within the Gallinette project team, created between Inria, the University of Nantes and the Institut Mines-Télécom Atlantique, Marie Kerjean's work involves adapting the Coq proof assistant for use in functional analysis, her aim being to open up new applications in the field of mathematics, but also to develop new uses for proof assistants in industry, in addition to developing libraries that the wider public are able to access and to use.



Floriane Gidel
L'Oréal - UNESCO Award

Floriane Gidel, researcher in the Monc project team between Inria, CNRS and the Bordeaux Polytechnic Institute, works on developing digital models capable of simulating the effects of protocols combining short electrical impulses and chemotherapy. This form of treatment, which is known as electroporation or electropermeabilisation, uses electricity in order to make cancerous cells porous to medication. Although limited for the time being to the treatment of surface tumours, these protocols could in the future be used to tackle tumours currently considered as being incurable.



Emilie Chouzenoux
ERC Starting Grant

Scanners, MRI and microscopy all supply doctors with vital information on our health, but the resolution and the contrast on the images could be improved. Researcher of the Opis project team of the Inria Saclay-Île-de-France research centre, Emilie Chouzenoux develops optimisation algorithms for use in image processing that will be capable of reliably producing better quality images at a lower cost.



Irene Vignon-Clementel
ERC Consolidator Grant

Irene Vignon-Clementel, researcher at the Inria Paris research centre in a joint project between Inria, Sorbonne Université and CNRS is a specialist in digital simulation. She has set herself the task of designing a simulator capable of anticipating changes in blood flow in patients before operations. Her work focuses on whole organs, but also on their different parts and at different levels, including at a microscopic level, as they interact with the rest of the circulatory system.

One step closer to the quantum computer

When it comes to building a quantum computer, one of the main obstacles is the fragility of quantum information: as it interacts with the environment, the result is decoherence, which can render qubits unusable.

As such, developing a quantum computer will involve finding a way of protecting these physical qubits from noise in order to make them logical qubits. By drawing on multidisciplinary teams with expertise in mathematics

and IT, Inria is tackling this question on a number of fronts, whether with quantum low-density parity-check codes or, on a very different note, with the concept of the “cat qubit”. The concept behind the “cat qubit” is to significantly reduce one of the error components by introducing quantum dissipation directly into the superconducting circuit implementing the qubit. Combining this approach with a simple error-correcting code makes it possible to design a universal set of logical operations protected

from noise⁽¹⁾ with a reasonable number of physical qubits. These results have been produced over the past few years within the QUANTIC project team lead by Mazyar Mirrahimi, in collaboration with experimental physicists. In 2019, in a soon-to-be-published paper⁽²⁾, they provided experimental proof that this approach was capable of reducing errors by a factor of 300. This could make it possible to drastically reduce the number of physical qubits needed to make a logical qubit.

(1) J. Guillaud and M. Mirrahimi, Repetition cat-qubits for fault-tolerant quantum computation, Physical Review X, 9, 041053, December 2019.

(2) Exponential suppression of bit-flips in a qubit encoded in an oscillator, R. Lescanne, M. Villiers, T. Peronnin, A. Sarlette, M. Delbecq, B. Huard, T. Kontos, M. Mirrahimi, Z. Leghtas, ArXiv.1907.11729.

Post-quantum cryptography

The arrival of the quantum computer will be a total game-changer in the world of cryptography, as it will make it possible to solve mathematical problems that are currently unsolvable using traditional computers - problems on which the security of many encryption algorithms is based.

The risk was judged sufficiently serious for the NIST (the American National Institute of Standards

and Technology) to launch an **international competition** in 2017 aimed at standardising cryptographic algorithms capable of resisting quantum computers.

Inria was involved in 17% of the 69 submissions validated by the NIST. Following a selection made in early 2019, **the percentage of projects still in competition in which Inria project teams (Aric, Secret, Polsys, Grace) are involved has risen to 27%**. Such

a remarkable performance can be attributed to a vast array of methods: code theory, Euclidean networks, multivariate polynomial systems, isogenies of elliptic curves, etc.

These propositions are currently being critically analysed by the international cryptography community.

The standardisation initiative is expected to come to an end in 2022.

<Class'Code>

The Class'Code project, which is led by Inria and funded by La Caisse des Dépôts, and which has more than 70 partners, has so far been used to train more than 80,000 education professionals, helping them to introduce boys and girls to IT and digital concepts.

This innovative training programme started out with 5 online modules (MOOCs) combined with opportunities for learners to meet each other. Thanks to its dynamism, figures

from the worlds of academia and industry, as well as from schools and extra-curricular fields, get to work together on these subjects. Now a benchmark, the project has helped create new resources, in addition to facilitating international collaboration and expanding the target audience. More than 430,000 individual users have turned to the resources available on pixees.fr and classcode.fr, with a national network formed by all of the partners implementing hybrid training courses and sharing practices. The project has won a number of awards, including at European level where it was awarded the prize for

“best educational tool” by Informatics Europe, and the 2019 Inria Research and Innovation Support Prize. It was also behind the set-up of a Unesco chair. Its digital science and technology MOOC was chosen by the DGESCO as the introductory training course for secondary school teachers. It has been used to develop research initiatives between digital science and education sciences. Class'Code is now a nonprofit association supported by Inria. Its new projects include a training course on AI.



This year, 560,000 5th-year of secondary school pupils in France will discover digital science through the new Digital Science and Technology (SNT) course. In order to support this major undertaking, part of a wider initiative aimed at introducing everyone to digital science, Inria and its partners launched a challenge: to meet every 5th-year class in France.

By giving them the opportunity to meet scientists, it is hoped that this national operation will give pupils a taste for science in general and digital science in particular, providing an attractive and educational illustration of research in this field and the impact it has on society. All pupils, both boys and girls, will find out more about the opportunities available in the sciences, particularly in the digital sector. Particular attention will be paid to disadvantaged areas in order to reach all pupils at the same school level across the country.

There are a number of benefits to this project:

MAKING young people want to find out more about digital as a science and highlighting IT and digital science (NSI) as an option for sixth-year and final-year pupils.

SUPPORTING THE INVOLVEMENT of girls in the digital sector.

PROMOTING THE INVESTMENT of researchers in their scientific outreach assignments.

HIGHLIGHTING EXCHANGES between education and research.

1 scientist - 1 class, chiche !



François Cuny

Deputy CEO for Innovation



2019 was a very productive year for Inria, which has set its new strategy for 2023. At the centre of this plan is the priority given to impact in all its forms, and in particular the economic impact, for which we have set four main priorities: the creation of technology startups, joint agreements with French industrial partners, dissemination and training of open source software, and the economic impact of our international actions.

It was also a very important year concerning our strategy to support the creation of startups.

The Institute has the objective to multiply by 10 the number of startup projects that it will support each year by 2023. A strategic partnership was signed with Bpifrance (French Public Bank for Investments) to support this ambition. Inria has been retained as one of the business contributors in the French Tech Seed process (Bpifrance's leverage mechanism for the capital financing of Deep Tech startups). In addition, a Startup Studio has been created to support this strategy. This year has already enabled us to multiply by 2.5 the number of supported projects, from around ten to more than 25, and this will continue in 2020, which will probably see this number double again.

In 2019 Inria also strongly strengthened its links with major French companies in strategic areas such as Defense. We offer to our industrial partners new possibilities to work closely with our project teams through the creation of common teams mixing academic and industrial researchers. We are actually discussing with many of major French groups in this

perspective. We are very proud to have concluded a partnership with Naval Group that should soon lead to the first creation of a common project team.

The human resources to support open source software consortia have been strongly strengthened through the InriaSoft initiative. Among these open source software, we are very proud to mention that scikit-learn was awarded by the Inria - Académie des sciences innovation Award in 2019.

This software gathers a set of Python functions allowing to easily tackle statistical learning problems. Among the open source machine learning softwares, scikit-learn is in third position in terms of number of downloads just behind two solution from Google.

Inria Chile has validate with CORFO (the Chilean Bpi) its action plan to begin its third phase of existence.

This ambitious plan focuses on strengthening relationships with Chilean universities, training on Inria's open source softwares for industrial uses and support for startups creation.

Inria

Startup Studio

a global entrepreneurship development scheme

With the creation of the Inria Startup Studio in 2019, the Institute is intensifying its policy of supporting startup creation. This original new scheme, which focuses on the entrepreneur and not just the technology, is run by technology entrepreneurship professionals and aims to support innovative deep tech entrepreneurial projects.

Created in September 2019, the Startup Studio is already supporting sponsors of digital deep tech startup projects. The Institute, which has already supported the emergence of almost 200 companies that originated in its laboratories in the last 30 years, now wishes to move up a gear.

A 360° scheme

The running of this new scheme has been entrusted to Sophie Pellat and Hervé Lebreton, two great connoisseurs of startup culture who have long been involved in supporting entrepreneurs with innovative projects. This programme is a core element of Inria's

strategy for achieving its priority targets in terms of impact. It involves technology transfer and innovation specialists in the Inria centres and in regional ecosystems. The Startup Studio is one of the concrete offshoots of the partnership Inria entered into with Bpifrance in July 2019 within the wider framework of Bpifrance's Deeptech plan launched at the beginning of 2019.

One of the main objectives of the scheme is to attract entrepreneurial talent to Inria and its partners. It is a way of enriching an expertise-centric approach to opportunities for creating startups. The support offered is then focused on the project sponsors.

"The scheme aims to raise researchers' awareness of entrepreneurship and support them in all the dimensions it involves: defining needs in terms of resources (human, financial and material), meeting investors, listening to users' needs, positioning the product on its market, etc. From the initial idea to the concrete implementation of the project, we support them through all the key stages of the process," explains Hervé Lebreton.

“

With the Startup Studio, we are a presence alongside scientists who have made up their minds to give it a go, and our aim is to place them in the conditions most likely to foster success. We are living at a time that is very favourable to the creation of startups: the potential is there to make Inria's objective – sponsoring 100 projects a year by 2023 – a reality!

Sophie Pellat.

**Support
100 projects a year
by 2023**

Startup Wattson Elements

Wattson Elements is a startup that offers a technology capable of remotely monitoring berths and boats in a marina. The aim of the solution, named Falco, is to improve the management and security of port infrastructures whilst facilitating the development of new services for pleasure sailors.

Over the last few years, marinas have changed completely. More and more people are no longer buying their boats outright, preferring rental solutions or co-ownership, or they are using their boats as homes they can rent out through digital platforms. The upshot is that ports need to develop an offering that suits multiple types of customers and usages, if they are to have any hope of staying in control and even gaining some advantage from all these changes.

A multi-functional tool

Based on the use of sensors designed with by researchers at Inria Paris centre, the Falco system developed by this startup can remotely scan a whole range of parameters. Once fitted onto docks, these wireless boxes are capable, for example, of measuring the electricity consumption of each boat. Other types of sensors installed on the boat can simultaneously alert the harbour master's office and the boat's

owner if incidents occur.

Falco offers several types of alarm in a single device: intrusion, fire, excessive ship list, mooring problems. The owner remains in permanent contact with their boat via a smartphone app. And for marina managers, Falco allows for real-time monitoring of the comings and goings of different boats, opening up possibilities for better management of berth availability.

Strong growth potential

From next summer, several harbours with 500 berths or more will be equipped with the sensors needed for dynamic occupancy management and enhanced boat security. In the few months after that, the port of Kernével in Brittany, which has almost a thousand berths, should also be connected. With 180 marinas and no less than 160,000 berths available, the French coast offers a promising market for the startup which has already started international outreach.

With 180 marinas and no less than 160,000 berths available, the French coast offers a promising market for the startup.

The project was selected by the Innovation department and has benefited from the Inria programme that provides startup creation projects with end-to-end support. The founders have thus been supported by the Transfer, Partnerships and Innovation department at the Inria Paris centre as part of its plan to back entrepreneurial projects. The project has also benefited from funding and business accommodation in the dedicated startup space at the Paris centre. Since then the Inria spin-off has begun to secure its first contracts and has plans to raise capital in the second half of 2020 to pursue its development.

Naval Group/Inria: a strategic partnership for the defence industry

With the partnership agreement signed at the end of 2019 with the European leader in the naval defence industry, Inria continues to support the French industrial ecosystem. The creation of joint project teams will stimulate innovation and strengthen the company in the area of information systems.

Naval Group, the European leader in the naval defence industry specialised in the design, construction and maintenance of submarines and surface ships, wishes to step up its innovation efforts. To accompany this strategy, the firm is joining forces with Inria in an ambitious research partnership.

Contributing to the operational superiority of military ships

As it faces increasingly stiff international competition, Naval Group must also respond to the ever-growing need for technological superiority in combat of the ships it builds for the French Navy and its international customers. The partnership with Inria will enable it to ramp up its efforts in innovation, in particular in the field of information systems.

Omnipresent in the design of military ships and strategically important in operations, software plays a core role

in competitiveness and performance in the naval defence industry. The submarine combat system, one of the most complex objects ever designed, relies on hundreds of thousands of lines of code.

Accompanying public sovereignty policies

In order to meet the needs of the naval defence sector, the partnership is targeting three scientific themes: artificial intelligence, cybersecurity and signal processing. The Institute will bring its scientific excellence in these three fields - and that of its partners - to the industrial firm.

Synonymous with a high level of collective momentum, this cooperation is perceived as extremely rewarding. Based on strong governance, the partnership will be implemented in the form of joint project teams. The first one is expected to be based at Ollioules (Var), where a part of Naval Group's research centre is located

as well as its teams specialising in the design of mission and combat systems.

Inria wanted to boost its partnership development policy, and signing this agreement with Naval Group illustrates its willingness to support public sovereignty policies. An approach that is right at the heart of the Institute's strategy.

OUR ETHICS



Guillaume Prunier

Deputy CEO for Administration

“ Making a commitment, engaging in meaningful activities, asserting our values ”

Inria is an institute that places human beings at the centre of all. In 2019, we collectively reasserted that position. In our strategic plan: by clearly making priorities of the improvement of the percentage of disabled employees, the number of women in charge of project teams and quality of life at work for everyone. In our actions: by adopting and starting to implement the "Train, Prevent, Support" plan and an ambitious Disability programme, and by initiating a process of reflection on some ambitious building projects.

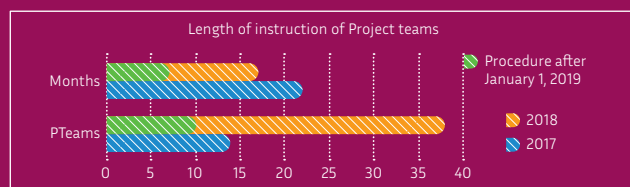
Inria is a responsible institute. On the budget front, our joint efforts have enabled us to go from a provisional budget showing a deficit to a surplus in the actual figures. 2019 will also have been the year when we implemented a real personal data protection policy: 155 data processing operations, including 82 research projects, were provided with support to bring them into line with the GDPR. In 2019, we also fulfilled our responsibilities in terms of the protection of the Nation's scientific and technical potential, with the introduction of a data sensitivity scale. Finally, in 2019 we reinvested in our legal security, in particular by creating a genuine Legal Affairs Department, and by embarking on the reshaping of our purchasing policy.

Inria is an institute whose goal is operational excellence, to guarantee the level of service rendered to research and innovation. In 2019, we embarked on the management of the Institute through figures: if you can't measure it, you can't improve it! The observatory of activities is undergoing an in-depth overhaul and is destined to be our sole source of truthful figures. In 2020, we will have dashboards at our disposal to help us to manage our activities in order to achieve the objectives of the COP (Objectives and

Performance Contract). To ensure that we progress towards operational excellence, in 2019 we have also appointed a secretary general in each centre. As the right-hand man or woman of the Centre Director, they are the guarantor of the smooth running of the centre's services, along with the head of services' team. Finally, the first results came through in 2019 on the operation of our expenditure chain: thanks to the involvement of all our staff at every level of the organisation, our average payment time has been reduced by 25%, in spite of a 6% increase in the number of invoices!

Inria is an institute that is gearing up for its digital transformation, a transformation that is indispensable if we are to achieve operational excellence. And of course it rests on the quality of our operating software. In 2019, we took the plunge and set up a single Information Systems Department (DSI). Collectively, we have managed to accept the need to move forward in an agile way. This courage has been rewarded: there has been no drop in quality of service, and we can all be proud of that. Some adjustments remain to be made to improve efficiency, but as of now we are up and running..

All these results have been achieved thanks to people's individual and collective efforts and are contributing to our strategic objective of building an efficient, smooth-running organisational structure. 2019 has been a good vintage!



A European label in HR strategy

In May 2019, Inria was awarded the "HR Excellence in Research" label for its action plan implementing the European Human Resources Strategy for Researchers. The aim of this strategy, known as HRS4R, is to perfect recruitment practices and the working conditions of scientists.



HR EXCELLENCE IN RESEARCH

The label is therefore awarded in recognition of the process of continuous improvement applied to Inria's HR policy, which consists of 38 separate projects covering several

themes: professional and ethical responsibilities, recruitment and selection; working conditions and social policy, training and guidance. To reinforce the Institute's scientific potential and increase its attractiveness, Inria will be focusing on three priorities:

Continuing existing initiatives and best practices in line with the principles of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers;

Improving the dissemination of information on recruitment processes and career development;

Working on all the aspects that can help to improve attractiveness: training, development, quality of life at work and career monitoring.

In 2021, Inria will carry out a self-assessment midway through its action plan, which will be submitted to the European Union. The following year, an audit will be carried out for the renewal of its label.

Internal mobilisation, external action: the ambitions of the Disability programme

On 19 November 2019, Inria announced the creation of an action plan consisting of three pillars and tied in with the COP (Objectives and Performance Contract) 2019-2023.

① Reinforcing societal impact through research and innovation

Today, 25 of the Institute's project teams are working in one way or another on disability. The action plan includes several components, among them the launch, at the beginning of 2020, of a major challenge combining research, development and technology

transfer. Just one of the experiments in preparation that is worthy of mention: the hosting of young people on the autism spectrum on placements in research laboratories in order to develop a programme of generic integration into HER.

② Supporting public policy on digital accessibility

Inria will also be improving the accessibility of its web content, by applying the WCAG (Web Content Accessibility Guidelines) to all future Inria communication items, including the website and intranet, and scheduling the adaptation of Inria's

internal software programs for visually impaired users.

③ Becoming an exemplary employer

In spite of different awareness-raising actions, the percentage of disabled people employed at Inria remains far too low: 2% in 2019, whereas the legal requirement is 6%⁽¹⁾. Proactive policies are therefore going to be implemented, with the aim, in particular, of increasing the number of applications and candidates and doing more to adapt the working environment.

(1) Achieving this rate of 6% is one of the objectives of Inria's new Objectives and Performance Contract.

Because digital technology has an impact on all aspects of society and daily life, a research institute like Inria, lying as it does at the heart of digital science and technology, must be more able than ever to work on new themes and to use new methods. Above all, it must continue to dare to explore and prepare for projects that are off the beaten track.

To fulfil this objective, the Foundation's missions are:

TO SUPPORT AUDACITY AND RISK-TAKING through ambitious research, innovation and entrepreneurial projects.

TO ENCOURAGE TALENTED YOUNG PEOPLE AND HELP THEM TO DEVELOP VOCATIONS through training by research and by supporting young researchers whatever their academic pathways and aspirations.

TO ELICIT AND ACCOMPANY RESEARCH TOPICS AND INNOVATIONS that will revolutionise and support the digital transformation of society, often by encouraging an interdisciplinary approach.

TO DEFEND, THROUGH RESEARCH AND INNOVATION, the causes supported by Inria that require long-term investment and the neutrality of a public research institute.

Based on principles of transparency and ethics, the Inria Foundation will prioritise meaningful strategic approaches, be they related to the causes supported by the Institute (digital technology to help the disabled, making science and technology more attractive to young people, particularly

women, the digital transformation of lifelong education, the development of open source software as an infrastructure for innovation, etc.) or to taking part in the resolution, by the use of an interdisciplinary approach, of our society's great challenges (digital risks and opportunities related to sustain-

nable development, digital transformation of towns and mobility, the trustworthy digital society, etc.).

Human beings are central to each of these strategic aims because digital technology can only be a means of strengthening the development of our societies.

The Inria Foundation will help to finance the emergence of new projects to help meet these strategic aims, be it through research, spreading knowledge throughout society or entrepreneurial initiatives backed by public research.

Over the period 2019-2023, the Foundation's ambition is 75 million, thus raising of sponsorship funds for "Making sense of the digital".

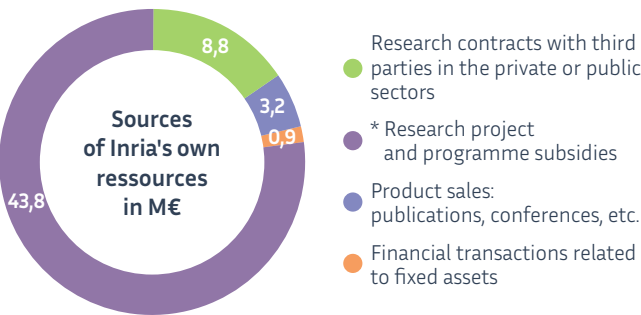
Financial Report

ANNUAL BUDGET REPORT FOR THE 2019 FINANCIAL YEAR

Inria's **initial budget** for 2019, adopted in November 2018, stood at €239.8m for revenue and expenditure, but was reduced to €237.2m in the last amending budget passed in November 2019.

Regarding execution of the 2019 budget in terms of revenue, the **Subsidy for Public Service Expenses (SCSP)** stands at €176.6m compared to €172.1m in 2018 and €170.6m in 2017. It represents 75% of the revenues received for the 2019 financial year.

Own resources amounted to about €59.9m, i.e. an execution rate of 94% compared to the amounts posted in the last amending budget. They account for 25% of all the Institute's resources in 2019. Own resources mainly come from:



* Including: €12.8m from the ANR, €10.4m from other public partners, €5.6m from the European Commission and €3.8m from private partners.

Total revenue was **€236m** in 2019, representing an execution rate of **98.4%** compared to the amending budget.

By nature, expenditure breaks down as follows: €168.7m of payroll costs (74.1% of total expenditure), including €133.6m for the Restrictive Wage Bill and €35.1m for the Non-Restrictive Wage Bill.

The number of "under the ceiling" staff (i.e. those whose pay is based on the SCSP) reached 1605 full-time equivalent hours worked (FTEHW) compared to 1,616 in 2018 and 1,579 in 2017 and for 1,615 forecast in the 2019 initial budget. The number of "non-ceiling" staff (i.e. those whose pay is based on own resources) was 766 FTEHW compared to 730 in 2018 and 729 in 2017.

€49.2m for **non-scheduled investment and operating costs (FCI)**; €9.7m in **expenditure related to scheduled investment transactions (OIP)**.

Overall expenditure in 2019 amounted to €227.7m compared to an initial forecast of **€239.8m**, representing an execution rate of 94.9%.

By purpose, expenditure in 2019 included:

- €157.1m on scientific activities at the research centres (item 1) i.e. 69% of total expenditure in 2019;
- €25.3m on joint research activity (item 2), i.e. 11%;
- €45.2m on support functions (item 3), i.e. 20%;

The table below shows the scientific themes corresponding to the Institute's main objectives, taking into account all the expenses, regardless of funding source and all items combined.

TEAM EXPENDITURE PER THEME €M	119,7
Applied Mathematics, Computing and Simulation	18,9
Algorithms, Programming, Software and Architectures	26,5
Networks, Systems and Services, Distributed Calculation	20,3
Perception, Cognition and Interaction	29,9
Healthcare, Biology and Digital Planet	24,1

CERTIFICATION OF THE FINANCIAL ACCOUNTS

As has been the case since 2010, the 2019 accounts have been certified by two statutory auditors. The auditors have reiterated the reservation previously formulated relating to the physical inventory and the monitoring of fixed assets, but for the 2019 financial year they have withdrawn the reservation previously issued concerning the cut-off mechanism in connection with the identification of the trade payables.

The 2019 financial account shows a profit of €3.3m (compared to a profit of + €0.5m the previous year).

This evolution is due to several factors, mainly:

- an increase in subsidies and similar income (+€5.1m), which is explained, firstly, by the growth in the subsidy for public service expenses (+€2.3m), and secondly, by that in other operating subsidies (+€3.1m);
- the fall in direct income from activity (-€3.0m), corresponding in particular to income from contracts with private-sector partners);
- the increase in other income (write-backs on depreciation and provisions), namely +€3.5m, which is mainly accounted for by the write-back of the €4.6m provision for the dispute with the ERCEA;
- the increase in personnel costs of (+€1.7m);
- as well that in the appropriation to depreciation and provisions (+€2.1m).

The balance sheet total (assets and liabilities) amounts to €260.4m compared to €257.8m in 2018..

INCOME STATEMENT 1/2

	2019	2018	Variation 2019 / 2018
ITEM	Amount (in euros)	Amount (in euros)	%
Subsidy for public service expenses	174 423 464	172 132 749	1,3%
Operating subsidies granted by the State and other public entities	37 054 439	33 912 234	9,3%
Subsidies allocated to funding maintenance costs	-	-	-
Donations and bequests	212 415	508 706	-58,2%
Allocated tax income	-	-	-
SUBSIDIES AND SIMILAR INCOME	211 690 318	206 553 689	2,5%
Sales of goods or services	12 750 354	14 440 560	-11,7%
Income from the sale of assets	40 140	29 731	35,0%
Other management income	744 205	2 089 954	-64,4%
Inventory and self-constructed assets	-	-	-
Income earned for provision of a public service	-	-	-
DIRECT INCOME FROM ACTIVITY	13 534 699	16 560 245	-18,3%
Write-backs on depreciation and provisions	19 467 589	15 251 013	27,6%
Write-backs of asset-related funds	5 431 798	6 192 438	-12,3%
OTHER INCOME	24 899 387	21 443 451	16,1%
OPERATING INCOME	250 124 404	244 557 385	2,3%
Purchases	104 987	119 741	-12,3%
Use of goods and supplies, works and services	38 330 700	38 053 394	0,7%
Payroll costs	157 556 188	155 822 975	1,1%
Other operating costs (incl. losses/write-offs)	19 160 596	19 670 196	-2,6%
Depreciation and provisions, Net accounting value of assets disposed of	31 540 844	29 469 555	7,0%
OPERATING COSTS	246 693 315	243 135 861	1,5%
NET INCOME (OR LOSS) FROM ACTIVITY	3 431 089	1 421 524	141,4%

INCOME STATEMENT 2/2

	2019	2018	Variation 2019 / 2018
ITEM	Amount (in euros)	Amount (in euros)	%
Income from shares and loans	-	-	-
Net income from sale of financial assets	-	-	-
Interest on non-capital receivables	-	-	-
Income from short-term investments and cash	-	-	-
Income from sales of short-term investments	-	-	-
Foreign exchange gains	7 957	10 666	-25,4%
Other financial income	-	39 808	-100,0%
Write-backs on depreciation and provisions	48 410	-	-
FINANCIAL INCOME	56 367	50 474	11,7%
Interest	-	-	-
Net loss on disposal of securities	-	-	-
Foreign exchange losses	9 552	20 862	-54,2%
Other financial costs	-	-	-
Depreciation and provisions for financial costs	166 053	-	-
FINANCIAL COSTS	175 605	20 862	741,7%
NET FINANCIAL INCOME (OR LOSS)	119 238	29 612	-502,7%
Corporate tax	-	-	-
FISCAL YEAR PROFIT OR LOSS	3 311 851	1 451 136	128,2%

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