

2015

ANNUAL REPORT



AGENCE NATIONALE DE LA RECHERCHE  
**ANR**



MICHAEL MATLOSZ

“ANR serves the scientific communities with transparency and professionalism”

In your opinion, what were the key events of the past year?

Michael Matlosz: "The question of climate and environmental changes is a major societal issue which has mobilised ANR since its creation. With the COP21 conference on climate change, ANR naturally wanted this topic to be one of the major focuses of its year. ANR thus involved itself in three events designed to inform the discussions and gave impetus to the setting up of an international call for proposals on a scale unprecedented to date.

On a more general note, 2015 saw the completion of several projects which were highly symbolic of project-based funding. You will find them in the highlights section of this document. They illustrate the key developmental role that project-based funding can have nationally and internationally, as well as its effect on closing the gap between disciplines and between the academic and business world. Some highly theoretical projects described herein will also illustrate the position of fundamental research in ANR's action. Although it represents a large proportion of the projects supported under the general call for proposals, in our opinion fundamental research does not have sufficient visibility.

Consequently, we have decided to highlight some of these projects in this annual report.

2015 was also an important year for the Investments for the Future Programme (PIA). For several projects of the first PIA, 2015 represented a milestone with a review by an international jury, determining in some cases whether their funding would be continued or not. These reviews provide the State with an overview of the actions undertaken and the results achieved thanks to the assigned funds, with personalised feedback for each project in order to organise the next phases."

And what about the agency's internal functioning?

MM: "Further to the decree of 24th March 2014, new modes of governance were put in place during 2014 and finalised in 2015 with the creation of a scientific advisory panel, a body for reflection assisting the ANR President and CEO. A few months later we wanted to make a brief assessment of our new way of functioning. This assessment led us to make a few adjustments, particularly regarding our internal organisation, with restructuring of the Grant Agreement and Funding Division and of the Accounting Agency, as well as

clarifying the roles of General Management. At the same time we carried out a major undertaking to implement the reform of the GBCP (Public sector budget and accounts management), which mobilised more than one hundred staff members and all ANR's activity divisions."

As ANR approaches its 10th anniversary, how do you view the agency?

MM: "ANR has been working to serve the scientific communities with transparent and professionalism since its creation. With almost 10 years behind it, the agency is entering into a new phase of maturity. Its core activity is still the funding of project-based research. But it is constantly evolving to continuously improve the service rendered to the research communities as a whole and to fulfil, always to the best possible extent, the duties entrusted to it.

A symbol of this new phase in the life of ANR is the drafting of our first Objectives and Performance Agreement (COP) for the 2016-2109 period which we will sign with the State. I am delighted with this new initiative, which will underpin our missions and give enhanced recognition of ANR's role. The staff of ANR and I are deeply committed to working on this new goal."





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IN THE WINGS  
OF ANR



# IOI

## WHO WE ARE

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## KEY FIGURES



€528.1 M

OPERATING BUDGET FOR 2015,  
OF WHICH €390.2M ALLOCATED  
TO CALLS FOR PROPOSALS



280

STAFF HEADCOUNT AS AT 31/12/15,  
I.E. 259 FTEW (FULL-TIME  
EQUIVALENTS WORKED)

MORE THAN

9,000

PEER REVIEWERS MOBILISED TO  
EVALUATE THE SUBMITTED PROJECTS



1,043 PROJECTS  
FUNDED IN 2015

NEARLY

14,300

PROJECTS FUNDED  
SINCE ANR WAS CREATED

MORE THAN

83%

OF THE PROJECTS FUNDED  
ARE COLLABORATIVE PROJECTS

25.5%

OF THE PROJECTS FUNDED  
IN 2015 ARE INTERNATIONAL  
PROJECTS CO-FUNDED  
WITH FOREIGN AGENCIES

21.3%

OF THE PROJECTS FUNDED  
IN 2015 BRING TOGETHER  
RESEARCH TEAMS FROM ACADEMIC  
AND CORPORATE SPHERES

€6  
billion

DEVOTED TO THE  
FUNDING OF RESEARCH  
PROJECTS SINCE 2005

## IDENTITY CARD

### NAME:

ANR (French National Research Agency)

### DATE OF CREATION:

A three-stage process

- February 2005: Creation of a public interest grouping foreshadowing the agency.
- 1<sup>st</sup> August 2006: Decree establishing the existence of ANR as a public administrative institution placed under the authority of the Ministry responsible for Research.
- 1<sup>st</sup> January 2007: The change of status provided for by the decree took effect.

### ROLES & MISSIONS:

A core mission: Funding and promoting the development of research in all its forms.

Through its action, the agency must also:

- Foster technical innovation, technology transfer, and public-private sector partnerships.
- Contribute to the enhancing of European and international scientific cooperation.

Since 2010, ANR has been the principal operator of the Investments for the Future programme in the field of higher education and research. As such, it acts on behalf of the Commissariat-General for Investment (CGI).

Since 2014 these missions have been extended to analysing the development of the research offering and measuring the impact of its funding on French scientific output.

### DISTINGUISHING FEATURES:

- A structure at the core of the French and European research systems.
- A wide range of funding instruments.

### AT THE CENTRE OF THE RESEARCH ECOSYSTEM

The ANR Governing Board includes representatives from several Ministries (Research, Higher Education, Industry and Budget), from the French Strategic Research Council (CSR), and qualified personalities representing the broad scientific fields and the socio-economic world. ANR also interacts with the Ministries concerned by research, research Alliances (Aviesan, Ancre, Allistene, AllEnvi, and Athena), research organisations, universities, competitiveness clusters, as well as associations and foundations. On the European and international front ANR works with the project-based funding agencies of other countries and participates in the European and international organisations that support research (Science Europe, Global Research Council, etc.).

## 1 PROJECT-BASED FUNDING: AN ADVANTAGE FOR FRANCE

Project-based funding is a method of funding research that is widely used in the majority of countries reputed for research (United Kingdom, Japan, United State, Germany, etc.), and today it brings true added value to France on several accounts.

The analyses of the OECD (Organisation for Economic Cooperation and Development), of the Court of Auditors, of the largest international funding agencies and of ANR converge in the finding that project mode allows **precise financial tracking of research activities** by domain and also **speeds up research on the scientific priorities** defined by the State by mobilising the best teams.

But there are many other impacts over and beyond these financial aspects. The competitive and independent selection procedures, meeting international standards, enable the **funding to be directed towards the most successful research teams.**

The response to scientific and societal challenges is a source of **creativity** (response to scientific challenges, selection based on concept originality, etc.) and **facilitates collaboration** between scientific teams from different disciplines and from public and private institutions (research organisations, universities, companies, schools, etc.) **working towards common objectives.**

Project-based funding thus **fosters interdisciplinarity and partnerships between academic teams or with enterprises.** It also stimulates the **emergence of risky projects which can potentially generate scientific leaps.** This mode of funding **brings together teams from different institutions** (organisations, universities, enterprises, schools) and hence **decompartmentalises French research.** The decompartmentalisation of disciplines is a very strong incentive in collaborative projects because the very notion of project encourages bringing together different types of skills to attain a common scientific objective.

Such **alliances** are vital for taking up the societal challenges identified in the context of national and European strategies, societal challenges which all correspond to complex issues necessitating the **synergy of varied disciplinary fields**, if we are to hope to acquire new knowledge which can be rapidly deployed to resolve these issues.

## 2 QUALITY, TRANSPARENCY AND ETHICS AT THE CORE OF ANR'S ACTIONS

ANR organizes the funding of project-based research based on a competitive selection process. In accordance with the relevant international standards, this mechanism is based on the principle of peer reviews. As it has expanded, ANR has added various tools to this process in order to resolutely position quality, transparency and ethics at the core of its actions.

### THE PEER REVIEW - THE FOUNDATION OF THE EVALUATION

To ensure competitive selection based on peer judgement, ANR relies on regularly renewed **panels** of scientific personalities external to ANR, and **the widest possible community of peer reviewers** who are independent of the panels.

These scientists, who may be French or foreign, are invited by ANR upon proposal by the evaluation panels, who select them according to **criteria of competence, reputation, independence and integrity.** Before being given access to the complete proposal file, the peer reviewers sign a confidentiality agreement, declare that they have no conflicts of interest and accept the principles of non-disclosure and management of conflicts of interest described in ANR's **code of ethics.** These peer reviewers play a key role in the process for selecting project proposals submitted to ANR. The discussions of the evaluation panels are effectively based on the peer reviewers' appraisal reports. It is the consensual or contradictory nature of the appraisal reports that fuels the committees' discussions which result in the classification of the proposals.

### THREE FLAGSHIP TOOLS FOR ENSURING A HIGH QUALITY SELECTION

Since 2009, ANR has had a **code of ethics** which sets out the good practices with which all persons and entities involved in the agency's activities must comply. This charter guarantees **transparency of the processes, compliance** with the research project **selection criteria** and **sound management of public funds.**

In April 2011, ANR created a **Redress Committee.** This committee examines and analyses any problems in the functioning of the selection process. Matters can be referred to this collegial body by either the project applicant or ANR **at any stage of the selection process** (pre-selection or selection) and **concerning all the calls for proposals launched by ANR,** apart from those of the Investments for the Future programme.

In June 2014, ANR supplemented these tools with a **policy on ethics and scientific integrity.** This policy describes the fundamental principles applicable in the exercise of research or research training activities, and the rights and duties of those who support, evaluate and perform research work. It applies to applicant researchers and organisations, and to all persons involved in ANR's activities.

**WORTH KNOWING**  
At least three peer reviews are carried out on each project evaluated.

### DID YOU KNOW?

You can find the list of **peer reviewers having contributed to the selection process**, classified by year of issue, for the calls for proposals (apart from certain specific international calls such as ERA-NET and JPI) on the ANR website.





MORE THAN  
**9,000**  
EXTERNAL  
SCIENTISTS  
(PEER REVIEWERS)  
MOBILISED FOR  
THE EVALUATIONS

GENERIC CALL  
FOR PROPOSALS

**10**  
CHALLENGE SCIENTIFIC  
ADVISORY PANELS (CPSD)



ABOUT  
**300**  
MEMBERS OF CHALLENGE  
SCIENTIFIC ADVISORY PANELS

**41**   
SCIENTIFIC EVALUATION  
PANELS (CES)

**904**  
MEMBERS OF SCIENTIFIC  
EVALUATION PANELS

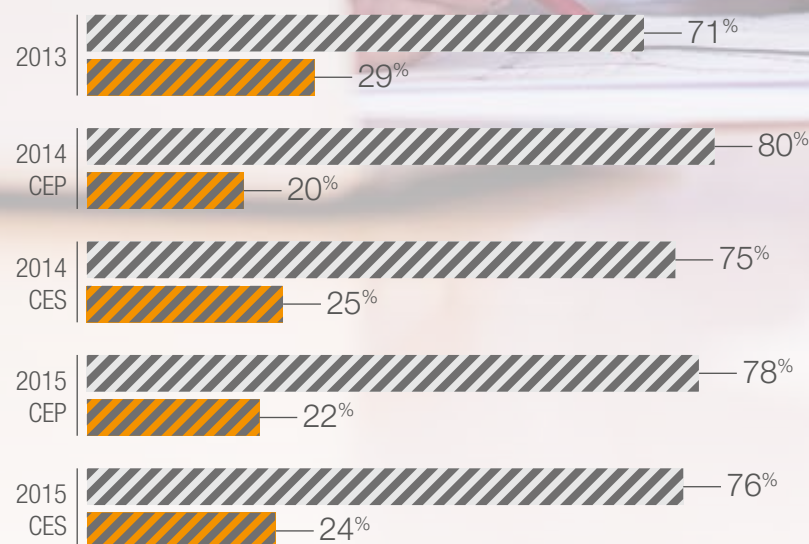


**1,619**  
MEMBERS OF PRE-PROPOSAL  
EVALUATION PANELS (CEP)

**38,700**  
PEER REVIEWS CARRIED OUT

**5,103**  
PEER REVIEWS CARRIED OUT  
BY FOREIGN PEER REVIEWERS

PROPORTION OF MEN / WOMEN ON THE EVALUATION PANELS  
(NUMBER OF PHYSICAL PERSONS)



CEP: Pre-proposal Evaluation Panel  
CES: Scientific Evaluation Panels

Men Women

**3**  
ENCOURAGING  
INTERDISCIPLINARITY  
AND THE SHARING  
OF SCIENTIFIC  
CULTURES

Promoting communication between scientific disciplines and the research communities is one of ANR's priorities. For ANR it is a question of encouraging cross-cutting approaches, multidisciplinary and the sharing of cultures within the research teams it funds. The ultimate objective is not only to foster mutual enrichment but also to share means and resources.

Interdisciplinarity makes it possible to have the knowledge combinations necessary to be able understand objects and subjects in all their complexity. Calling upon several disciplines can also be indispensable in order to take up the major challenges of our time by building on several types of expertise and know-how in an integrated manner. Climate change, population ageing or the availability of sufficient water resources of adequate quality; due to their very nature, some issues require the pooling of skills from different horizons, the contribution of highly diverse scientific fields, drawn for example from the life and environmental sciences, earth sciences and social sciences and humanities.

STIMULATE INTERCHANGES, THE CREATION OF BRIDGES  
AND THE CONFRONTATION OF VIEWPOINTS

In the same way as it tries to facilitate cross-cutting approaches between scientific disciplines, ANR counts on the development of partnerships between the public and private sectors. In keeping with its missions, the agency seeks to open up these two worlds to each other and reinforce their ties. Thanks to dedicated funding instruments, ANR endeavours to stimulate interchanges, the creation of bridges and the confrontation of viewpoints. The aim is to use this not only to speed up technology transfer and the creation of economic value from the products of public research, but also to promote the opening of public research to the corporate world to encourage academic research work to take better account of the scientific concerns of industry.



**3,231**  
PUBLIC-PRIVATE PARTNERSHIP (PPP)  
PROJECTS FUNDED SINCE 2005

**222**  
PPP PROJECTS FUNDED IN 2015

**27.5%**  
OF THE BUDGET ALLOCATED  
IN 2015 WAS DEVOTED TO  
PPP PROJECTS

**6.1%**  
OF THE BUDGET  
ALLOCATED IN 2015 WAS  
ASSIGNED TO COMPANIES



4

## CONTRIBUTING TO RESEARCH WITHOUT BORDERS: ANR IN THE INTERNATIONAL ECOSYSTEM

Ensuring international openness is a major part of ANR's remit. Its action aims at increasing the excellence, competitiveness, attractiveness, impact and outreach of French research in Europe and the world. With research, its implications and its resources becoming increasingly internationalised, ANR and its counterparts seek to join forces to find concerted solutions to problems that go beyond the single-country context. It is a question of pooling resources and sharing research efforts and costs to take up the major knowledge acquisition challenges.

Since it was created, ANR has multiplied the ways of developing international partnerships. This gradual increase in international collaboration has enabled various objectives to be met: reinforcing the competitiveness of French research is a prominent example, not to forget facilitating the entry of French research teams into the European competition or fostering collaboration between French and leading foreign research teams.

As a representative of a mode of competitive project-based funding, ANR has undertaken to rapidly integrate the European and global networks, thereby facilitating international collaboration involving French teams through the lever of project-based funding.

### FACILITATING INTERNATIONAL RESEARCH PARTNERSHIPS

ANR supports the development of international research projects. It works in close collaboration and enters into agreements with research funding agencies of other countries in order to remove obstacles to cooperation. These agreements can concern targeted themes or be open to all the research themes funded by ANR. They either fit into the generic call for proposals or form the subject of specific calls (see page 84).

25.5% of the projects funded by ANR in 2015 are international projects co-funded with foreign agencies.

### ENHANCING THE VISIBILITY OF FRENCH RESEARCH IN THE INTERNATIONAL NETWORKS

ANR also plays an active role in the European and international research policy and enhances the visibility of French project-based research through its participation in various European and global forums and bodies. It is, for example, a member of:

- Science Europe, a European association representing the interests of research funding organisations in Europe. Michael Matlosz, President & CEO of ANR is Chairman of this association,
- the Global Research Council (GR), an informal organisation of the heads of the world's research agencies,
- the G8-HORCs (Heads Of Research Councils of the G8 countries),
- the Belmont Forum, the main group of agencies funding research into global environmental change.

### BUILDING THE EUROPEAN RESEARCH AREA (ERA)

ANR has positioned itself as an actor in the construction of the ERA. Increasing the competitiveness and attractiveness of French research on the European stage, facilitating the entry of French research teams into the European competition and their collaboration with the top researchers of the continent, etc. These ambitions are embodied in various actions, such as launching collaborative calls for proposals with the main countries in European research, or playing an active role in the multilateral programmes of the European Union (ERA-NET, Joint Programming Initiatives).

75% of the international projects co-funded by ANR are conducted in collaboration with other European countries.

ANR also participates in the networks for reflection and consultation on scientific policy and on the preparation and implementation of European agendas on key subjects. It creates institutional partnerships with its counterparts, which serve in particular to share good practices with regard to research evaluation and funding. It moreover integrates the European dimension into its programme planning by linking it with the Horizon 2020 research programme.



€69.5 M

DEVOTED TO INTERNATIONAL PROJECTS CO-FUNDED WITH FOREIGN COUNTERPARTS IN 2015

267

INTERNATIONAL PROJECTS CO-FUNDED WITH FOREIGN COUNTERPARTS IN 2015

1,533

INTERNATIONAL PROJECTS CO-FUNDED WITH FOREIGN COUNTERPARTS SINCE 2005

€435.5 M

BUDGET DEVOTED TO INTERNATIONAL PROJECTS CO-FUNDED WITH FOREIGN COUNTERPARTS SINCE 2005

### SCIENCE EUROPE AND ANR

Michael Matlosz, President & CEO of ANR, was elected Chairman of Science Europe on 20th November 2015 for the next two years and will fulfil this non-executive function alongside his functions as President & CEO of ANR. As Chairman of the association, Michael Matlosz represents the interests of Science Europe's fifty or so member organisations before the various actors of European and worldwide research. ANR has been a member of Science Europe since its creation in 2011, while Michael Matlosz for his part had been a member of its Executive Committee since November 2014.

Michael Matlosz considers this "double Chairmanship" (ANR and Science-Europe) to be beneficial for two reasons. Firstly, for the widened visibility over the landscape of the research agencies and organizations of the different European countries and their contributions to the construction of the European Research Area, which allows a comparison of the diversity of practices and approaches of the 47 member organisations from 27 countries that constitute Science Europe. Secondly, by being seen on the European scale under the banners of both ANR and Science Europe as a major player in the construction of research on our continent and being a visible and legitimate representative to express our viewpoints on the subject of the research policy before the main decision makers and stakeholders of this policy in the European Union and its member countries.







## 5 AN AGENCY THAT IS ATTENTIVE TO ITS USERS

By virtue of the role conferred upon it, ANR is at the centre of a very wide network of persons and entities: scientists leading projects, research organisations, universities, alliances, other research funding agencies, etc. Due to this variety of audiences, explaining its modes of actions, giving the audiences full and reliable information and better identifying their expectations are priorities for ANR. Various measures have already been initiated with this aim.

For several years now ANR has endeavoured to adapt to the needs of the scientific community and the research landscape. It is gradually acquiring the tools necessary for monitoring the projects and measuring the impact of the funding instruments it proposes. ANR's communication department tries to develop information aids dedicated to the actors of the sector, whether they are the users of project-based funding, ANR partners or, of course, higher education and research institutions. The agency also makes a point of sharing news of the projects it funds, especially with the community of researchers, by providing information on the noteworthy advances and successes of the projects.

### HIGHLIGHTING ANR'S ACTIONS AND THE RESULTS OF THE FUNDED PROJECTS

As the prime mover of ANR's communication operations, the Information and Communication Division is a key point of contact for the institutional partners. It offers its skills to the ANR teams by proposing a range of services, such as institutional and international communication, press relations, digital multimedia information, or the creation and organisation of scientific events and symposiums in collaboration with the teams of the Scientific Operations Division. In 2015, the work to highlight the role and actions of ANR and the results of the funded projects continued not only on the agency's website, but also through its social network accounts, its activity report, and at the events it organises.

#### A FIRST SATISFACTION SURVEY LAUNCHED IN MAY 2016

As part of its quality approach and in relation with the simplification strategy of the Ministry responsible for Research, ANR wished to obtain the opinion of the Principal Investigators of the selected projects for the 2014 or 2015 editions. The 1,600 or so scientists concerned were thus invited via an on-line questionnaire to give their opinions on the quality of the agency's procedures. The result of this survey will be communicated on the ANR website and analysed so that improvements can be made with the aim of better meeting the research communities' expectations with regard to the quality of service delivered.

8 SCIENTIFIC VALUE-PROMOTION EVENTS ORGANISED

3 INTERNAL EVENTS



1,212,576 VISITS TO THE ANR WEBSITE

664,283 INDIVIDUAL VISITORS

3,098,867 PAGES CONSULTED

564 WEBSITE UPDATES CARRIED OUT

156 NEWS PUBLICATIONS

99 IN FRENCH

57 IN ENGLISH

5,504

TWITTER SUBSCRIBERS, I.E. +54% IN 1 YEAR

2,263

LINKED IN SUBSCRIBERS, I.E. +74% IN 1 YEAR



# 1 FUNDING INSTRUMENTS TO SERVE THE COMMUNITIES

**ANR has designed and deployed a range of funding instruments to satisfy the project-based funding needs of the research communities and its assigned role in the public policy for research and innovation in France. Each of these instruments meets a clearly defined end-purpose.**

### YOUNG RESEARCHERS (JCJC)

Intended to encourage accountability in young researchers and bring out their scientific innovation capacity, this instrument should allow the recipients to develop, independently, work on their own specific theme and set up the beginnings of a team or consolidate an existing team.

### HOSTING HIGH-LEVEL RESEARCHERS (ACHN)

Put in place alongside the Work Programme 2014, this instrument is intended to enable brilliant junior or senior high-level researchers from other countries to come and work for a sustained period in French research institutions.

### INDUSTRIAL CHAIRS

Intended to help develop lasting relations between higher education and research institutions and companies, this instrument allows a research and higher education Chair - financed in part by the company - to be established within the institution.

### COLLABORATIVE RESEARCH PROJECTS - PRC

By pooling the skills and resources of teams from different research structures, this instrument helps reinforce collaboration between teams who would not habitually have worked together, and enables them to achieve more ambitious results which break away from conventional paths.

### COLLABORATIVE RESEARCH PROJECTS INVOLVING ENTERPRISES - PRCE

By comparing the academic viewpoint with that of industry, this instrument aims at enabling new research questions to be addressed and problems to be approached from different angles. It is also intended to improve innovation capacities, enhance the transfer of results and know-how arising from public research to the business world, and to take better account of industrial needs in academic research work.

### INTERNATIONAL COLLABORATIVE RESEARCH PROJECTS - PRCI

ANR supports the development of international research projects as part of its international cooperation policy. Thanks to the partnerships it has established with various counterparts abroad, French teams can submit a project involving one or more foreign teams to the generic call for proposals. The aim of these agreements is not only to increase the excellence, impact and outreach of French research, but also to promote collaborative research in Europe and the world and thereby foster the emergence of high-level research partnerships.

### CHALLENGE

The "Challenge" instrument is designed to encourage several teams to work simultaneously but independently on a given narrowly-focused subject. The aim of putting them in competition with one another is to bring them to compare their respective approaches to a given scientific application or question.

### JOINT (OR COMMON) LABORATORIES - LABCOM

Put in place in 2013, the Labcom instrument aims at developing the industrial partnership potential that exists in the academic research actors. The idea is to help them establish bilateral partnerships with enterprises, especially small and medium-sized enterprises (SMEs) and intermediate-sized enterprises (ISEs).

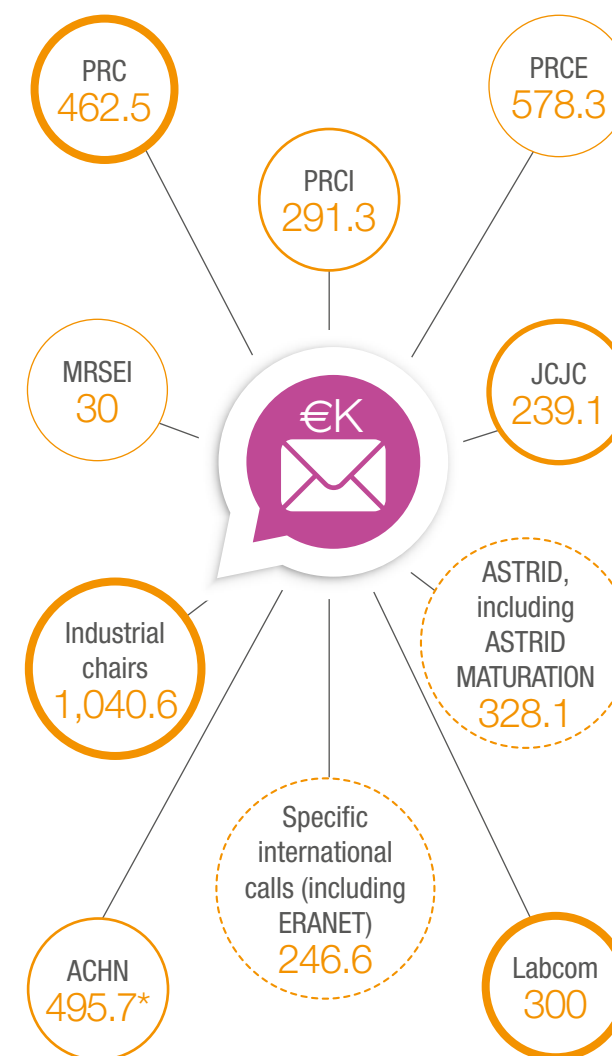
### FLASH CALL FOR PROPOSALS

The Flash instrument is designed to support an urgent need for research whose scientific relevance is linked to an event or a natural disaster of exceptional scale. The aim is to finance the work necessary for the acquisition of rare information and data that are impossible to obtain in normal situations.

### MRSEI

This is the French acronym for "Setting up European and International Scientific Networks"; this instrument aims at supporting the setting up of transnational networks coordinated by French researchers. It aims at encouraging French participation in European and international calls for proposals and ultimately to increase the visibility and outreach of French research.

AVERAGE AID ALLOCATED PER FUNDING INSTRUMENT



\* Data from 2014, as the Hosting High-Level Researchers (ACHN) call was not opened in 2015.

THREE TYPES OF INSTRUMENTS PROPOSED

- dedicated to individuals
- targeting collaborative research
- initiation of projects



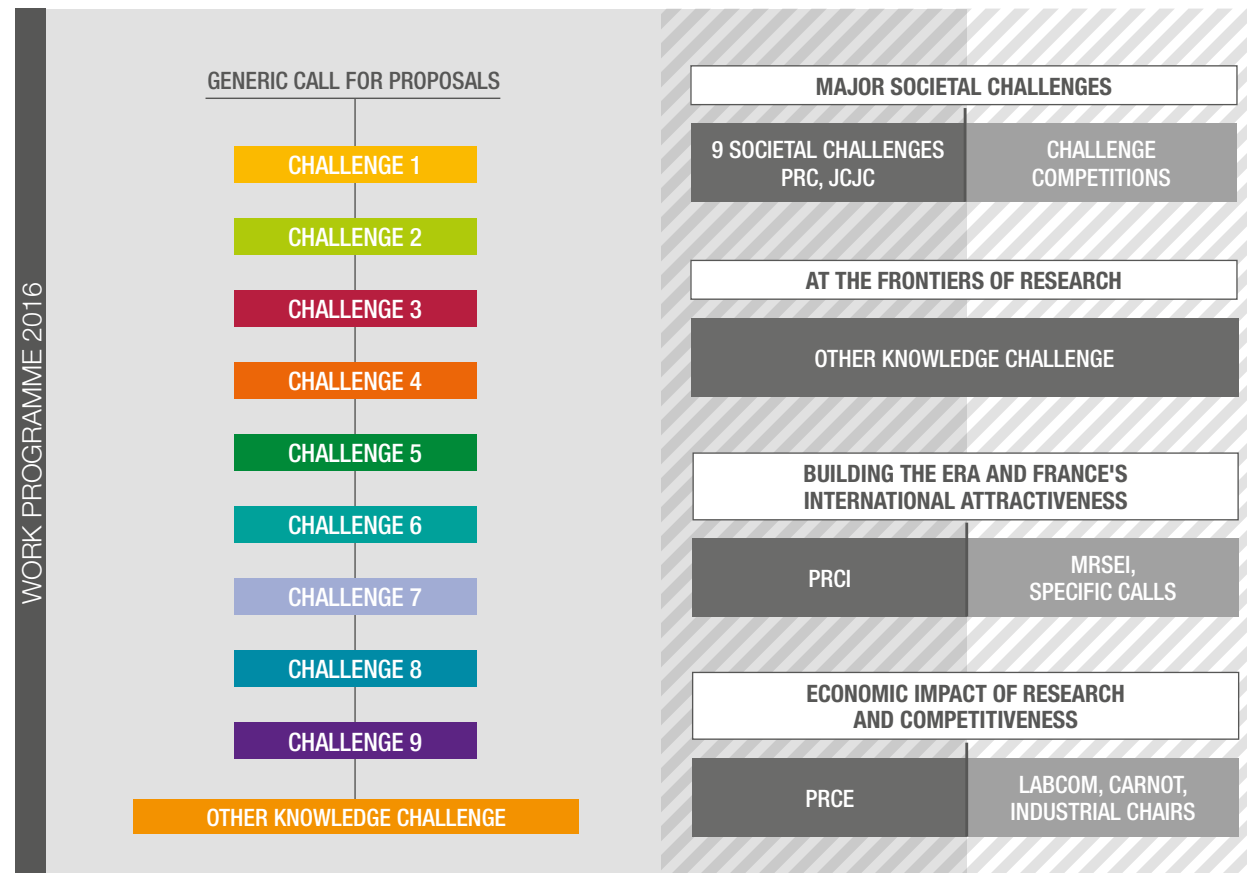
## 2 STRUCTURE OF THE FUNDING OFFERING

During 2013, ANR - in just a few months and in collaboration with the Ministry responsible for Research - devised a new way of working to serve for the scientific community. The focal points of this new approach were firstly the development of an annual work programme describing the research priorities and the funding instruments that can be mobilised for the coming year, and secondly grouping the majority of the funding offering in a generic call for proposals.

### FOUR COMPONENTS, NINE SOCIETAL CHALLENGES

The work programme comprises four interlinked components, with their own specific budget and governance:

- Major societal challenges
- At the frontiers of research
- Building the European Research Area (ERA) and France's international attractiveness
- Economic impact of research and competitiveness



### A DOCUMENT PREPARED THROUGH CONSULTATION

The ANR work programme lies within a framework set by the strategic agenda "France Europe 2020" and the National Strategy for Research (SNR), documents which themselves are consistent with the structuring of the European framework programme Horizon 2020. The work programme thus incorporates the proposals of the Scientific Challenge Advisory Panels (CPSDs) to feed back experience from the

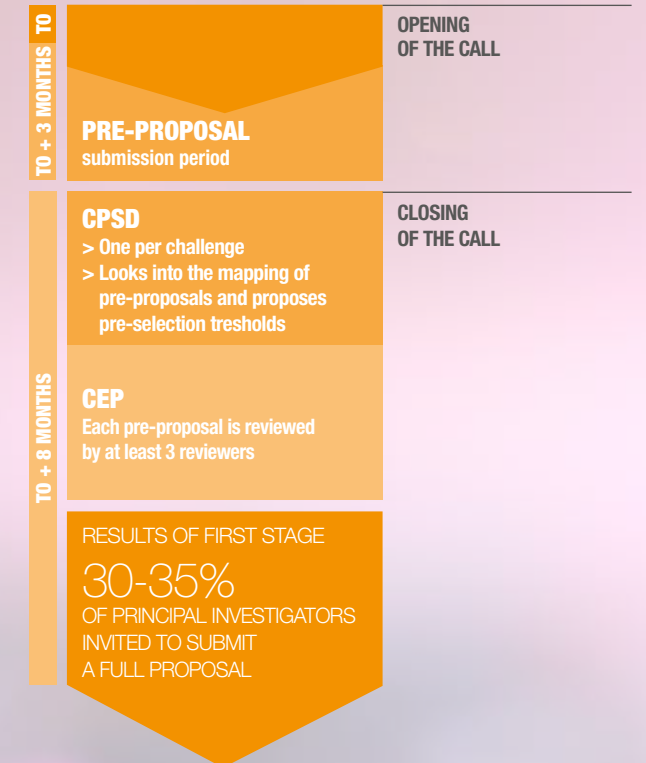
preceding year's programme, the research Alliances, CNRS and the Ministries concerned (Ministries responsible for Research and Higher Education, Agriculture, Ecology, Health, Industry, Defence, Foreign Affairs, Culture, and National Education). Lastly, in its section devoted to societal challenges, the work program integrates the priority research orientations for France, as defined in the National Strategy for Research.

## 3 THE SELECTION PROCESS APPLIED BY ANR

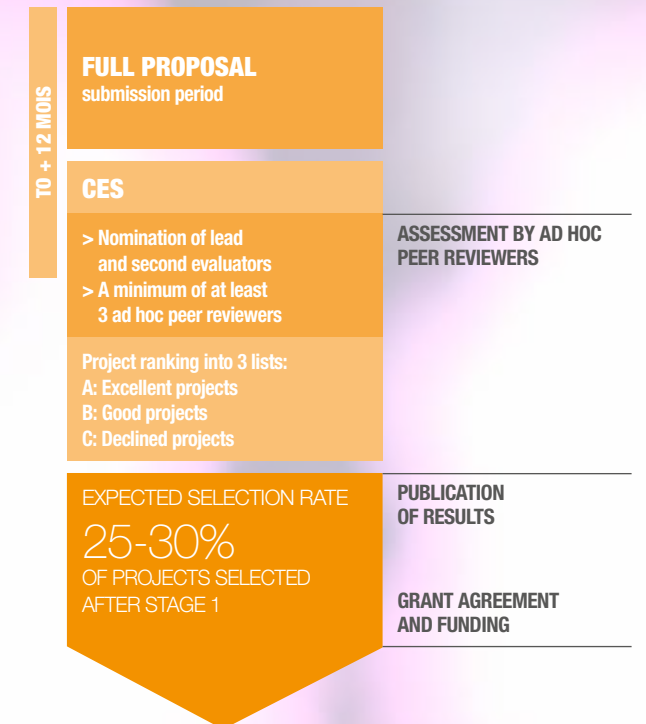
### SIMPLIFICATION: A COLLECTIVELY DEVELOPED STRATEGY

At the end of 2015 and during the first quarter of 2016, ANR took part in a large-scale undertaking initiated by the Ministry responsible for Research to develop a strategy for the simplification of Higher Education and Research. Initiated on the basis of a report by the IGAENR (General Inspectorate of Administration for National Education and Research), the work was also based on the reflections of four thematic working groups. ANR participated extensively in one of the working groups which focused more specifically on calls for proposals. During the public consultation that followed this preparatory phase, ANR submitted a substantiated list of proposals. Among the first 50 simplification measures announced at the end of April by Thierry Mandon, Secretary of State for Higher Education and Research, several concern ANR directly and will be implemented at the start of the new academic year following the 2016 summer recess.

### STAGE 1: PRE-PROPOSALS



### STAGE 2: FULL PROPOSALS



CPSD : Scientific Challenge Steering Committee

CEP : Pre-proposal Evaluation Panel

CES : Scientific Evaluation Panel

# KEY FIGURES FOR THE 2015 SELECTION



€390.2 M

BUDGET ALLOCATED TO CALLS FOR PROPOSALS

29

SPECIFIC INTERNATIONAL CALLS FOR PROPOSALS LAUNCHED

9,038

PROJECTS SUBMITTED

1,043

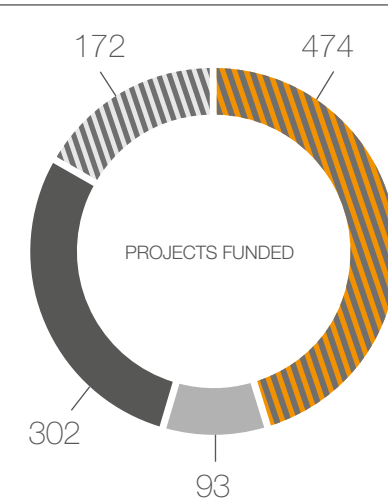
PROJECTS FUNDED

83.3%

SHARE OF COLLABORATIVE PROJECTS

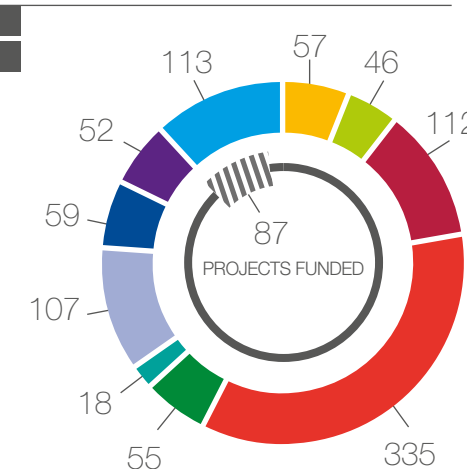
## KEY FIGURES FOR THE 2015 SELECTION

GRANTS AND PROJECTS FUNDED IN 2015 BY COMPONENT



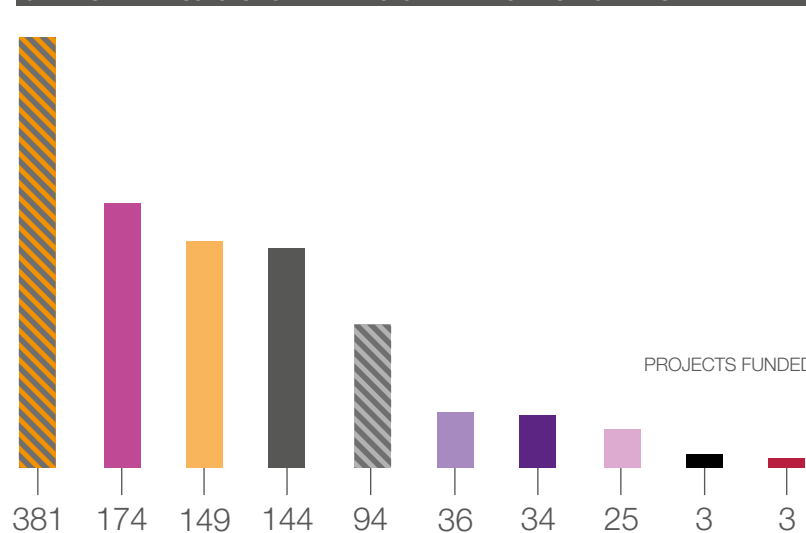
Component 1: Major Societal Challenges	€191.6 M
Component 2: At the Frontiers of Research	€32.7 M
Component 3: Building the European Research Area and France's international attractiveness	€70.9 M
Component 4: Economic Impact of Research and Competitiveness	€93.9 M

GRANTS AND PROJECTS FUNDED IN 2015 BY CHALLENGE



Health and well-being	€132.3 M
Information and communication society	€48.2 M
Industrial renewal	€45.4 M
Other Knowledge Challenge	€37.9 M
Efficient resource management and adaptation to climate change	€24.3 M
Food security and demographic challenges	€21.1 M
Clean, secure and efficient energy	€19.4 M
Freedom and security of Europe, its citizens and its residents	€19.1 M
Other (OH Risk, Hosting High-Level Researchers, Industrial Chairs, LabCom)	€16.9 M
Innovative, inclusive and adaptive societies	€15.7 M
Sustainable mobility and urban systems	€10 M

GRANTS AND PROJECTS FUNDED IN 2015 BY TYPE OF INSTRUMENTS

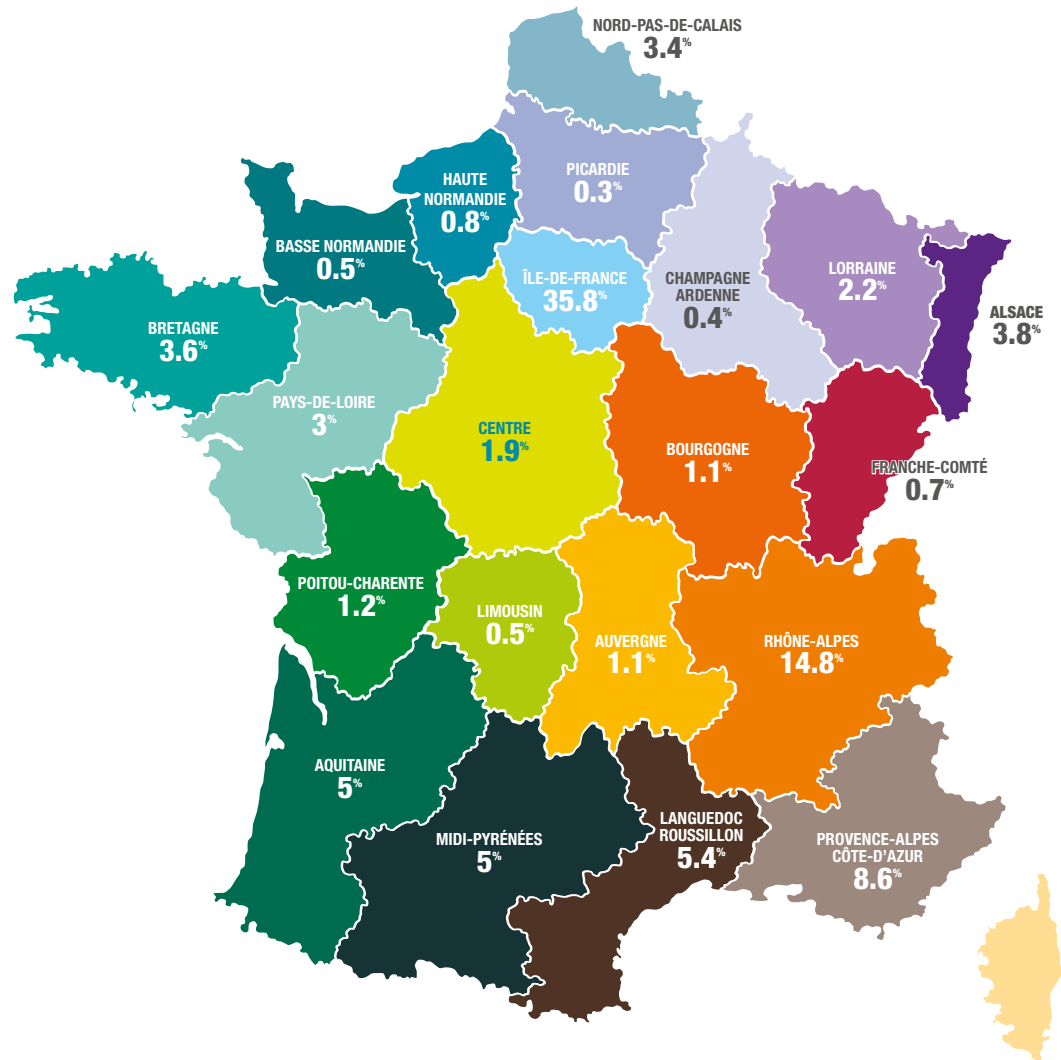


Collaborative Research Projects	€176 M
Specific international calls (ERA-NETs, JPIs, bi- and multilateral calls)	€42.4 M
Young Researchers	€35.6 M
Collaborative Research Projects involving Enterprises	€83.3 M
International Collaborative Research Projects	€27.4 M
MRSEI	€1.1 M
ASTRID	€11.2 M
Labcom	€7.5 M
Industrial Chairs	€3.1 M
Flash Drones	€1.4 M

For the record, 2 projects have been funded in BTR - Basic Technological Research (not included in the Generic Call for Proposals)



DISTRIBUTION OF FUNDS ALLOCATED TO CALLS FOR PROPOSALS BY REGION

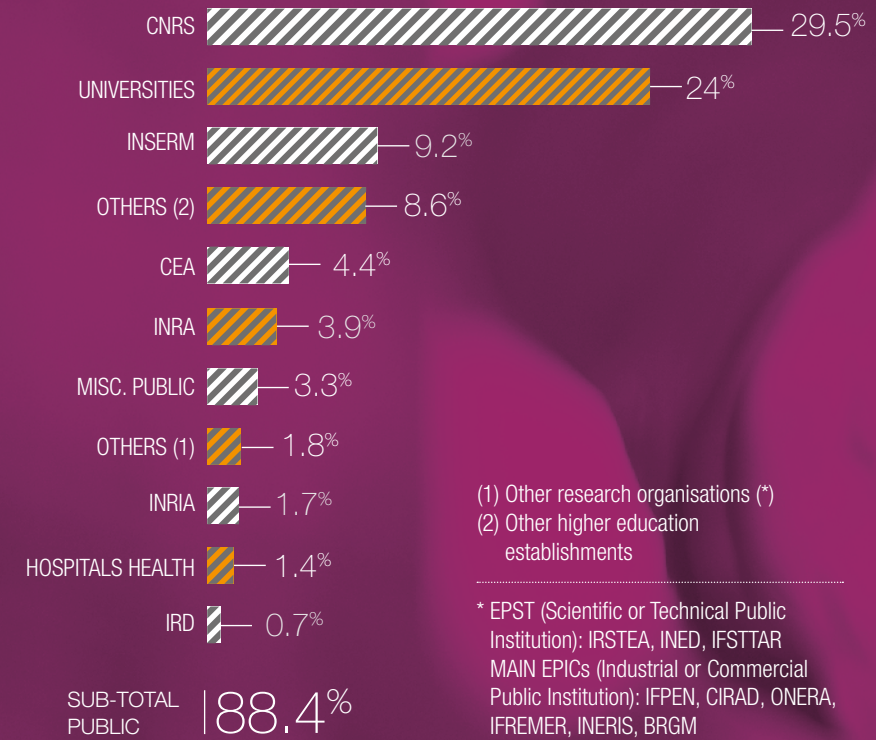


FRENCH STRUCTURES SITUATED ABROAD: 0.7%



DISTRIBUTION OF FUNDS ALLOCATED IN 2015 TO CALLS FOR PROPOSALS BY TYPE OF BENEFICIARY

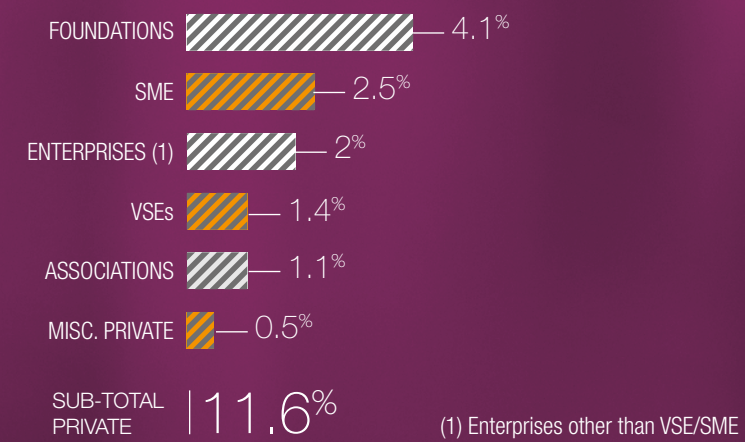
PUBLIC



(1) Other research organisations (\*)  
(2) Other higher education establishments

\* EPST (Scientific or Technical Public Institution): IRSTEA, INED, IFSTTAR  
MAIN EPICs (Industrial or Commercial Public Institution): IFPEN, CIRAD, ONERA, IFREMER, INERIS, BRGM

PRIVATE



(1) Enterprises other than VSE/SME

# INVESTMENTS FOR THE FUTURE, A SPECIFIC MISSION



In 2010, ANR was designated principal operator by the State for the actions of the Investments for the Future Programme in the area of higher education and research. Under the second Investments for the Future Programme, ANR has been confirmed as principal operator in these areas.

Provided for in the Amending Finance Law of 9th March 2010, the Investments for the Future Programme is intended to increase productivity, enhance innovation, increase corporate competitiveness and foster employment and equal opportunity by encouraging investment and innovation in 5 priority sectors generating growth and employment:

- Higher education and training;
- Research;
- Industrial sectors and SMEs;
- Sustainable development;
- Digital technology.

Under the Investments for the Future programmes, ANR manages **26.57 billion euros** on behalf of the State.

## ANR - PRINCIPAL OPERATOR FOR THE STATE

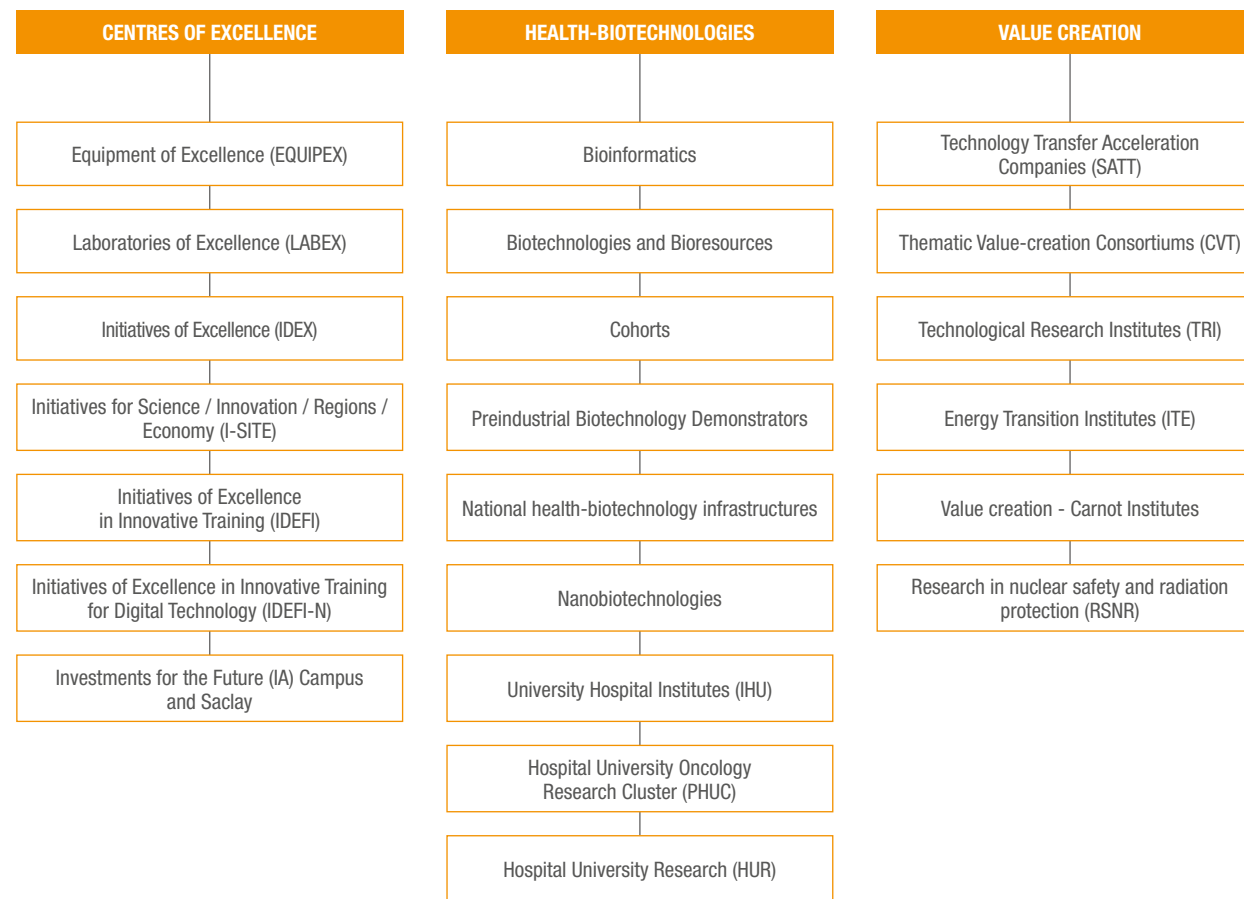
Management of the 35 billion euros of the Investments for the Future Programme (PIA) has been entrusted to 10 State operators, including ANR. The agreements signed between the State and the operators cover some forty actions. They set the rules for exemplary governance based on a requirement for profitability with a return on investment for the State and systematic assessment of the actions carried out.

ANR is the principal operator for Investments for the Future Programme, with 21 of the programme's actions under its responsibility. They concern the centres of excellence, health, biotechnologies, and value creation from research.

The actions of the first Investments for the Future programme formed the subject of calls for proposals, most of which were launched in 2010 and 2011. After the project selection phase, which is now over, ANR was tasked with negotiating the grant agreements with the project principal investigators and ensuring project funding, monitoring, and the first interim assessments in 2015. Under the second PIA, provided for by the Financing Law of 29th December 2013 with a budget of 12 billion euros, new calls for proposals were initiated in 2014 and continued in 2015.

# INVESTMENTS FOR THE FUTURE, A SPECIFIC MISSION

## AREAS UNDER ANR RESPONSIBILITY



## A SPECIFIC MODE OF MANAGEMENT

Management of the Investments for the Future involves a number of particularities with respect to ANR's other missions.

- Selection by **essentially international juries**. The projects were evaluated essentially by international juries with project selection criteria being defined according to the Investments for the Future priorities and the final selection decision, which lies with the Prime Minister.
- **A large volume of appropriations allocated**. The volume of appropriations allocated to the selected projects is substantial and covers projects extending until 2020 (for the first programme, beyond this for the second) opening up new prospects and encouraging collaborations which otherwise could not have existed.

- **The funding of projects and major infrastructure**. They allow not only the funding of large-scale research projects but also the setting up of new "objects" such as intermediate-sized research facilities, biology-health research infrastructures, or the emergence of global research and education clusters.





# 02

30 HIGHLIGHTS  
PROVIDING  
AN OVERVIEW  
OF THE YEAR





## SPECIAL FOCUS ON 5 INTERNATIONAL HIGHLIGHTS

### ARCHAEOLOGY

## COMBINING COMPUTING AND HUMAN SCIENCE TO ADVANCE KNOWLEDGE

#### IDENTITY CARD

#### GROPLAN

ONTOLOGY AND PHOTOGRAMMETRY FOR GENERALISATION OF SURVEYS IN UNDERWATER AND NAUTICAL ARCHAEOLOGY

► **ANR programme and edition:**  
Digital content and interactions (CONTINT) - 2013

► **Identifier:**  
ANR-13-CORD-0014

► **Coordinating entity:**  
Laboratory of Information and System Sciences - CNRS

► **Partners:**

- Camille-Jullian Centre
- COMEX
- Société d'études et de travaux photogrammétrique
- Texas A&M University
- University of Malta

► **ANR grant:** €633 k

► **Contact:**  
Pierre DRAP: Pierre.Drap@univ-amu.fr

#### On-line content

Video extract of the exploration:  
[www.youtube.com/watch?v=BwgDzA9vEJg](http://www.youtube.com/watch?v=BwgDzA9vEJg)  
[www.groplan.eu](http://www.groplan.eu)

**Ships which have sunk in deep water constitute vestiges of choice for archaeologists. This is because, unless they have been looted, their cargo is often intact and well preserved. Exploration of such shipwrecks is however limited by the depth to which divers can descend. To get round this problem, the Groplan project partners are developing computing aids enabling them to make a survey of shipwrecks. Guided by archaeological knowledge, they can be used to control the exploration by robots.**

This project, situated at the confluence of human science and computing, involves university and industrial researchers working in France, Malta and the USA. In summer 2014, the tools developed under this project were used to explore the wreck of a ship lying at a depth of more than one hundred metres off the coast of Malta. Probably dating back to the start of the 7<sup>th</sup> century BC - making it the oldest shipwreck found in the western Mediterranean to date - it had been spotted a few years ago but could not be explored because of its depth.

From filming through to the recognition and locating of the artefacts visible on the surface layer, the exploration and analysis of the data collected were totally automated thanks to the underwater photogrammetry aids developed.

#### A FUNDAMENTAL HISTORICAL DISCOVERY

This first exploration enabled the entire visible part of the ship to be surveyed, revealing that the cargo is still stowed and therefore probably intact. The first observations show a cargo of liquid products (wine, oil?) from the Gulf of Naples, Carthage, perhaps from Sardinia and western Sicily, and a large batch of basalt millstones. This is a fundamental discovery from an historical viewpoint. It is effectively the first time that researchers are able to observe a Phoenician cargo from the Archaic Period in the central Mediterranean. It confirms that the Western Phoenicians and the indigenous communities in direct contact with them developed an economy of surplus production very early on. From an historical and heritage viewpoint, the new means of exploration at great depth developed under this project opens up a whole new dimension for underwater archaeological research, namely that of shipwrecks and deposits situated at great depth.

#### WORTH KNOWING

Photogrammetry is a technique for generating 3D illustrations of objects from a large number of images shot at different angles. This technique is extremely useful in underwater archaeology.



### INTERNATIONAL

## TIGHTENED COOPERATION WITH THE MAGHREB AND THE MIDDLE-EAST TO TACKLE THE CHALLENGES FACING THE MEDITERRANEAN REGION

**Climate change, fast-growing urbanisation, soil nutrient depletion, erosion, multiple sources of pollution, access to water, the Mediterranean countries are faced with many common challenges. ANR is involved in two transnational initiatives bringing together both sides of the Mediterranean in order to find joint and concerted solutions.**

Although agriculture, water and energy are major concerns for this region, research in these areas remains diffuse. The Mediterranean countries have thus decided to come together to jointly launch calls for proposals aiming to stimulate innovation in these areas. Pooling the intellectual and technological resources on these themes should in the long-term allow the development of environmentally-friendly agricultural practices that makes efficient use of water and inputs while meeting food security requirements. In addition to this, the development of renewable energies and wastewater recycling or treatment techniques consolidate these objectives and support economic and social development in rural areas.

#### TWO TRANSNATIONAL CALLS FOR PROPOSALS LAUNCHED IN 2015

Created within the framework of the European Union's 7<sup>th</sup> Framework Programme for Research and Technological D (FP7), the ERA-NETs ARIMNet 2 and ERANETMED launched two calls for proposals specific to the Mediterranean region in 2015. These funding instruments aim to develop and coordinate national research on themes relating to food security, agricultural practices, new energies and water management by supporting transnational and transdisciplinary projects. The aim of the funded projects is to stimulate innovation in these areas. Mobility, training young students, pooling knowledge and innovation are also central elements of these calls.

ANR participates actively in these Mediterranean initiatives. In its role as a funding agency it supports the French teams involved in the selected projects. It participates with the other countries' funding agencies in defining the Mediterranean region's scientific strategy priorities. ANR also plays an operational role by ensuring the secretariat for the ARIMNet2 call for proposals with Morocco.



29

TRANS-MEDITERRANEAN PROJECTS FUNDED FOR A SUM OF

€5.2 M

VIA ARIMNET (9 PROJECTS IN 2012, 7 PROJECTS IN 2015) AND ERANETMED



#### TWO NEW CALLS FOR PROPOSALS IN 2016

Two new calls for proposals were initiated in this context in spring 2016. The first (Arimnet) concerns the improvement of the contribution of agriculture and food supply systems to the economic and social development of rural areas. The second (ERANETMED) aims at promoting solutions for managing rare and coveted resources in arid and coastal areas.



## A NEW INSTRUMENT DEDICATED TO SETTING UP SCIENTIFIC NETWORKS

Created in 2015, the MRSEI (French acronym meaning "Setting up European and International Scientific Networks") instrument supports the setting up of transnational networks coordinated by French researchers. It aims at encouraging French participation in European and international calls for proposals and ultimately to increase the visibility and outreach of French research.

The setting up of a research project in response to a European or international call for proposals can prove difficult for several reasons: the targeted community is not yet established; meetings and workshops are necessary to define the best possible research strategy; the subject must be addressed by a broadly-based multidisciplinary community, etc. Creating a network between potential future partners beforehand can help overcome these difficulties.

With the MRSEI instrument ANR wishes to promote, in the short term, the creation and drafting of collaborative research projects involving the members of the defined networks. This instrument is intended in particular to finance the partners' meetings and workshops that the consortium will need to organise to define the scientific project and the best research strategy. It will also allow the introduction of new and complementary partners to bring added value and new skills to the team.

### AN INSTRUMENT DESIGNED TO MEET THE NEEDS OF THE COMMUNITIES

MRSEI is devised to ensure flexibility and efficacy. To allow rapid decision-making and appropriate setting up of the funding, MRSEI provides for two calls for proposals per year, a simplified submission file, a single beneficiary of the funding (the French public research organisation leading the project) and a peer selection process involving a single ad hoc panel without systematic use of external peer reviews.

The projects can be awarded funding of €30 K maximum for a period of 18 months. The allocation can only be used to finance operating expenditure (communication, meetings, workshops, etc.), as this instrument is not intended to fund research work.

### WHO IS TARGETED?

All scientific communities from both the public and private sectors can join forces thanks to this instrument. Consortia from all disciplines can apply. And, in keeping with the Horizon 2020 framework programme, multidisciplinary proposals are welcome.

2

CALL FOR PROPOSALS  
PUT OUT IN 2015

66

PROJECTS FUNDED

43%

SELECTION  
RATE

#### On-line content

- MRSEI brochure
- More information on Horizon 2020:  
[www.horizon2020.gouv.fr](http://www.horizon2020.gouv.fr)



## ELSTRAD EXPLORES THE MECHANISMS ENABLING PEOPLE TO ORIENTATE THEMSELVES IN THEIR ENVIRONMENT (I.E. NAVIGATE AND FIND THEIR ROUTE)

The ability of people to orientate themselves in their environment and learn new routes is an essential part of human development. People with intellectual deficiencies can have difficulty in navigating in their environment and learning new routes, which can affect their day-to-day life and their independence. This is the case for example in people with Down syndrome or Williams syndrome. The aim of the ELSTRAD project was thus to identify the nature and origin of the difficulties encountered by these people by comparing their ability to orientate themselves with that of typically developing children.

Learning to navigate around an environment involves three distinct forms of knowledge with increasing degrees of complexity: knowledge of the landmarks situated along the route, knowledge of the route (sequence of changes of direction associated with landmarks), configural knowledge (acquisition of a cognitive map) through which the spatial structure of the environment is understood.

The research carried out in the ELSTRAD project thus assessed each of these knowledge levels in typically developing children and in persons with Down syndrome and Williams syndrome. To achieve this, the project researchers used the technology of virtual environments.

### DIFFICULTIES SPECIFIC TO EACH SYNDROME

The route knowledge assessment was based on a learning situation in which the person had to retrace a route which s/he had just been shown in an unfamiliar environment. The person repeated the tests until they succeeded. The configural knowledge assessment was based on finding the short-cut linking two known destinations. The cognitive factors involved were also studied (short-term memory, attention, inhibition, etc.). This work brought new elements in the understanding of each of the components involved in spatial navigation, be it in typically developing children or in persons with learning difficulties. It also appears that the difficulties encountered by the people with Williams syndrome or Down syndrome cannot be explained solely by the presence of a deficiency, but that they are specific to each syndrome. For example, people with Down syndrome require more attempts to learn a route than people with Williams syndrome.

**ELSTRAD**  
VIRTUAL ENVIRONMENTS  
FOR TEACHING  
INTELLECTUALLY DEFICIENT  
PERSONS TO ORIENTATE  
THEMSELVES IN THEIR  
SPATIAL ENVIRONMENT

► **ANR programme and edition:**  
Franco-British programme -  
Edition 2009

► **Identifier:**  
ANR-09-FRBR-035

► **Coordinating entity:**  
University of Lille 3

► **Partners:**  
• University of Rouen  
• Institute of Education (IOE), London  
• University of Sheffield

► **ANR grant:** €155 K

► **Contact:**  
Yannick COURBOIS  
Yannick.courbois@univ-lille3.fr

► **Website:**  
[www.elstrad.eu](http://www.elstrad.eu)

### WORTH KNOWING

Spatial navigation involves travel in large areas directed towards a destination. Spatial navigation skills develop progressively in the child up to the age of 12.



**HIGHQ-FERMIONS**

ELEMENTARY EXCITATIONS OF HIGHLY CORRELATED FERMIONS AT ATOMIC WAVE-VECTORS: EXPERIMENTS AND THEORY

► **ANR programme and edition:**

Blanc international programme- Sciences of information, matter and engineering - 2010

► **Identifier:**

ANR-10-INTB-0403

► **Coordinating entity:**

Néel Institute - CNRS

► **Partners:**

- Nanosciences and Cryogenics Institute, CEA
- Institute of Theoretical Physics, University of Linz/Austria

► **ANR grant:** €405 K

► **Contact:**

Henri GODFRIN  
henri.godfrin@grenoble.cnrs.fr

**HIGHQ-FERMIONS EXCITE MATTER**

On the fundamental plane, knowledge of the behaviour of the particles that constitute matter is evolving rapidly. Understanding the properties of systems with several interacting atoms constitutes one of the major challenges of modern physics. The HighQ-Fermions project, cofunded by ANR and FWF, its Austrian counterpart, thus focused on the experimental and theoretical aspects of elementary excitations in quantum fluids. It also included state-of-the-art applied research in the area of cryogenic techniques with an industrial partner.

There are two types of quantum systems. Those made up of bosons are relatively well understood. Those made up of fermions remain veiled in mystery, even though they occur commonly in nature. Metals, atomic nuclei and neutron stars, for example, are effectively made up of fermions.

Given this context, the objective of the HighQ-Fermions project was to better understand quantum fluids and their elementary excitations (see box). To achieve this, Helium 3 - a fermion, and its more common isotope, Helium 4 - a boson, were studied.

**WORKING AT A TENTH OF A DEGREE ABOVE ABSOLUTE ZERO**

Due to the weakness of the signal to observe, these experiments can only be carried out at extremely low temperatures, less than one tenth of a degree above absolute zero. To obtain these experimental conditions, the partners had to construct a state-of-the-art cryogenic device. This device - a dilution refrigerator - produced in collaboration with Air Liquide, allowed the production and measurement of very low temperatures appropriate for the measurements to be taken.

The work carried out in this project confirmed the dynamic theory developed by the Austrian partner. This project enabled significant progress to be made in knowledge relating to the dynamics of correlated quantum systems. The results of HighQ-Fermions thus led to numerous scientific publications, notably in the prestigious review Nature. The experimental part of the work allowed the development of an original prototype of the dilution refrigerator and advanced training of several students and engineers which resulted in job creations.



**WORTH KNOWING**

Physics distinguishes two families of particles, the fermions and the bosons. Fermions include particles such as electrons, neutrons and protons. Bosons include particles such as photons and gluons. The particles can group together to form atoms which in turn will be either bosons (such as helium 4), or fermions (such as helium 3).

According to the Pauli exclusion principle, two identical fermions cannot occupy the same quantum state simultaneously. Thus, the quantum state of a fermionic liquid is obtained by placing the particles in successive states of increasing energy. Matter can be "excited" beyond that fundamental state. The corresponding energy quanta, called **elementary excitations**, constitute the foundation of the modern description of quantum matter.

**OTHER HIGHLIGHTS**

**2015. A YEAR TURNED TOWARDS THE CLIMATE**

The COP21 conference hosted by France from 30<sup>th</sup> November to 11<sup>th</sup> December was a focal point of the year 2015. The question of climate and environmental changes is a major societal issue which has mobilised ANR since its creation. Consequently, ANR quite naturally made this a key subject of its action in 2015, a year in which considerable resources were mobilised in preparation for the COP21 conference. ANR wanted to contribute to the discussions through three events. The agency also highlighted various projects it has funded on the issue of climate change through the News section and dedicated pages on its website.

**SHARING THE CONTRIBUTIONS OF PROJECT-BASED COLLABORATIVE RESEARCH**

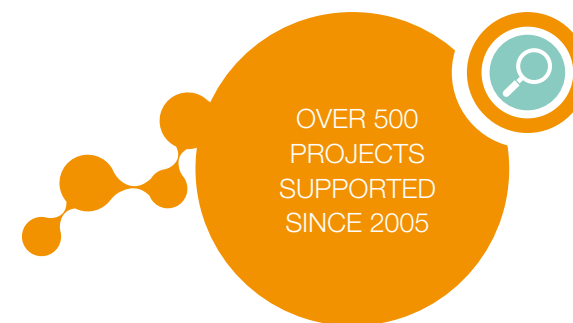
ANR organised a symposium held on 6<sup>th</sup> July 2015 on the theme "Dealing with climatic change: the contributions of collaborative research projects". As a satellite event of the international scientific conference "Our Common Future Under Climate Change", this symposium provided the opportunity to assess the results of ten years of collaborative research on the climate. More than 120 projects supported by ANR and the Investments for the Future programme were presented on this occasion. This event brought together wide diversity of researchers and teams from all disciplines to discuss topics such as impact, resilience, adaptation and the reduction of greenhouse gases. The event also offered a sound basis for encouraging cooperation between stakeholders and public and private actors.

**DISCUSS THE MAJOR ISSUES OF CLIMATE CHANGE**

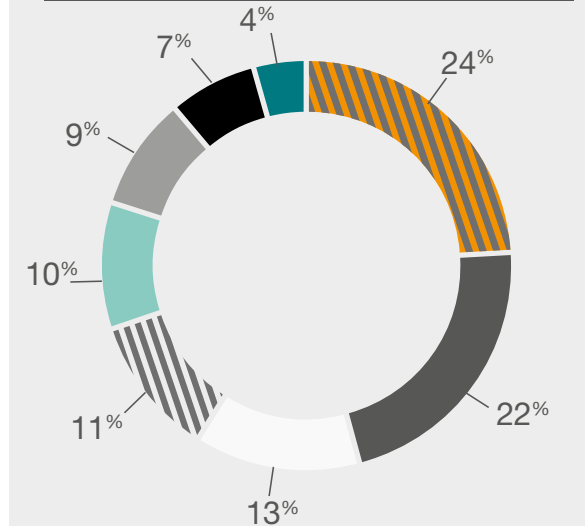
On 2<sup>nd</sup> December 2015, ANR participated in a day organised by the Minister responsible for Research and held in the "civil society village" at Le Bourget. Researchers and actors of civil society attended eight round tables on climate change during this event.

**SHOW THE SOLUTIONS BROUGHT BY RESEARCH**

Lastly, alongside fifteen research organisations and the Ministry responsible for Research, ANR was present on the stand "La recherche se mobilise pour le climat" (**Research takes action for the climate**) at the COP21 Solutions exhibition held from 4<sup>th</sup> to 10<sup>th</sup> December at the Grand Palais.



**PROJECTS FUNDED ON THE ANR FUNDING BUDGET BETWEEN 2005 AND 2014**

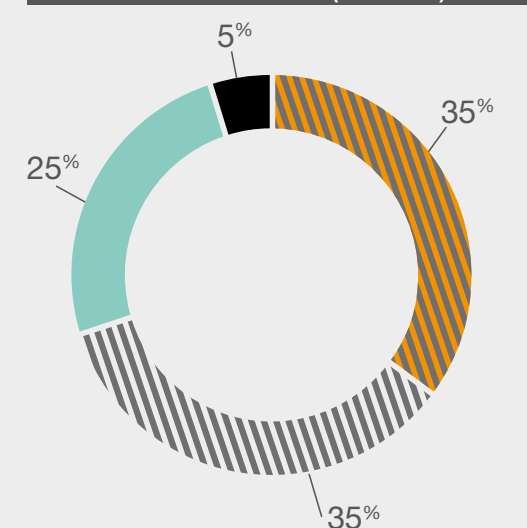


500 PROJECTS FUNDED OVER THE 2005-2014 PERIOD FOR A TOTAL OF €250 M

- Biodiversity & ecosystems
- Climate systems
- Energy, transport, technology
- Big data
- Agro-ecosystems
- Human and social dimension
- Sustainable cities
- Health

23 PROJECTS FUNDED VIA THE INVESTMENTS FOR THE FUTURE PROGRAMME BETWEEN 2010 AND 2019 FOR A TOTAL OF €210 M (Excluding health, ICST, SSH, energy)

**PROJECTS SUPPORTED UNDER THE INVESTMENTS FOR THE FUTURE PROGRAMME (2010-2019)**





### WORKING AT A SUPRA-NATIONAL LEVEL

Climate and environmental changes are, by definition, transnational issues. Thus, over and beyond the work programme's national call concerning the societal challenge "Efficient resource management and adaptation to climate change", ANR is particularly active on the international front. On the European front, ANR is involved in the construction and supporting of four Joint Programming Initiatives (JPI) in the areas of climate, the oceans, water and agriculture, four major areas affected by climate change. These JPIs facilitate the synergising of national programme planning on research needs with a strong societal impact.

### BUILDING A COMMON VISION AND RESEARCH AGENDA

These initiatives lead to the defining of a common vision and a strategic research agenda on issues which the national programmes cannot address effectively on their own. ANR is currently chair of the Climate JPI for the 2015-2017 period. In this context, 2015 was devoted to the preparation of an extensive call for proposals on climate services, launched at the beginning of 2016 (see box). On the international front, ANR is also a member of the Belmont Forum, an initiative bringing together the main funding agencies of the G7 countries and of the emerging BRICS countries (Brazil, Russia, India, China and South Africa) and the European Commission. This informal organisation puts out joint calls for proposals. ANR has ensured the secretariat since 2015. In addition, since 2014, ANR along with the Ministry responsible for Research, the AllEnvi alliance and the CNRS, is a stakeholder in the international consortium ensuring the secretariat of Future Earth. This programme aims at better coordinating international research at the interface between the environment and sustainable development.

### ERA4CS, A NEW KIND OF CALL FOR PROPOSALS

2015 saw the putting in place of the Cofund ERA4CS ERA-NET dedicated to climate services (European Commission agreement No. 690462). With its dual role of chair of the Climate JPI and coordinator of the Cofund ERA-NET, the agency was particularly involved in setting up the project and defending it before the European Commission.

ERA4CS has two particularities compared with the usual funding instruments of this type. Firstly, it offers researchers two possible support vectors. The first conventional vector involves financial support via the national funding organisations, while the second "in kind" relies on the research organisations themselves. A system of dual governance of the call for proposals is thus in place. The second particularity is that, thanks to this specific setup, ERA4CS attains an unprecedented scale. Bringing together 43 partners (including ANR, BRGM, CNRS, CEA, IGN, INRA and MétéoFrance) from 18 countries, the call for proposals launched in this context in March 2016 was awarded €72 M.

This new model of a totally new scale and structure is arousing the interest of the European community supporting research. Who knows, perhaps the coming months will see the creation of other actions of this type.



## THE PHEROTAXIS PROJECT MODELS THE OLFACTORY PROCESSES

In order to open the path to the development of new sensors, the Pherotaxis project has sought to understand the mechanisms of emission of odours (pheromones) and the location of olfactory sources in insects. Involving physicists, neurobiologists and computer scientists, this project aimed to develop a comprehensive model of the olfactory processes.

How do animals manage to locate sources of odours? Based on the analysis of experimental data obtained from studies of insects, and butterflies in particular, the Pherotaxis project partners modelled the mechanisms of pheromone emission (plumes), of odour perception (neural networks involved), and the search behaviours. Thanks to this work, the idea was to propose a comprehensive model of the pheromone olfactory processes on the molecular, cellular, systemic and behavioural scales.

### MOVING TOWARDS THE DEVELOPMENT OF NEW SENSORS

Several major results have been obtained and published concerning the physical modelling of the pheromone plume, the coding properties of the 1st and 2nd order olfactory neurons, the strategies for seeking an olfactory source, the analysis of the behaviour of insects seeking an olfactory source and comparison of reactive and cognitive search strategies with robots. This work has resulted in three patents. These results concern sectors as varied as agriculture, environment and security. They could give rise to the development of new sensors allowing, for example, the monitoring of agricultural crops and thus predict possible infestations by harmful insects, or the detection of pollution at an earlier stage, or the monitoring, from the "olfactory" aspect, infrastructures which are important with regard to safety.



**PHEROTAXIS**  
LOCATING  
SOURCES OF ODOURS  
BY INSECTS  
AND ROBOTS

► **Investments for the Future Programme 1**

► **Identifier:**  
ANR-10-BINF-0005

► **Coordinating entity:**  
INRA Versailles Grignon Centre

► **Partners:**  
• Pasteur Institute  
• CNRS

► **Investments for the Future grant:**  
€740,000

► **Contact:**  
Jean-Pierre ROSPARS  
rospars@versailles.inra.fr

### THE BIOINFORMATICS INITIATIVE

Launched in 2011, this initiative aimed at funding ambitious projects at the frontiers of the disciplines of biology, mathematics and computing with a view to making significant progress in the knowledge and valorisation of biological mechanisms as well as in the fields of mathematical models, algorithms and software.

The ultimate aim was to remove the obstacles identified in multi-scale and multi-physics modelling and to develop software solutions for areas such as health, biology, agronomy and the environment.

**GENIM**

MAINTENANCE OF GENDER INEQUALITIES: SOCIO-PSYCHOLOGICAL PROCESSES OF LEGITIMATION

► **ANR programme and edition:**

Sciences of information, matter and engineering: Changing societies. Inequality, Inequalities (INEG) - 2011 Edition

► **Identifier:**

ANR-11-INEG-0002

► **Coordinating entity:**

Blaise Pascal University - Clermont-Ferrand II

► **Partner:**

Paris V - René Descartes University

► **Budget:** €210 k► **Contact:**

Delphine MARTINOT  
Delphine.martinot@univ-bpclermont.fr



## THE GENIM PROJECT LOOKS INTO THE PSYCHOLOGICAL AND SOCIAL PROCESSES INVOLVED

**For the last thirty years or so, girls on the whole do better than boys at school. Although these good results give them the possibility of pursuing high-level studies and careers, the majority of women do not take this opportunity. To help cast light on this paradox, the GENIM project focused on the psychological and social processes that help maintain inequalities between men and women.**

Are women's preferences and choices of orientation and career partly the product of a justification function of the social system? This theory is at the centre of the reflection structuring the GENIM project. To explore this theory, the project work hinged around four questions. What gender stereotypes exist in the school environment, and to they have a function of justifying gender inequalities? In what manner do women end up by internalising their supposed inferiority and in what way to the legitimating ideologies influence their perceived competence, their autobiographical memories and their performance in the stereotyped areas? Are the inequalities between men and women partly rooted in the selection function of educational institutions? And lastly, what are the potentially justifying beliefs and ideologies of the social system, and what are their consequences on the exposure of sexism? To answer these questions, twenty-seven research actions and experiments were conducted, chiefly in the school environment.

### GENDER STEREOTYPES SERVING TO JUSTIFY THE SYSTEM

The results as a whole reflect, at least in part, the observed paradox. Girls who succeed at school are perceived as being more obedient and less self-assured, and their intelligence is considered less adaptable than that of boys. And the harder they work, the less they are considered to have the potential to succeed. These characteristics are hardly conducive to the pursuit of high-level studies.

Added to this is the fact that girls embrace values of surpassing oneself which are perceived as being of little use in succeeding at university, whereas boys embrace values of self-assertion, perceived as being conducive to success. Girls thus experience a cultural offset between the values that are expected to ensure for professional success and the values they have internalised during their socialisation, which reduces the scope of possibilities in the paths they dare consider. Lastly, when male and female students are asked to justify the social system in which they live, the gender differences in terms of self-perception, self-projection and performance are accentuated, demonstrating that gender stereotypes serve the justification of the social system and gender inequalities.

Alongside the scientific promotion of this work, it has been disseminated to a wide audience. The results have also been passed on to political circles thanks to a hearing before the French Higher Council for Professional Equality between Men and Women.

## WORKING TOWARDS THE DEVELOPMENT OF A ROBOTISED HAND CONTROLLED BY THOUGHT

**Being unable to grasp and manipulate objects is one of the most dramatic consequences of paralysis. Restoring this essential function would lead to an undeniable gain in independence for a large population of patients. With this objective in their sights, the GRASP project partners combine neuroscience with computing to create a brain-machine interface that can control a robotic hand.**

Manual dexterity is expressed in particular when making movements to grasp and manipulate objects. A major characteristic of these movements is the coordinated control of the positioning of the fingers on the object and the forces applied to the surface of the object. This coordination is vital for the execution of precise and efficient movements. The prime objective of the GRASP project was to understand how the brain manages these two aspects of movement. To achieve this, the Marseille University partner taught a macaque monkey to grasp an object with varying degrees of force and gripping it in two different ways. At the same time the cerebral activities associated with these movements were recorded. The Paris University partner analysed the muscular activity of human subjects performing the same task. They also reproduced this task with a robotised anthropomorphic hand (Shadow Robot Company)

### A PROMISING FIRST STEP

This work firstly revealed that the coordinated activity of the hand muscles ensures simultaneous control of the force and trajectory adjustments necessary to grasp the object. These 2 levels of control are represented jointly in the cerebral activity as characteristic modulations in space and time. In a second phase these cerebral activity modulations were translated into computer language in order to implement the brain-machine interface for controlling the artificial hand and making it reproduce the grasping movements. This project is a first step towards the real-time control of a robotised hand by a primate brain. In the longer term, this work will be able to serve as a basis for the functional rehabilitation of paralysed patients.

**GRASP**

CORTICAL CONTROL OF MANUAL INPUT MOVEMENTS: FROM PRIMATE TO ROBOT

► **ANR programme and edition:**

Blanc - SVSE 4 - Neurosciences - 2011

► **Identifier:**

ANR-11-BSV4-0026

► **Coordinating entity:**

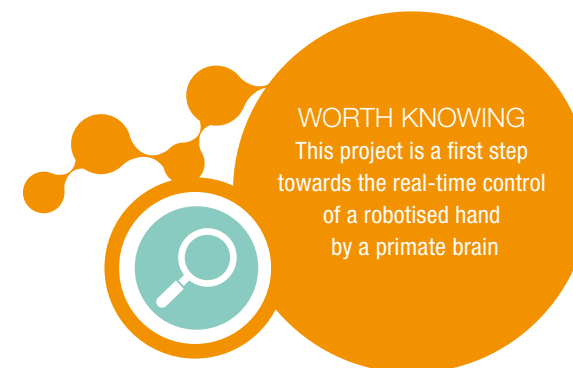
CNRS

► **Partners:**

- Aix-Marseille University
- Paris V University

► **ANR grant:** 320 K€► **Contact:**

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Hand G and E outline © Shadowrobot



## FERROENERGY COLLOIDAL PYROELECTRIC CONVERSION

### ► ANR programme and edition:

Energy efficiency and reduction of CO<sub>2</sub> emissions in industrial systems - 2010

### ► Identifier:

ANR-10-EESI-0004

### ► Coordinating entity:

Armines

### ► Partners:

- CNRS
- C2P2 (Lyon I University - Chemistry, Physics, Computing Engineering School of Lyon)
- "Structures Properties and Modelling of Solids" Laboratory (Supélec CNRS)
- Eifer

### ► ANR grant: €860 k

### ► Contact:

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### ► Website:

www.ferroenergy.com

## CONVERTING WASTE HEAT INTO ELECTRICITY

A great many industrial processes cause heat to be released into the environment. This waste heat (also known as secondary or low-grade heat) constitutes a considerable energy loss. Recovering or reusing it for other purposes (such as heating) is thus of major importance in terms of energy efficiency. It is in this context that the Ferroenergy project has developed a new process for converting heat into electricity.

Current processes enabling waste heat to be recovered for conversion into electricity are essentially based on the use of thermodynamic steam cycles. If the temperature difference between the hot source and cold sink is small (a few tens of degrees), these processes are unprofitable. Complementary to existing systems, the process developed under the Ferroenergy project targets applications with low temperature differences. It is based on the pyroelectric effect in ferroelectric colloidal suspensions. The possibility of generating electricity by this phenomenon has been known since the 1980's, but current conversion units use a technology that cannot really be transposed to the industrial scale. The challenge of the project was then to both develop this disruptive technology process and make it readily usable in industry.

### A PROTOTYPE AND A START-UP

The project partners thus designed stable colloidal suspensions of nanoparticles and polymers displaying the mechanical properties of a liquid and the pyroelectric properties of a solid. These suspensions were integrated into a thermodynamic device using Olsen cycles - the thermodynamic reaction behind the pyroelectric effect - to produce electricity. Lastly, a prototype was produced to validate the concept.

This work gave rise to about ten scientific publications in peer-reviewed international journals and to the international extension of the patent concerning the process. A start-up, Ferroenergy SARL, has been created to commercialise the results of the work and to lead the second phase of the project.



## FOUR PROJECTS SELECTED

Set up under the second Investments for the Future Programme (PIA2), IDEX/I-SITE runs in two waves. The first wave launched in late September 2014 ran throughout 2015 and resulted in the selection of four projects at the beginning of 2016.

Following the call for proposals published on 29<sup>th</sup> September 2014, ANR received twenty proposals. On 24<sup>th</sup> April 2015, at the end of the preselection phase conducted by the international jury, eight of these proposals were selected. The final selection phase ended on 22<sup>nd</sup> January 2016 with a meeting of the advisory panel where the chairman of the jury presented the panel's proposed selection of four projects.

### SELECTION OF THE SECOND WAVE PLANNED FOR EARLY 2017

The Prime Minister, having consulted the Commissariat-General for Investment, decided to accept this proposal. The ISITE-BFC, I-SITE projects supported by the University of Bourgogne Franche Comté, LUE, I-SITE supported by the University of Lorraine, UCA JEDI, IDEX supported by the Côte d'Azur University, and UGA, IDEX supported by the Grenoble Alpes University were thus selected.

The second wave of this call for proposals was launched at the end of 2015, with the deadline for application file submission set for 8<sup>th</sup> March, with preselection at the end of June 2016 and final selection in February 2017.

## SUPPORTING TWO TYPES OF STRUCTURES



### ► The IDEX

#### Initiatives of Excellence

are research universities with a global outreach situated at the forefront of scientific power and impact in wide fields of knowledge.

### ► The I-SITE

#### Science - Innovation - Territories - Economy Initiatives

are universities which create value from internationally-recognised thematic scientific assets which are more concentrated and distinctive, and constitute a driving lever and foundation for their strategy for development and partnerships with the business world.



### WORTH KNOWING

The jury's reports on the projects and its general comments on the submitted files for the preselection and selection phases respectively are available on the ANR web site.





## A MAJOR CONCERN FOR ANR

After hardly ten years of existence, ANR has seen many phases of growth and transformation, particularly when new missions have been entrusted to it. These developments and the ensuing successive organisational changes can be the cause of psycho-social risks. Aware of this risk, in autumn 2014 the General Management of ANR launched a large-scale initiative concerning the quality of life at work.

The aim of this initiative is to adopt a very pragmatic approach to the ways of improving the quality of life at work for everyone and at the same time prevent possible psycho-social risks. An anonymous survey was carried out with all the personnel in early 2015 to make an initial situation assessment. The results of this survey were presented in April 2015.

In a second phase, an improvement and prevention plan was drawn up on the basis of the diagnosis. An initiative steering committee was set up for this purpose. As in the agency's activities and functions, it comprises voluntary representatives of all the ANR entities. The first concrete outputs of this group comprise a procedure for reporting risk situations and a network of resources contacts, which have been in place since mid-2016.



## TERAHERTZ FREQUENCIES ARE LAYING THE FOUNDATIONS OF FUTURE COMMUNICATION NETWORK CORES (5G, 6G)

**In the field of wireless communications, system complexity is being constantly pushed to the physical limits. It is a question of transmitting ever-greater quantities of information ever-more rapidly to massively mobile users. With this backdrop, the partners of the Com'Toniq project were seeking to produce the first photonics-based terahertz transmission system, the basis for future terahertz communications for 5G networks.**

Today, the frequencies available for wireless communications are reaching the point of saturation. It is thus becoming a matter of urgency to find new transmission windows. The capacity of current wireless communication systems is effectively limited by the nature of the waves used, which work in the gigahertz (GHz) frequency range. The targeted development is therefore to move communications to higher frequencies, up to the terahertz (THz) range. This is the purpose of the Com'Toniq project. To achieve this it has brought together specialists from the fields of lasers, optoelectronic components for the terahertz generation, and instrumentation for the shaping of the signals.

### A WORLD FIRST

Their aim? Develop the first photonic-based terahertz transmission system including a dedicated photonic oscillator. More precisely, this involved producing a coherent wireless transmission system with a capacity of at least 56 Gigabits per second and a carrier frequency of 280 GHz. The targeted transmission distance is situated in the 100 m to 1 km range, with a point-to-point (P2P) link.

The first high point of this work was when the Institute of Electronics, Microelectronics and Nanotechnology (IEMN) and the company Tektronix announced on 9th June 2015 that they had achieved a world first by wirelessly transmitting data at 0.4 THz using QAM-16 (Quadrature Amplitude Modulation) coding. According to the IEMN, the demonstration concerns the transmission of signals at 32 Gbit/s over a distance of 25 m, thereby laying the foundations for future THz communications for 5G networks. The final phase of the COM'TONIQ project is now concentrating on the outdoor demonstration of the developed system in order to attain distances compatible with the "backhauls" of the future mobile networks (cell size of 1 km), but these systems could also be used for the real-time transmission of ultra-high definition television ("4K") for events broadcasting applications.

**COM'TONIQ**  
ULTRA-HIGH SPEED  
QUASI-OPTIC PHOTONIC  
BASED COMMUNICATIONS

► **ANR programme and edition:**  
Hardware and software  
infrastructures for the digital society  
(INFRA) - 2013

► **Identifier:**  
ANR-13-INFR-0011

► **Coordinating entity:**  
Institute of Electronics,  
Microelectronics and  
Nanotechnology -  
Lille 1 University

► **Partners:**

- Institute of Physics of Rennes
- Laboratory of Physics of Lasers,  
Atoms and Molecules
- TEMATYS
- Thales Research  
and Technology - France

► **ANR grant:** €866 K

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## LABEXMED

SOCIAL SCIENCES  
AND THE HUMANITIES  
AT THE CENTRE OF  
INTERDISCIPLINARITY  
FOR THE MEDITERRANEAN

► Investments for the Future  
Programme 1

► Identifier:  
10-LABX-0090



► Coordinating entity:  
Aix-Marseille University

- Partners:
- CNRS Provence-Corse
  - IRD Marseille
  - School of Higher Studies in Social Sciences
  - University of Avignon and Pays du Vaucluse
  - Paris I University

► Investments for the Future grant:  
€10 M

► Contact:  
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► Website :  
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## THE LABEXMED IS BANKING ON INTERDISCIPLINARITY

A place of contact, interchange and confrontation involving Europe and African and Asian regions, the Mediterranean basin is at the centre of numerous issues: geopolitical changes, migratory streams, social and economic transformations, politico-religious controversies, cultural mixing and confrontation, management of resources and patrimonial issues, not to mention risks and crises. To analyse and understand these challenges, the LabexMed, since 2011, brings together sixteen joint research units of the Aix-Marseille University in a variety of disciplines.

Archaeology, history, anthropology, sociology, geography, political science, economy, law, philosophy, epistemology: thanks to this asserted interdisciplinary dimension, not only in the area of social science and the humanities, but also with the earth sciences, biology, and environmental sciences, LabexMED seeks to develop interdisciplinary research projects on the Mediterranean region. Its work also aims at fostering young researcher training and mobility in the Mediterranean basin, and in developing Euro-Mediterranean partnerships. The Labex work hinges around five main themes (see box).

### WORK CROWNED WITH SUCCESS

Since its creation in 2011, this Labex has established partnerships with communities and local cultural mediation actors (Villa méditerranée, MuCEM, etc.). Some fifteen research projects have been funded under it (production of documentaries, cultural initiatives combining art and science, exhibitions, etc.). With regard to the development of the use of digital technologies, the LabexMED has, among other things, collaborated with several reference institutions such as the very large research infrastructure Huma-Num, or the CNRS centre for direct scientific communication. In terms of scientific output, 124 publications (papers and books) have been published since 2011, with a very marked increase as of 2013. To conclude, the quality of the LabexMED work has been acknowledged through the prestigious awards obtained throughout the project: 4 nominations for the University Institute of France (2011 and 2012 and 2 in 2015) and 2 funding grants from the European Research Council (ERC) in 2013 and 2014.

### FIVE AREAS OF WORK

- Productive systems, Circulation, Interdependency
- Socio-Environmental Dynamics
- Knowledge, Techniques, Languages
- Heritage: Stakes, Practices, Representations
- States, Rights, Belonging



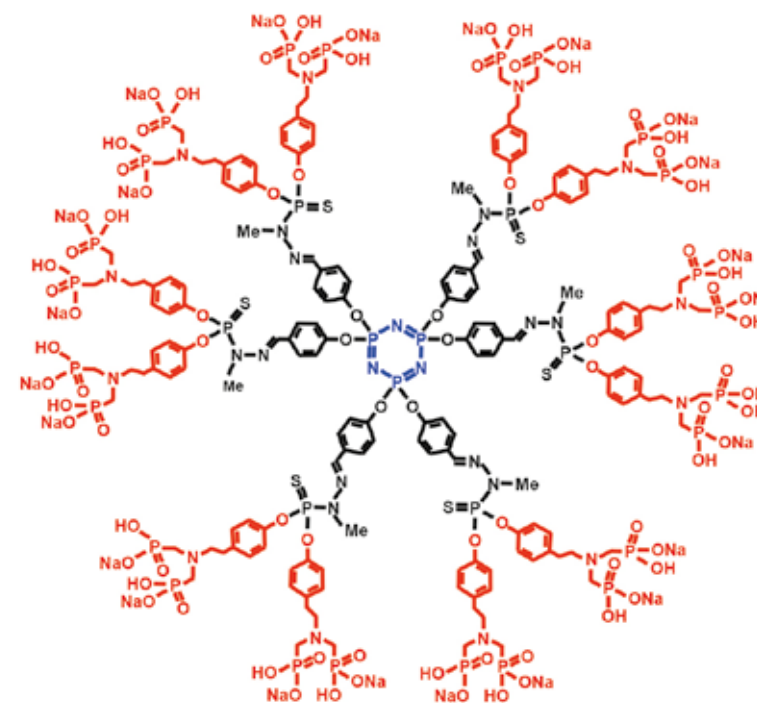
## DENDRI'MS PAVES THE WAY FOR NEW TREATMENTS

Multiple sclerosis is an incapacitating disease affecting more than 2 million people in the world. While current treatments are costly and present multiple contra-indications, the DENDRI'MS project sought to evaluate the therapeutic potential of a new class of immunomodulatory molecules.

Although effective new therapies for multiple sclerosis have been proposed over the last 15 years, research in this area remains as relevant as ever. This is because existing treatments target only the symptoms of the disease without treating the causes. Furthermore, the majority of them are based on the administration of monoclonal antibodies, treatments which are expensive and present significant contra-indications. Given this context, the DENDRI'MS project partners sought to develop new therapeutic molecules targeting different aspects of the disease (chronic inflammation and neurodegeneration). In the course of previous work, these researchers identified synthetic molecules called phosphorous-based dendrimers presenting anti-inflammatory properties. A particular dendrimer called ABP (Aza-BisPhosphonate) demonstrated its effectiveness when tested in a mouse model of spontaneous experimental arthritis.

### AT THE INTERFACE BETWEEN CHEMISTRY, IMMUNOLOGY AND NANOMEDICINE

The aim of the DENDRI'MS project was to evaluate the therapeutic potential of ABP in animal models of multiple sclerosis. The question was not only to determine whether the molecule was effective but also to ascertain that it was harmless. At the interface between chemistry, immunology and nanomedicine, this work has demonstrated the effectiveness of dendrimer ABP in a mouse model of multiple sclerosis and the tolerance of the non-human primate to it. These nanometric molecules obtained from synthetic chemistry could thus represent a new class of therapeutic agents in the treatment of chronic inflammatory diseases. The project thus achieved the preclinical proof of concept and proposed a transition to regulatory preclinical development, which was initiated within the framework of the TREE-DRUG project (PRTS programme, 2013 edition).



## DENDRI'MS

TREATMENT OF MULTIPLE  
SCLEROSIS BY A  
PHOSPHOROUS-BASED  
IMMUNOMODULATORY  
DENDRIMER

► ANR programme and edition:  
Partnership Research and Biomedical  
Innovation (RPIB) - 2011

► Identifier:  
ANR-11-RPIB-0005

► Coordinating entity:  
Inserm

- Partners:
- CNRS
  - CYNBIOSE

► ANR grant: €669 k

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### WORTH KNOWING

Multiple sclerosis is a chronic inflammatory disease of autoimmune origin. It is the most widespread neurodegenerative disease in young adults. It affects 2 million people in the world and 80,000 in France.

Two-dimensional structure of the ABP dendrimer. The N3P3 core is in blue, the branches are in black, the azabisphosphonate surface groups (in the form of monosodium salt) are in red.



**MATDNP**

CHARACTERISATION OF MICRO- AND NANO-STRUCTURED MATERIALS BY NMR: ENHANCED SENSITIVITY BY ELECTRON-NUCLEI COHERENCE TRANSFERS

► **ANR programme and edition:**

ANR programme and edition: Sciences of information, matter and engineering: Chemistry of solids, colloids and physical chemistry (JCJC SIMI 8) - 2010 edition

► **Identifier:**

ANR-10-JCJC-0811

► **Coordinating entity:**

CNRS

► **ANR grant:** €150 k► **Contact:**

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**WORTH KNOWING**

A catalyst is a substance which increases the rate and selectiveness of a chemical reaction. It participates in the reaction but is then regenerated.

## OLIVIER LAFON SCRUTINIZES THE SURFACE OF CATALYSTS

**Sustainable development, energy, depollution, heterogeneous catalysts are key materials for a multitude of applications and are used in nearly 80% of processes in the chemical industry. Rational improvement of their performance requires knowledge of their structure on the atomic scale. This subject was the focal point of the MatDNP project. Interview with Olivier Lafon, the project principal investigator.**

**WHAT DOES YOUR WORK INVOLVE?**

I am interested in heterogeneous catalysts. To be more precise, I am trying to acquire deeper knowledge of their structure on the atomic scale in order to better understand their action and ultimately try to improve them.

Nuclear Magnetic Resonance (NMR) spectroscopy of solids is a powerful method for examining the surface structure catalysts. This technique, which is similar to MRI (magnetic resonance imaging), allows the examination of surfaces that are disordered or display defects.

The use of NMR spectroscopy for catalysts nevertheless remains limited by its low sensitivity because nuclei are poorly magnetic. A promising approach for increasing NMR sensitivity is dynamic nuclear polarisation (DNP), which consists in transferring the magnetisation of the electrons to the nuclei. In 2010, when I submitted my proposal for the MatDNP project, high-field DNP was receiving a lot of attention, but it had only been used to study biomolecules. My work in the project consisted in exploring the potential of this technique for characterising catalysts.

**WHAT DID THE ANR FUNDING ENABLE YOU TO DO?**

For the laboratory to which I belong, the aim of this project was to initiate a new research theme. Thanks to the ANR funding, I was able to carry out dynamic nuclear polarisation experiments and be one of the first researchers in the world to use this technique to characterise heterogeneous catalysts.

Our work demonstrated that dynamic nuclear polarisation can increase the sensitivity of NMR for catalysts by several orders of magnitude and thus obtain new information on their surface structures. The results have given rise to numerous scientific publications and oral presentations at congresses. I have been able to set up new academic collaborations, more specifically in the USA, Germany, China and India. The project as a springboard that enabled me to gain academic recognition. In 2013 I received the "Magnetic Resonance in Chemistry Award for Young Scientists". In 2015, I was Visiting Professor of the Academy of Science of China for 2 months, and I have just been selected as a junior member of the University Institute of France.

**AND NOW?**

This project has helped boost the visibility of our laboratory, the UCCS, in the field of NMR. The Lille University site has been chosen to accommodate a device that is unique in France, a 1.2 GHz NMR spectrometer for analysing liquids and solids. This will be the first machine of this type in France and the 6th in the world. I am in charge of this project and of the very-high-field NMR infrastructure on the Lille campus.

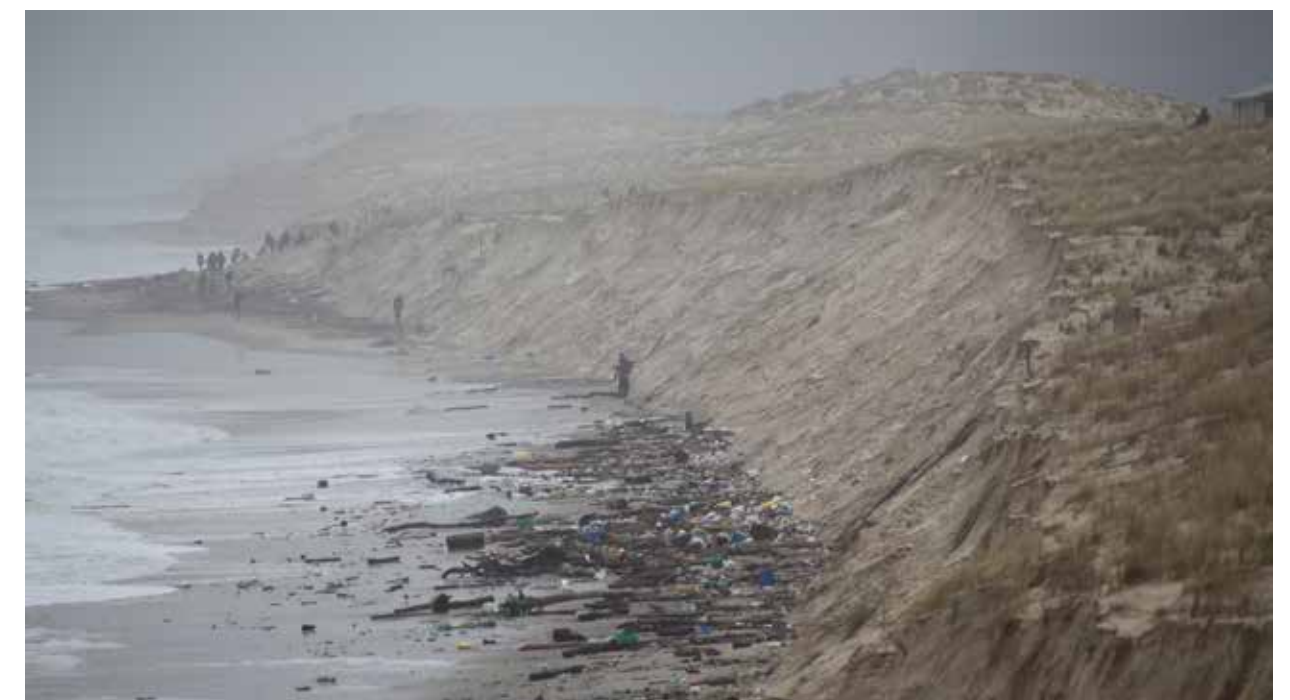
## BARBEC DECIPHERS THE EFFECT OF THE WAVES ON THE DYNAMICS OF SANDY BEACHES

**Coastal environments are singular, harbouring a large number of concerns associated with resources and climate change, particularly linked to risks of natural or anthropogenic origin. Among the coastal environments, sandy beaches are particularly attractive sites (tourism, recreational activities). Yet they are also among the least well understood and the least predictable. Understanding, simulating and predicting the dynamics of these beaches is therefore a fundamental step towards operational forecasting services. Such was the purpose of the BARBEC project.**

Wave-dominated sandy beaches are characterised by the presence of sedimentary structures that cover a vast range of temporal and spatial scales. On the whole, the international scientific community has always studied each morphological entity (or sandy body) of the beach system independently. The approach adopted by the BARBEC project scientists, on the contrary, was to consider the "beach system" as a whole. To this end, the scientists deployed a very wide range of methods and analytical tools: digital morphodynamic modelling, physical modelling, remote sensing by video imaging carried out during an intensive measurement campaign, including a decadal storm episode.

**RECONCILING THEORY WITH OBSERVATIONS**

This work enabled the theory to be reconciled with the observations and models based on behavioural laws to be developed. It brought highly significant advances in the dynamics of beach systems, three-dimensional morphodynamics and the dynamics of the coastline. The project has led to some thirty publications in international reviews and numerous communication actions. As the work carried out concerned a theme of high societal impact, the results have been widely disseminated, particularly to the downstream actors, the general public, lifeboat services and emerging countries. Lastly, these results also had a significant leverage effect in terms of international recognition since the BARBEC research team was subsequently involved in seven new collaborative projects, most of which were international.

**BARBEC**

ROLE OF MORPHOLOGICAL INTERACTIONS IN THE OVERALL DYNAMICS OF WAVE-DOMINATED SANDY BARRED BEACH SYSTEMS

► **ANR programme and edition:**

Sciences of information, matter and engineering: Earth system, environment risks (JCJC SIMI 6) - 2010 edition

► **Identifier:**

ANR-10-JCJC-0602

► **Coordinating entity:**

Bordeaux 1 University

► **ANR grant:** €155 k► **Contact:**

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Scalloped erosion of the dune during winter 2013-2014 along the length of the sandy Aquitaine coastline. The BARBEC project researchers demonstrated that this scallop-shaped erosion was controlled by the morphology of a pre-coastal sandy bar situated more than 500 m off-shore of the dune in 5-m deep water (Castelle et al., 2015).



**EPISPERM2**

MOLECULAR BASIS  
OF POST-MEIOTIC  
REPROGRAMMING  
OF THE MALE GENOME

► **ANR programme and edition:**

Blanc - SVSE 8 - Biochemistry,  
molecular and structural biology -  
2011 Edition

► **Identifier:**

ANR-11-BSV8-0014

► **Coordinating entity:**

Inserm

► **Partners:**

- Aix-Marseille University
- Paris V University

► **ANR grant:** €350 K► **Contact:**

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## EPISPERM2 REVEALS A CRUCIAL STEP IN THE BIOLOGY OF ORGANISMS

Further to meiosis, the genetic material of the future spermatozoa undergoes a spectacular overall reorganisation. This step, which is essential for the protection of the male genetic material, nevertheless remains shrouded in mystery because the molecular processes involved are unknown. The object of the EpiSperm 2 project was to unveil these mechanisms.

In the first EpiSperm project, the scientists involved identified cellular factors potentially involved in the genome packaging events following meiosis. Studies of the function of a subgroup of the identified factors were then carried out. This work shows that specific histones (proteins bound to the cellular DNA) and a factor - Brdt - which recognises the chemical modifications of the histones, govern the genome packaging process. On the basis of these results, the EpiSperm2 project more specifically continued to explore the Role of Brdt and examine the role of two histone variants, TH2B and H2AL2.

### AN INITIAL MOLECULAR UNDERSTANDING OF THE PROGRAMMING OF THE MALE GAMETES

After being activated in the meiosis process, Brdt initiates a specific programme of the male germline while at the same time repressing active genes in the precursor cells (spermatids) of the spermatozoa. In the phases following meiosis, a chemical modification of the histones recognised by Brdt gives the signal for their replacement. EpiSperm2 shows that although they are essential, these two phases alone are not sufficient to remove the histones and that the action of the histone variants (H2A and H2B) is also necessary. Thus, the entire gene expression programme of the male cells is dictated by epigenetic marking based on the use of new kinds of histones, their chemical modifications and the factors that recognise them, all discovered through the EpiSperm projects. Overall, this project has allowed the first molecular models of the DNA packaging process in male gametes to be presented. The impacts of the results are of a conceptual nature since they shed light on an essential phenomenon in the biology of organisms. Beyond this, they provide a better understanding of certain causes of male infertility. Lastly, they also concern cancer research as some of the identified factors are illegitimately expressed in certain cancerous cells.

**WORTH KNOWING**

The formation of the reproductive cells (ova and spermatozoa) involves a phase of successive double division of the cellular genetic material. This phase, known as meiosis, is crucial for genetic mixing. In the context of spermatogenesis, the aim of the post-meiotic phase is to generate a compact and transportable genome.



## RETHINKING THE STRUCTURE FOR THE BENEFIT OF EFFICIENCY

Following the setting up of the new governance provided for by the decree of 24<sup>th</sup> March 2014, ANR used the second half of 2015 to assess the effects of this new mode of functioning. Nearly one year after its deployment, ANR considered it necessary to adjust its internal organisation in order to clarify roles and achieve greater overall efficiency.

Following the April 2015 appointment of a Deputy Director-General - Administration and Budget, the President & CEO announced at the Governing Board meeting of June 2015, his decision to separate the functions of certifying officer and accountant. These functions are devolved respectively to the DCF (Grant Agreement and Funding Division) and to the Accounting Agency.

Bringing together the certifying officer and accounting agent to enhance accounting quality reliability and to reduce the checks performed can be appropriate in institutions with a "conventional mode of functioning", for which the operating budget represents the majority of the activity.

As a funding agency, ANR presents budgeting and accounting particularities. For example, its operating budget represents just 3% of the overall budget it manages. With sights set on improving ANR's performance in its activity as a funding structure, the aim of this organisational change was to clarify the responsibilities of the various actors in the certifying officer side of the expenditure chain and, to achieve this, reinforce General Management's coordination of the activities of the certifying officer covering all the operational divisions. Summer 2015 was devoted to the preparation of the project to reconfigure the DCF and the accounting agency in collaboration with all the internal actors involved. This project entered into application in autumn 2015.

**CLARIFYING THE ORGANISATION**

The start of 2016 saw the reorganising of General Management, again with the aim of clarifying the internal organisation and the roles of each person and entity. Further to the setting up of the new mode of governance of the ANR in September 2014, the President & CEO had decided to organise General Management around two Deputy Director Generals, one dedicated to organisation, the other to administration and the budget. A year after deploying this organizational structure, the internal assessment revealed some confusion in the interpretation of the responsibilities of the two Deputy Director Generals resulting in overlaps that could create functional problems. The highly cross-cutting positioning of the two Deputy Director Generals put in place as of September 2014 contributed to this phenomenon.

In January 2016, the President & CEO thus decided to do away with the function of Deputy Director-General - Organisation and Processes. In doing so, the aim was to increase the accountability of the "activity" operational divisions (DOS, DCF, DIAC), confirm the position and essential role of the DCF as a cornerstone in conducting ANR's missions, clarify hierarchical relations and reinforce the position of the support divisions in supporting General Management and the operations divisions. A support hub has thus been set up around the Deputy Director General - Administration and Budget. The Legal Affairs, Human Resources and Information Systems Divisions now report to the Deputy Director General - Administration & Budget (see organisation chart on p. 72) in addition to the Budget Management and Implementation Control, General Affairs, Auditing and the Budget Accounting Information System and Project Management services.



## A RENEWED PARTNERSHIP

Both ANR and the competitiveness clusters were created in 2005, and they have developed a policy of very rich and regular interchange and sharing. In September 2015 the two parties organised a get-together to give new impetus to their collaboration.

Since their creation in 2005, ANR and the competitiveness clusters have brought mutual benefit to each other. If ANR funds scientific projects which have been labelled by the clusters, the clusters and their ecosystem enable the projects to receive support and assistance during their construction. The upshot for the projects selected and funded by ANR is an enhanced impact, particularly in terms of value creation, technology transfer and creation of start-ups.

### MATERIALISING THE WORK ALREADY UNDERTAKEN

Wishing to go further in their joint work, ANR and the AFPC (French Association of Competitiveness Clusters) set up a working group in 2015 to better define the conditions of involvement and interchange between the two parties. The working group's work led to a gathering of representatives of 33 of the 70 competitiveness clusters on the afternoon of 10th September 2015. After presenting the plan of action and the generic call for proposals 2016, the lines of collaboration envisaged for 2016 were set out.

### THREE SHARED OBJECTIVES

- Reinforcement of the ties between the public and private research actors,
- Creation of value from research,
- Construction of nationally and internationally recognised scientific and technological communities.



## RECONSTITUTING PAST CLIMATES TO BETTER PREDICT FUTURE CHANGES

Understanding Man's influence on the climate, especially since the mid-20<sup>th</sup> century, necessitates better knowledge of past events which have disturbed the climatic balance (climatic forcings). The work carried out in the VOLSOL project has resulted in one of the largest databases on forcings of volcanic and solar origin over the last 2000 years, containing unprecedented and valuable data for the entire climate sciences community.

For the recent period, the main natural climate forcings are of volcanic and solar origin. Satellite observations have enabled them to be partly documented. However, these data only cover the last 30 years, which is too short a time frame to fully test the relation between these two natural forcings and the change in climate. The aim of the VOLSOL project was thus to reconstitute the volcanic and solar forcings for the last 2000 years.

To do this, the scientists analysed samples of ice taken from the Dome C site in the Antarctic. More specifically this involved looking for chemical substances such as beryllium-10, formed by the interaction of cosmic rays with terrestrial nuclei (cosmogenic nuclides). These substances enable past solar activity to be reconstituted. Measurement of sulphur concentrations in the same ice samples enabled volcanic eruptions to be traced.

### RESULTS WITH HIGH ADDED VALUE

This work resulted in the acquisition of completely new data and the creation of one of the largest databases on volcanic and solar forcings for a period considered crucial by the International partnership in ice core science. These results are now being used by the climate sciences community to test and improve models reproducing past climatic variations. Some of the results already published by VOLSOL were incorporated in the last report of the IPCC (Intergovernmental Panel on Climate Change). The data obtained continue to be used in several new collaborative research projects, including in particular a collaboration with the LSCE (Laboratory of Climate and Environmental Sciences) which has received funding from the ERC (European Research Council). A new collaboration has also been set up with the University of California in Diego.

**VOLSOL**  
NATURAL VOLCANIC AND SOLAR CLIMATE FORCINGS

► **ANR programme and edition:**  
Sciences of information, matter and engineering: Earth system, environment risks (JCJC SIMI 6) - 2009 edition

► **Identifier:**  
ANR-09-BLAN-0003

► **Coordinating entity:**  
CEREGE (European Centre for Research and Teaching in Environmental Geosciences)

► **Partners:**

- Laboratory of Glaciology and Environmental Geophysics
- Laboratory atmospheres, environments, spatial observations

► **ANR grant:** €155 K

► **Contact:**  
Edouard BARD  
bard@cerege.fr

► **Website :**  
[www.cerege.fr/spip.php?article251](http://www.cerege.fr/spip.php?article251)

### WORTH KNOWING

In the Polar regions the snow that falls builds up, does not melt, and is gradually transformed into ice. During this process, it traps air (as bubbles) and dust. The ice cores provide evidence of the past climate, including environmental parameters and greenhouse gas content. Thanks to the data obtained from the ice core analyses, climate change models can be evaluated.





## A PIVOTAL YEAR IN TERMS OF INTERNAL ORGANISATION

ANR has seen many changes, both organisational and functional, over the last few years. The latest include the creation in 2014 of the Scientific Operations Division and five thematic scientific departments. One year later, the agency wanted to fine-tune this organisation by adding a new HR model in which the individual roles are clarified.

Continuing in line with the changes initiated since 2013, this organisation was developed during 2015 in collaboration with the different entities concerned and the personnel representatives. It comprises four main changes:

- **The role of the heads of department is reinforced**

The department heads, who are confirmed and nationally and internationally recognised researchers, fulfil a dual role within ANR. Assisted by a closely-knit management team (one assistant and a few scientific supervisors), they supervise the teams and ensure the smooth running of the project selection and monitoring process. Alongside this, as members of the ANR Scientific Advisory Panel, they help develop the agency's scientific strategy. Previously seconded to ANR on a part-time basis, they will now be under contract with the agency and devote 100% of their time to this function for a period of 4 years.

### TWO CALLS FOR APPLICATIONS PUT OUT IN EARLY 2016

Giving substance to this new HR model, the calls for applications for the positions of heads of department and chairman/advisor were opened in May 2016 with a view to taking up the function in autumn.

- **The scope of the scientific supervisors has been widened**

Skilled in a broad scientific area, the scientific supervisors are associated with several evaluation panels and assist the head of department in managerial tasks and in drafting the department's work programme and scientific strategy.

- **Creation of a new function, the chairman/advisor**

Until now the chairmen of the scientific advisory panels were external to ANR, providing their services simply for the panel meetings. In order to involve them more deeply in the life of ANR and be able to make greater use of their expertise, the agency has decided to create the function of chairman/advisor. Appointed for a period of one year, renewable twice, they devote 20 to 30% of their annual working time to ANR.

- **The scientific project officers are at the centre of the system**

The scientific project officers are the guarantors of the project selection and monitoring processes. Attached to a panel, they work in tandem with a chairman/advisor. With the deployment of ANR's activities in impact analysis, the role is extended to include this new mission.



## SETTING UP OF THE SCIENTIFIC ADVISORY BOARD (CPS)

Provided for by a decree of 24<sup>th</sup> March 2014, the scientific advisory board was put in place in October 2015. It is the ultimate brick created to underpin ANR's new mode of governance. Presentation of the body and the role it plays in ANR's strategy.

The Scientific Advisory Board (CPS) is a body for reflection which acts in support of the President and CEO on all questions lying within the competence of ANR. It is called upon in particular with regard to the ANR's annual work programme for which it must have a global vision, from the preparation phase through to the execution report and rules, for example, on the overall coherence of the process, or on the interlinking of the different instruments. Matters can be referred to the Scientific Advisory Board by the ANR President or its Governors Board.

### PROVIDE A STRATEGIC VISION

Comprising 11 members (6 external personalities and the heads of ANR's five scientific departments), the Scientific Advisory Board is tasked with providing the agency with a strategic vision of its action. Its work is materialised through advisory opinions and recommendations which are presented to the Governors Board. This strategic vision ties in with the role of the Governors Board which, through its decisions, is responsible for governing the life of the agency.

Thanks to their very diverse profiles and resolutely international dimension, the members of the Scientific Advisory Board provide ANR with a vision that covers highly complementary aspects. The panel effectively counts two former chairmen of funding agencies, two representatives from the socio-economic world and two French members with a broad vision of the national landscape and ANR's position. Furthermore, thanks to the heads of ANR's scientific departments, the panel has a firm footing in the life of the agency.

AT LEAST **3**  
MEETINGS PER YEAR

**11**  
MEMBERS

A **2**-YEARS  
RENEWABLE MANDATE



### THE SUBJECTS ADDRESSED

In its first three meetings (in the period from October 2015 to May 2016), the Scientific Advisory Board focused on the ANR Work Programme, its mission concerning impact, international cooperation, the creation of the scientific departments and the recruitment of department heads.

**34**  
MULTIDISCIPLINARY  
INSTITUTES

**15%**  
OF THE PUBLIC  
RESEARCH  
HEADCOUNT



**20,000**  
RESEARCHERS  
AND TECHNICIANS

**7,500**  
DOCTORAL STUDENTS

**2.2** BILLION EUROS  
CONSOLIDATED BUDGET

**50%**  
MORE THAN  
OF THE RESEARCH  
CONTRACTS  
SIGNED BETWEEN  
COMPANIES AND PUBLIC  
LABORATORIES

**€455 M**  
CONTRACTUAL REVENUE

**7,500**  
CONTRACTS SIGNED  
PER YEAR

WITH MORE THAN  
**2,000**  
COMPANIES, INCLUDING  
900 SMES/SMIS

**60**  
SPIN-OFF COMPANIES  
PER YEAR

## THE CARNOT INSTITUTES A YEAR OF MAJOR IMPORTANCE

Created in 2006 by the Ministry responsible for Research, the "Carnot Institute" label aims at recognising and supporting laboratories which undertake to place partnership research at the core of their research strategy and to give greater consideration to the needs of the business world. ANR has managed the label since its creation. The year 2015 was particularly important for the system since it marked the end of the second labelling wave and the preparation of the Carnot 3 call for applications.

During the year, the 34 Carnot Institutes labelled in 2011 were evaluated by a dedicated committee of experts, the Carnot committee. The committee based its evaluation on the Institutes' results at the end of the funding period and the hearing of their senior management. At the beginning of 2015, the Carnot 3 Commission, a group of experts mostly from the corporate world, was tasked by the Ministries responsible for Research (MENESR) and for Industry (MEIN) with proposing areas of change in the system for the next labelling wave. Drawing a highly positive conclusion on the functioning of the Carnot institutes, the Carnot 3 Commission considered that "this simple system, which fosters accountability and is subject to regular retrospective assessment, is highly successful in reinforcing the bonds between public research and enterprises, and in assisting the development of the institutes".

### THREE SIGNIFICANT CHANGES IN THE CARNOT 3 CALL FOR APPLICATIONS

Based on the Carnot 3 Commission's recommendations and the results of the assessment of the institutes labelled in 2011, the call for the third labelling wave was drawn up by ANR in accordance with the specifications of the MENESR and launched in November 2015. The underlying objective was to ensure that the Carnot institutes make a significant contribution to the economic recovery of the country. The first notable change introduced in this third call is the desire to establish the Carnot label lastingly in the research policy in France and to consolidate the institutes' role in the development of partnership research. Viewed in this context, the Carnot institutes are no longer limited in their duration. To contribute to the competitiveness of the economy through the high standard of the work of the Carnot institutes, the "Carnot label" and its quality criteria have also been tightened. A third significant change is that each Institute's governance is accountable for the use of the funds and implementation of the strategy. The ongoing selection takes place in spring 2016.





**INDIRA**  
RAPID ASSAYS TO  
EVALUATE INDIVIDUAL  
RADIOSENSITIVITY



► **ANR programme and edition:**  
Investments for the Future 1

► **Identifier:**  
11-RSNR-0011

► **Coordinating entity:**  
Inserm

► **Partners:**

- CEA/DSV/LGRK
- CEA/DSV/LCE
- AP-HP
- Paris SAMU

► **Investments for the Future grant:**  
€2,589 k

► **Contact:**  
Nicolas FORAY  
nicolas.foray@inserm.fr

#### DID YOU KNOW?

Out of the **380,000 new cases of cancer** diagnosed each year, the majority of patients are treated by radiotherapy. Among these, **5 to 20% suffer from tissular complications** which can hinder or even stop the planned treatment. These reactions are the manifestation of individual radiosensitivity.

#### DID YOU KNOW?

The accident at the Fukushima nuclear power plant in Japan in March 2011 highlighted the need to reinforce expertise and research in nuclear safety and radiation protection. Under the "tomorrow's nuclear energy" action of the Investments for the Future programme, a call for proposals on the theme of "Nuclear safety and radiation protection" was launched in summer 2011.

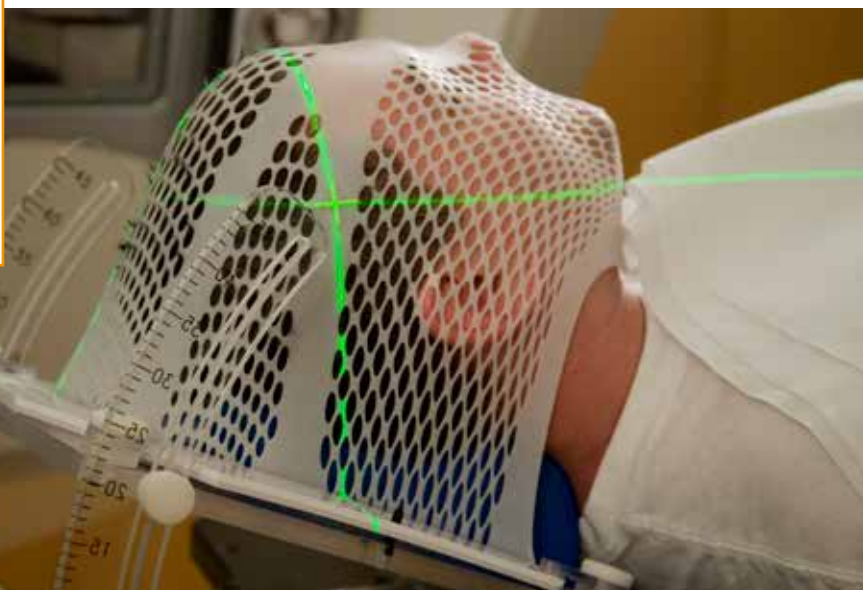
## INDIRA BRINGS A NEW UNDERSTANDING OF THE CELLULAR RESPONSE TO RADIATION

The exposure of cells to ionising radiation causes damage to the DNA which can lead to the death of the exposed cells. However, the effect of a given dose of radiation can vary from one person to another, and 5 to 15% of the population can be radio-sensitive. Understanding this phenomenon and being able to identify the radio-sensitive sub-population are of considerable importance in terms of health, whether for adapting radiation treatments to the patient or in the event of a nuclear accident. These two questions were the central focus of the INDIRA project.

In order to understand the radiosensitivity mechanisms, the project partners focused their attention on ATM (Ataxia Telangiectasia Mutated). ATM is a protein named after a disorder called Ataxia Telangiectasia, caused by DNA mutations and associated with a high level of radiosensitivity. Until now, ATM was considered like a protein of the nucleus. Analysis of the cell lines from patients suffering from undesirable reactions after radiotherapy has shown that the protein is situated in the cytoplasm of the cells and is transferred to the nucleus after irradiation. The first part of the INDIRA project work thus consisted in producing a mathematical model of the steps of this transfer. The second part validated this model. It was carried out on samples (of blood, hair follicles and skin) taken from a cohort of volunteers from the SAMU (emergency medical services) of Paris.

#### PAVING THE WAY FOR PERSONALISED RADIOTHERAPY TREATMENTS

The results of this project provide a new understanding of the cellular response to ionising radiation. After moving from the cytoplasm to the nucleus, ATM triggers the repair of the damaged DNA. The longer the time this transfer takes, the higher the radiosensitivity. Based on this finding, human radiosensitivity was classified in three groups. As of now, this enables radiotherapy treatments to be adapted to the sensitivity profile of the patient. This work has given rise to numerous publications and several patent applications. In 2014, Neolys Diagnostics - a start-up - was created to commercialise the developed radiosensitivity tests and give radiotherapists a new tool to improve the personalisation of radiation treatments.



## FOUR YEARS OF INVESTIGATION TO RECONSTRUCT THE BRIDGE OF AVIGNON

A major tourist attraction of the left bank of the river Rhone, the Avignon Bridge had a span of more than 900 metres in the Middle Ages when it crossed the river from bank to bank. Today, only four arches of this monument are still standing. In order to further our knowledge of this gem of French heritage, the Pavage project brought together archaeologists, architects, geomorphologists and engineers. After four years of investigations, this project has enabled a digital reconstruction of the bridge to be produced.

Examination of ancient manuscripts and drawings, field expeditions in search of archaeological clues, 3D laser scans, manual surveys, under-river ultrasonography imaging, core sampling, electro-resistivity and bathymetric measurements: the investigation left no stones unturned. There were several objectives. The question was to bring together and make a synthesis of knowledge of the bridge, over which legend had for a long time gained the upper hand over archaeological and architectural observations. The work thus focused on evaluating the hydromorphological consequences of climatic variations on the scale of the last millennium and to establish relations with the possible constructions of the bridge, followed by its weakening and ultimate collapse. The project also sought to show the implications of the spatio-temporal changes of the river channel on the transformations of the riparian environments (landscapes, occupation potentials, use of the land and the river, urban risk).

#### A FILM AND AN APPLICATION TO IMMERSE YOURSELF IN HISTORY

These various questions had never really been addressed simultaneously by architects, historians and geomorphologists. Thanks to the multi-disciplinary approach, they have now been answered. The project enabled the location of the now-buried piles of the ancient bridge to be identified, thereby allowing the exact path of the bridge to be confirmed before digitally reconstructing it. The Pavage project thus nurtured the collaboration of a large number of disciplines. A total of forty-three researchers in five laboratories worked on it. The project results have been highlighted by the production of a film enabling the bridge to be viewed in its entirety such as it existed in 1350, before eighteen of its arches were swept away by the river Rhone. A mobile application called "Avignon Pont 3D" (Avignon Bridge 3D) has also been created. It recounts the history of the bridge over three historical periods and from three different points of view. Thanks to the panoramic 3D views and augmented reality, users of the application are immersed in the Avignon of the 13th and 16th centuries, and move between historical, scientific and recreational content.



3D reconstitution of the Avignon bridge in its fluvial environment at the XII<sup>th</sup> century.

**PAVAGE**  
THE SAINT-BÉNÉSET  
BRIDGE OF AVIGNON:  
ARCHAEOLOGY, HISTORY,  
GEOMORPHOLOGY,  
ENVIRONMENT, 3D  
RECONSTRUCTION

► **ANR programme and edition:**  
Social sciences and humanities:  
Cultures, arts, civilisations  
(Blanc SHS 3), 2010

► **ANR identifier:**  
ANR-10-BLAN-2012

► **Coordinating entity:**  
CNRS - Provence regional delegation

► **Partners:**

- CNRS - DR12 - MAP - Provence regional delegation
- CNRS - DR12 - CEREGE - Provence regional delegation
- CNRS - LA3M - Provence regional delegation
- CNRS - CIHAM - Rhône - Auvergne regional delegation

► **ANR grant:** €330 K

► **Contact:**  
Livio DE LUCA  
livio.deluca@map.cnrs.fr

► **Website :**  
www.pavage.map.archi.fr

#### Associated digital content

- Film produced by  
Le Monde and CNRS Le Journal

## 81 JOINT LABORATORIES CREATED IN THREE YEARS

Put in place in 2013, the Labcom (joint laboratories) instrument aims at developing the industrial partnership and technology transfer potential that exists in the actors of academic research. The aim of this action is to help these researchers establish new and stronger bilateral partnerships with enterprises (specifically the small, medium and intermediate-sized enterprises (SME/ISEs).

Designed for ease of implementation by project principal investigators, this instrument enables the entities concerned to submit their application as and when the opportunity arises. There is no obligation to have a "bricks-and-mortar" structure; a virtual laboratory can, for example, make an application. The selected LabComs are then allocated flat-rate funding of €300 K granted to the academic laboratory for a three-year period.

Three years after the creation of this new instrument, the initial target of creating 100 Labcoms in three years has almost been reached, as there were 81 such structures at the end of 2015.



## PUTTING IN PLACE THE PUBLIC BUDGET AND ACCOUNTING MANAGEMENT REFORM

**For ANR, like all public institutions, the 1<sup>st</sup> January 2016 saw the entry into force of a new budgetary framework. To implement this public budget and account management (GBCP) reform and draw all the expected benefits from it, ANR has established a dedicated plan of action.**

The implementation of this reform raised many issues for ANR. The first question for ANR was to render the financial information system - SIBC/SAP - compatible with the GBCP decree. However, the reflection on the implementation of this new framework led ANR to call into question other processes:

- "interfaces with the scientific data and grant agreement management system" and necessitated transferring management of the process of financial implementation of the grant agreements from the SIM (activity information system) to the SIBC;
- upgrading of authorisations in conformity with the scopes of intervention in budgetary management and accounting management;
- necessity to standardise the processing of mission expenses from issue of the mission order through to payment of the statement of expenses;
- restoring the budgetary, accounting and cash flow information with determination of the required strategic and operational management indicators, in addition to the statutory GBCP statements provided for by the decree.

### FIVE AREAS OF WORK HIGHLIGHTED

The needs identified by ANR relative to implementation of the GBCP reform have thus been set out in a plan of action. They hinge around five areas (see box). Using this as a basis, detailed design workshops mobilising more than one hundred ANR staff members and all the activity divisions were organised from mid-May to mid-July 2015 on the first three themes.

In the last quarter of 2015, the personnel again rallied to the cause of "acceptance testing" the IT developments produced to integrate the GBCP changes.

As of February 2016 an extensive training programme was implemented to familiarise ANR personnel with the new aspects of the budgetary and accounting information system.

Thanks to these actions and the strong commitment of the personnel, ANR was able to apply the GBCP reform in its 2016 management as of February.

The themes dedicated to electronic document management (EDM) and mission expenses will be addressed at the beginning of 2016.

### DID YOU KNOW?

#### What things change with the GBCP (Public Budget and Accounting Management) reform?

With this reform, the previous budgetary framework of the institutions is enriched by a budgetary accounting system with commitment authorities, payment appropriations and utilisations, analogous to that of the State.

- 1• **Budgetary authorisation aids inspired from the LOLF (organic law on finance laws) to which the limitation applies:** commitment authorities, payment appropriations and utilisation authorisation ceilings are grouped in limiting budget envelopes by type of expenditure (personnel, operating, investment and project funding) from which the organisation's funding stakes can be identified in the course of the financial year.
- 2• **General accounting situation forecasts - income statement and cash flow statement - adopted by the Board of Governors to continue keeping track of the economic situation of the organisation**

#### Improved management of public organisations and finances

This new framework supplements the existing rules of good management and governance. It provides financial information that is much more comprehensive than before, making it possible to define rules of good management that are suited to the organisation. Bringing the budgetary and accounting frameworks of the State and the public administration bodies closer together facilitates the understanding and assessment of policy implementation. The introduction of limited commitment authorities gives Boards of Governors the power to oversee commitments that the organisation can take which have financial impacts covering several years. The ceiling on payment appropriations and utilisation authorisations provides for better management of the organisation's expenditures. The tracking of outgoing and incoming payments enables the State to optimise the cash flow of public administrations and the conditions of indebtedness.

### A PLAN OF ACTION BASED ON

#### 5 PRIORITY THEMES

- The "core of the GBCP"
- The financial statements
- The SIM/SIBC interfaces
- Electronic document management (EDM) and electronic signature
- Mission expenses



**BOND**

BOUNDARIES, NUMERICS,  
DISPERSION

► **ANR programme and edition:**

Mathematics and interactions  
(Blanc SIMI 1) 2013

► **Identifier:**

ANR-13-BS01-0009

► **Coordinating entity:**

Camille Jordan Institute

► **Partners:**

- Mathematics Laboratory of Orsay
- J.A. Dieudonné laboratory

► **ANR grant:** €245 k► **Contact:**

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► **Website:**

bond.math.cnrs.fr

## PUTTING WAVES INTO THE EQUATION

**Who could understand the behaviour of waves better than mathematicians? Although this statement may seem somewhat incongruous, it is nevertheless not far from the truth, as illustrated by the ANR-supported BOND and DYFICOLTI projects.**

Current mathematical research plays an important and sometimes little known role in a wide variety of scientific problems. Understanding the formation and behaviour of waves involves fluid mechanics and questions of fundamental mathematics such as problems of partial differential equations of evolution. The BOND and DYFICOLTI projects have in common the fact that they examine the mathematical theory (existence, stability, asymptotic developments) of partial differential equations. These equations model fluid dynamics phenomena, and more particularly the non-linear behaviour of waves, including tidal bores and tsunamis.

**WORTH KNOWING**

Rogue (or freak) waves, tidal bores, tsunamis: some waves can be extremely dangerous. The models developed by mathematicians aim in particular to provide tools for acquiring a better understanding of these phenomena.

**CONSTRUCTION OF THEORETICAL MODELS FOR SIMULATION PURPOSES**

This work aims in particular at developing theoretical models of the calculation codes to simulate complex wave phenomena. These simulations are vital to the understanding of extreme events such as tsunamis, and can in such cases serve as decision aids. They could also be of value for designing renewable marine energy systems. Working on joint problems, the two groups of researchers created a joint working group baptised Mathocéan.

Their work resulted in scientific output of major importance with nearly 75 publications, an operational code for tsunamis and, for Anne-Laure Dalibard, one of the researchers involved in the DYFICOLTI project, funding from the ERC in 2014 and the setting up of a cooperation with the BCAM (Bilbao) and the technological transfer agency Tecnalia (Spain) on wave energy.

**On-line content**

The Mathocéan website: [www.mathocean.math.cnrs.fr](http://www.mathocean.math.cnrs.fr)

Brèves de maths website created in 2013  
for the "Mathematics of Planet Earth" year:

[www.breves-de-maths.fr](http://www.breves-de-maths.fr)

"Tête au carré" podcast, Les vagues par les mathématiques  
(Waves by mathematics):

[www.franceinter.fr/emissions/la-tete-au-carre/la-tete-au-carre-07-fevrier-2013](http://www.franceinter.fr/emissions/la-tete-au-carre/la-tete-au-carre-07-fevrier-2013)

**DYFICOLTI**

FLUID DYNAMICS,  
BOUNDARY LAYERS,  
VORTICES  
AND INTERFACES

► **ANR programme and edition:**

Mathematics and interactions  
(Blanc SIMI 1) 2013

► **Identifier:**

ANR-13-BS01-0003

► **Coordinating entity:**

Mathematics Institute of Bordeaux

► **Partners:**

- Fourier Institute
- Mathematical Research Institute of Rennes

► **ANR grant:** €199 k► **Contact:**

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► **Website:**

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## A MAJOR YEAR FOR PROJECT MONITORING



The year 2015 represented a major milestone in the monitoring of projects initiated in the first Investments for the Future programme. Three programmes of major importance, namely the Labex, Idefi and IHUs, effectively underwent an interim assessment review by a jury. Four SATTs reached a milestone that determines their continuation and funding for the next three years.

Complementing ANR's continuous monitoring, these assessments, and in particular the hearings by juries comprising leading scientists, mainly foreign, allow an in-depth assessment of the achievements of each project. The outcome of these reviews is, for the State, an overview of the actions undertaken and the results obtained thanks to the assigned funds and, for each project, personalised feedback enabling them to detail or perhaps even redirect the project priorities for the coming years. Based on a report submitted beforehand by each project and a hearing, these interim assessments took place at various moments during the year.

### IN JUNE, NEARLY 600 SCIENTISTS MET IN PARIS FOR THE LABEX

Five years after launching the Labex initiative, this interim assessment marked the mid-point of the 171 projects funded. Their achievements were examined by an international jury of forty-eight scientists divided into 15 thematic sub-juries. All these sub-juries consider the Labex action to be a real success, firstly by focusing on excellence in French research, and secondly by giving the scientific community an instrument providing flexibility and lasting increased organisational freedom.

### NOVEMBER, THE IDEFI MONTH

Three years after the projects started, two different but complementary dimensions had to be assessed: firstly, the intrinsic quality of the project achievements, and secondly the impact of each project in transforming its ecosystem. The jury was unanimous in considering that the IDEFI programme as a whole is running satisfactorily and that there are many good or very good projects. A few projects were nevertheless found to be experiencing difficulties. ANR will monitor these projects with particular attention in the future.

### DECEMBER, THE IHUS CLOSE THE YEAR

Four years after their selection, the University Hospital Institutes (IHU) underwent an interim assessment by a jury comprising nine of the initial evaluation panel members and six new members. The IHU jury as a whole judged the achievements of these projects very positively. The success of this action was subsequently widely praised at the highest level of State. The IHUs now have to submit their updated road maps for 2016-2020 period and beyond.

### LABEX

Launched in 2010, the Laboratories of Excellence (Labex) programme is intended to provide laboratories having international visibility with significant resources to enable them to play on a level field with their foreign counterparts.

OVERALL ENDOWMENT:  
1,5 BILLION EUROS  
OVER 10 YEARS

171 PROJECTS LABELLED

ENDOWMENT PER PROJECT:  
€2 TO 20M

### IDEFI

Launched in 2012, the Initiatives of Excellence in innovative training (IDEFI) programme is intended to enhance the prestige of innovation in training by supporting ambitious initiatives, commensurate with international university standards and symbolic of the university offering of tomorrow.

OVERALL ENDOWMENT:  
€184M

36 PROJECTS LABELLED

ENDOWMENT PER PROJECT:  
€1.5 TO 10M

### IHU

Launched in 2010, the University Hospital Institutes (IHU) programme is intended to fund centres of excellence in research, care, training and technology transfer in the area of health.

OVERALL ENDOWMENT:  
€349M  
OVER 10 YEARS

6 PROJECTS LABELLED

ENDOWMENT PER PROJECT:  
€4 TO 65M

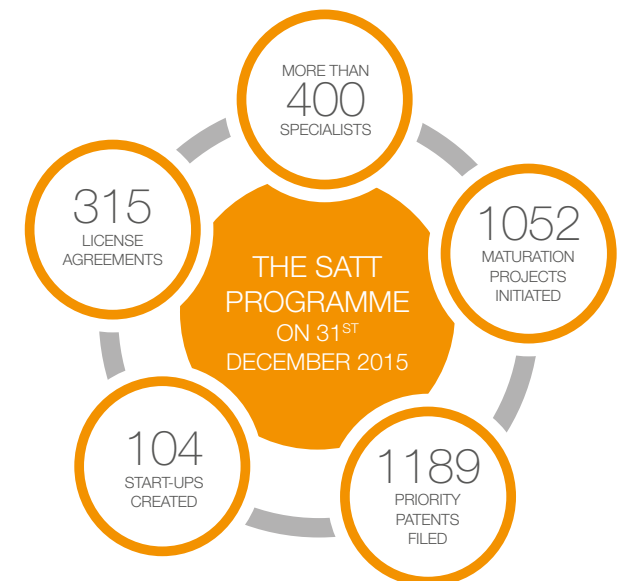
### TECHNOLOGY TRANSFER: FOUR NEW SATTs ASSESSED AND EXTENDED

With funding of €850 M, the role of the SATTs (technology transfer acceleration companies) is to manage value creation activities between laboratories and the corporate ecosystem. Fourteen such regional structures have been created in several waves since 2011. In addition to ANR's continuous monitoring, a 3-year milestone assessment determines the continuation of funding for the following three years. This task was entrusted to an external audit firm assigned by ANR in consultation with the SATT management committee.

Following the assessment of the first five SATTs in 2014, the four SATTs of the B wave (Ouest Valorisation, Aquitaine Sciences Transfert, AxLR and Nord) were assessed at the end of the first half of 2015. Further to a proposal from the steering committee of the Fonds National de Valorisation (French National Technology Transfer Fund), the Prime Minister enacted the extension of their funding for a further three years and a total sum of €84 M.

More broadly, the assessments carried out to date provide a more comprehensive assessment of the programme. They show that the themes covered by the SATTs respond to the dynamics of the regions in terms of research. These structures have enhanced the skills of their teams and their volume of activity is now substantial. The last five SATTs to be labelled will be assessed in 2016 and 2017.

### THE SATTs IN FIGURES AS AT 31/12/15



**WORTH KNOWING**  
Find the summaries of the Labex and Idéfi interim assessments on the "Suivi" (monitoring) pages of our Investments for the Future section





# 03

## IN THE WINGS OF ANR

Human Resources  
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# HUMAN RESOURCES, WHO ARE ANR'S EMPLOYEES?

## STABILISATION OF SKILLS:

### AN EFFECTIVE CONTRACTUAL POLICY

In order to improve internal recognition, improve the efficiency of the agency and harmonise practices, an ambitious contractual policy was put in place in 2013. The percentage of the personnel employed on limited-term contracts has decreased from 58% at the end of 2012 to 17% today. In accordance with the objectives set initially, this approach has enabled the skills to be stabilised without freezing staff numbers, particularly in the scientific sector, and has greatly reduced personnel turnover. Personnel turnover has stabilised at around 12% over the last two years. Given these satisfactory results, the contractual policy has been extended to the year 2016.

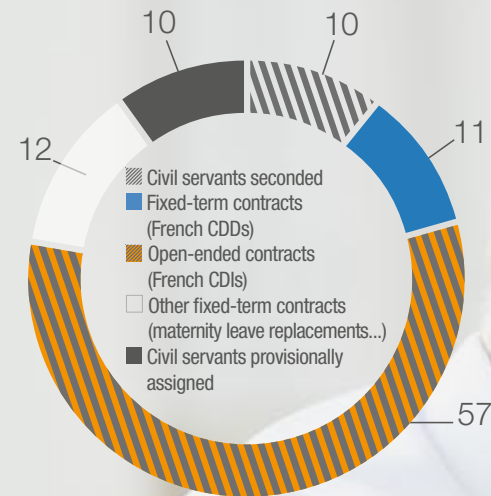
## JOBS AND SKILLS:

### A DIRECTORY DEDICATED TO ANR'S ACTIVITIES

Resulting from two years of collective effort, a directory of ANR jobs and skills was adopted at the beginning of 2016. This essential aid for the different aspects of HR (evaluations, recruitment, training courses, mobility, etc.) was used for the first time in the annual assessment interview campaign of 2016.

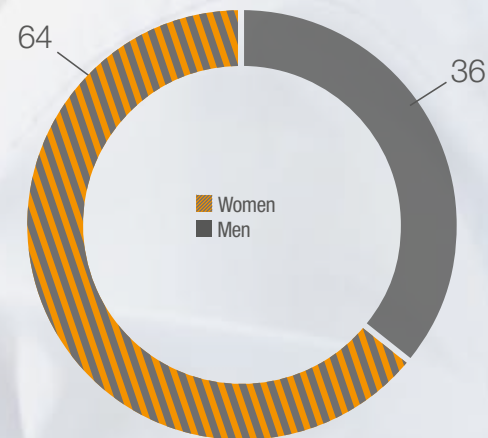
## WORKFORCE DISTRIBUTION BY STATUS

AS AT 31 DECEMBER 2015 (% FTE)



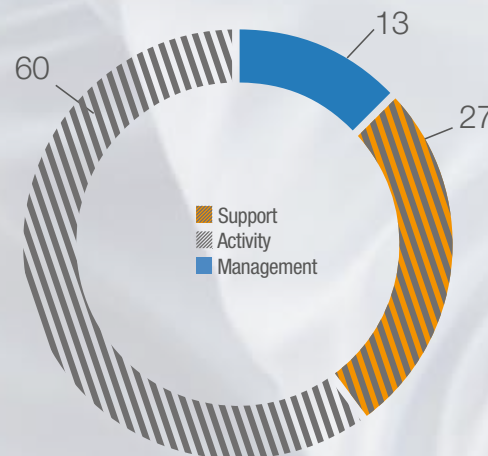
## WORKFORCE DISTRIBUTION BY GENDER

AS AT 31 DECEMBER (% OF COLLABORATORS)

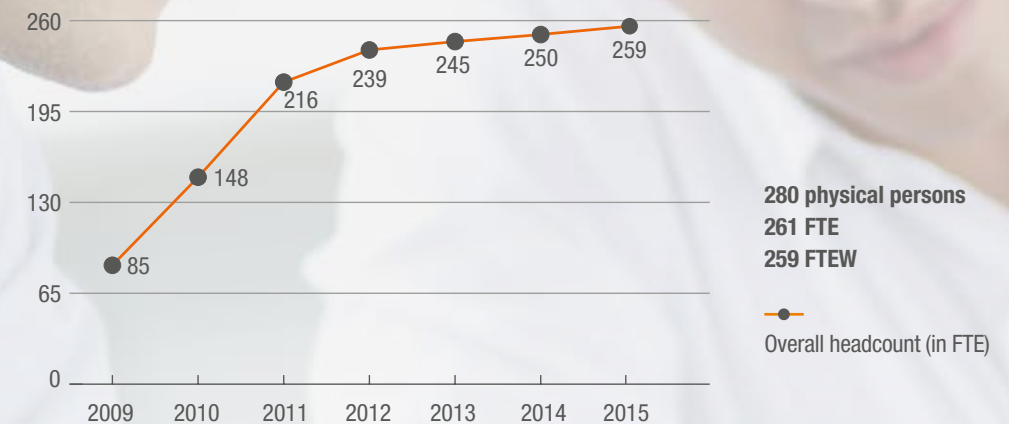


## DISTRIBUTION OF THE OVERALL WORKFORCE

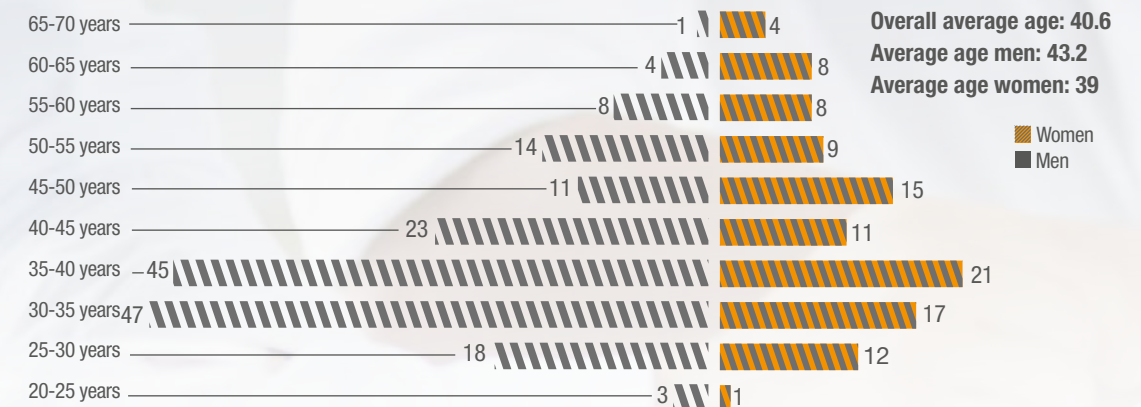
BY SECTOR AS AT 31 DECEMBER 2015 (% FTE)



## WORKFORCE EVOLUTION 2009-2015 (IN FTE)



## MALE/FEMALE POPULATION PYRAMID AS AT 31 DECEMBER 2015





## BUDGET

The initial 2015 budget of ANR was adjusted during the year on the commitment authorities and payment appropriations allocated to ANR for the funding of actions for 2015 to integrate a reduction of €18.4 M. The commitment authorities amounted to €510.7 M for an initial allocation of €529.1 M and the payment appropriations to €515.2 M for an initial allocation of €533.6 M.

In view of the lowering of the allocated appropriations, the "Hosting high-level researchers" call for proposals, budgeted at €14.5 M in the initial 2015 budget, had to be transferred to 2016.

The cash balance at the start of 2015 was €154.8 M. As at 31<sup>st</sup> December 2015 it was €26.7 M, its lowest level. Thus, during 2015 ANR used its cash reserves to honour the payments due during the year.

### ANALYSIS OF THE PRODUCTS OF THE BUSINESS YEAR 2015

The presentation of revenues takes into account the breakdown by type planned for in the GBCP reform based on two distinct headings: "earmarked revenues" and "global revenues".

The resources amount to €1,074.4 M in commitment authority, down by €16.6 M (-1/5%) compared with the second amending budget, of which €16.1 M was on reversals of provisions.

The payment appropriation resources amount to €1,067.3 M, down by €20.6 M (-1.9%) compared with the second amending budget, of which €16.1 M was on reversals of provisions and €4.4 M on cofunding.

### EXECUTION OF THE EXPENDITURES ENVELOPES

The total expenditure for 2015 (all envelopes included) amounts to €1,049.4 M.

- The management budget expenditure represents €34.3 M in payment appropriations, i.e. 98% of the second amending budget of 2015.

In 2015, ANR for the first time set up a litigation provision for the sum of €0.1 M, an allowance for doubtful accounts for €0.5 M and for CET for €0.3 M, and recognised loan losses of €0.4 M.

- The project funding expenditure (including provisions) totals €1,015.1 M in payment appropriations. This has increased by €27.2 M compared with 2014 and represents 97% of the total expenditure for 2015.

### PROJECT FUNDING BUDGET

The 2015 project funding budget was executed for the sum of €528.1 M commitment authority, corresponding to funding of which 96.7% (€510.7 M) came from the Ministry responsible for Research and 3.3% (€17.4 M) from co-funders.

The commitments on calls for proposals amount to €390.2 M commitment authority in 2015 compared with €414.3 M in 2014 (a reduction of 5.8%) and the commitments for "other than calls for proposals" amounted to €137.9 M commitment authority in 2015 compared with €139.4 M in 2014.

Project funding expenses for 2015 amount to €649.4 M in payment appropriations and can be broken down into €479.3 M on account of the calls for proposals and €170.1 M on account of actions funded other than calls for proposals (the "préciput" (a supplement to the grant awarded to ANR project beneficiaries), INCA, Carnot institutes, etc.).

The call for proposal liquidations amounted to €479.3 M (compared with €460.0 M in 2014), of which €447.9 M (93%) was to cover commitments prior to 2015 and €31.3 M (7%) corresponded to initial advances for projects selected in the 2015 edition.

The liquidations other than calls for proposals amounted to €170.1 M in 2015 (compared with €162.2 M in 2014) of which €86.5 M were on account of commitments prior to 2015 (essentially the "préciput" and programme Carnot which form the subject of multi-year coverages) and €38 M which were paid to INCA in 2015 in commitment authority = payment appropriation (in three annual payments).

The provisions of the project funding envelope correspond to the estimated amount of the needs associated with the commitments for the year which will become payable during the following years. These provisions amount to €365.7 M in the second amending budget, slightly down (by €12.4 M, or 3.3%) on 2014.

**MANAGEMENT BUDGET**

There are three envelopes for the expenditures associated with the management budget: Personnel, Functioning and Investment. The management budget expenditures in 2015 amount to €34.3 M, down by €0.7 M compared with the second amending budget and up by 0.4% on the 2014 figure.

The total headcount for ANR has increased by 11.6 FTEW (full-time equivalents worked) (i.e. +5.3%) compared with 2014. The headcount for unlimited term contracts + limited term contracts + ICDI+CDD+Incumbents) has increased by 7.9 FTEW taking it to 212.9 FTEW, the employment level ceiling. Personnel expenditure amounted to €15.8 M in 2015.

The operating budget includes all the management expenses entered in the ANR statement of operations. This budget (excluding amortisations) amounts to €16.4 M, down by €0.1 M with respect to the second amending budget, i.e. a utilisation rate of 99%.

- Human resource management expenses, excluding pay, represent €4.0 M
- Expenses associated with the organisation/participation in events (committees, symposia, etc.) amount to €3.4 M
- Supportive environment expenditures (common resources and premises) amount to €3.5 M
- Information and communication expenses amount to €1.3 M
- Information processing expenses represent €1.6 M
- Other expenses represent €2.7 M

Investment expenditure amounted to €1.0 M in 2015.

To conclude, for the financial year 2015, ANR records positive results of €18.9 M. In view of this positive result, the amount of the non-cash amortisation charges and the variation in the project funding provisions, ANR's self-financing capacity comes out at €-119.2 M.

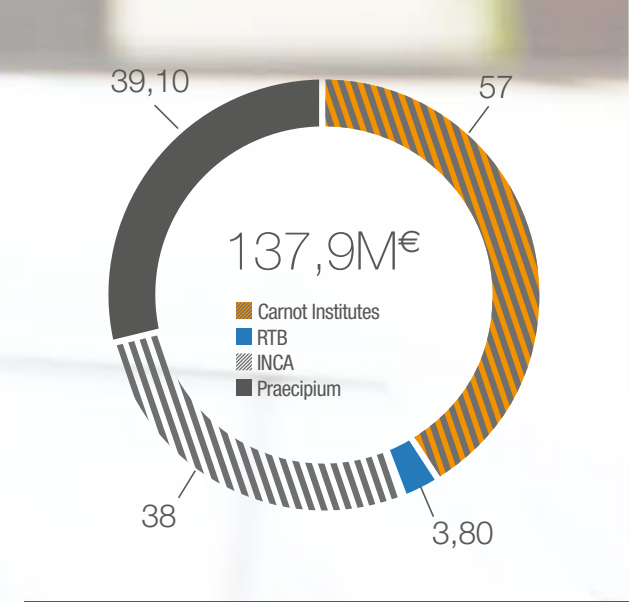
Drawings from working capital totalled €120.2 M (against €131.90 M planned in the second amending budget). The working capital which was €61.1 M on 31<sup>st</sup> December 2014 therefore totalled €-58.9 M at the end of 2015. This reduction in working capital reflects the fact that ANR had to draw on its reserves to finance the expenditure of the financial year.



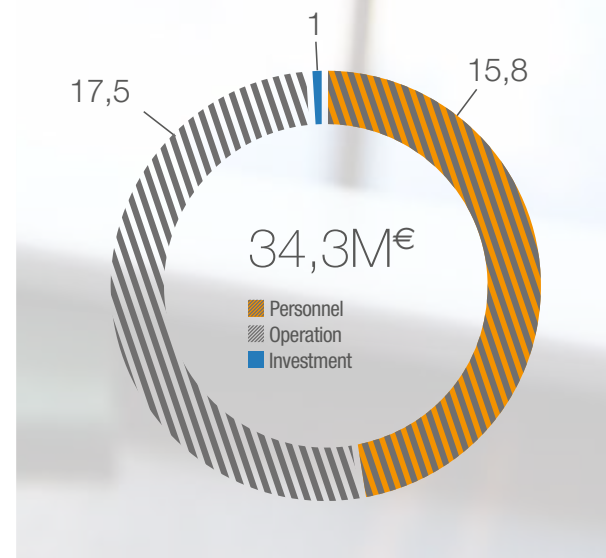
**ANR FUNDING BUDGET (€M)**



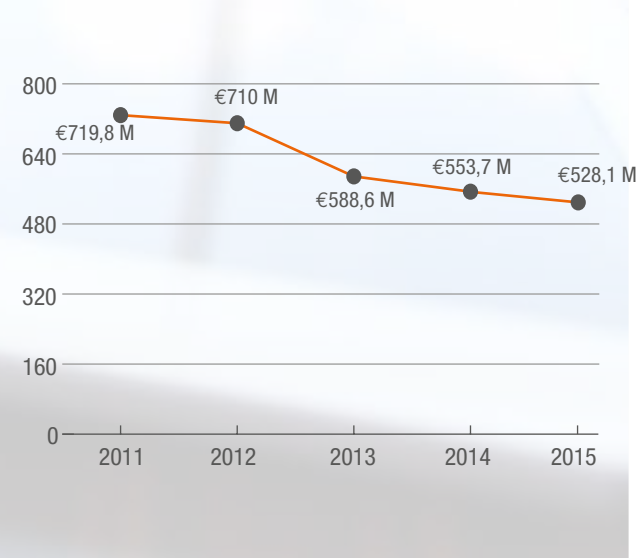
**FUNDING ALLOCATED OUTSIDE OF CALLS OF PROPOSALS (€M)**



**ANR MANAGEMENT BUDGET (€M)**



**FUNDING BUDGET EVOLUTION (2011-2015)**



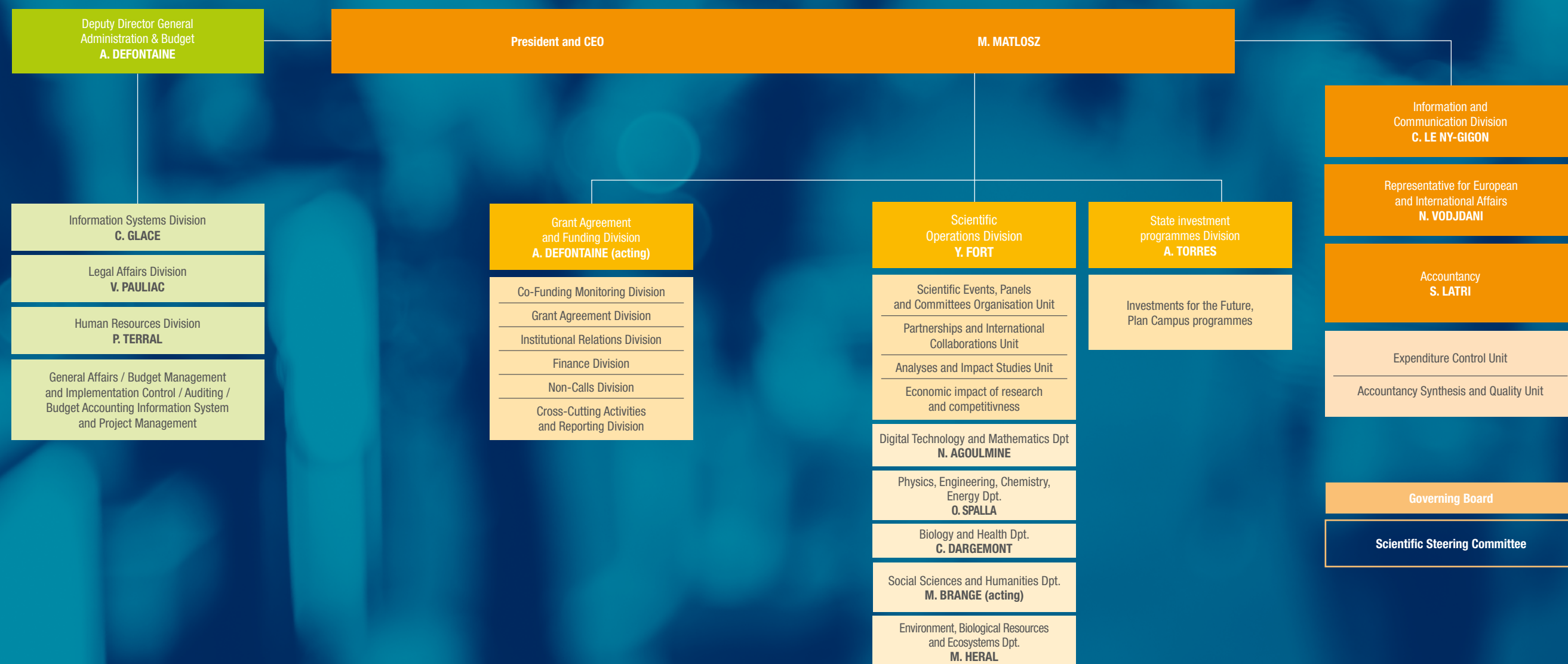


## GOVERNANCE

ANR is a public administrative institution under the authority of the Minister responsible for Research. It is administrated by a Board of Governors and directed by its President & Chief Executive Officer. The President & CEO is assisted by one or more Deputy Director General(s) and a Scientific Advisory Panel. These modes of ANR governance are defined by the decree of 1<sup>st</sup> August 2006 amended.

## ORGANISATION CHART OF ANR

22/08/2016



## GOVERNORS BOARD

The Governors Board settles the institution's affairs through its deliberations. The Board of Governors comprises nineteen members in addition to the ANR President:

**Six representatives of the State:** Two representatives of the Minister responsible for Research, one representative of the Minister responsible for Higher Education, two representatives of the Minister responsible for Industry, one representative of the Minister responsible for the Budget;

- Director General of Research and Innovation
- Guillaume Gaubert, Director of Financial Affairs, Secretariat General for National Education, Higher Education, Research
- Simone Bonnafous, Director General for Higher Education and Professional Integration
- Pascal Faure, Director General for Enterprises
- Benoît Legait, Chairman of the Technologies and Society Section, General Council for the Economy, Industry, Energy and Technologies,
- Arnaud Jullian, Deputy Director, Budget Department

**Six qualified personalities representing the major scientific areas,** including at least one person from the Conference of Heads of Higher Education Institutions

- Fabienne Blaise, President, Lille 3 University
- Alain Fuchs, President & CEO, CNRS (National Centre for Scientific Research)
- François Houllier, President & CEO, INRA (National Institute of Agricultural Research)
- Yves Levy, President & CEO, INSERM (National Institute for Health and Medical Research).
- Brigitte Plateau, Administrator-General, Grenoble INP
- Françoise Touboul, Scientific Advisor, CEA (Alternative Energies and Atomic Energy Commission)

**Four qualified personalities from the socio-economic world** chosen for the skills in the field of research and technological development;

- Yann Barbaux, Director of Innovation, Airbus
- Marie Meynadier, Director General, EOS Imaging
- Jean-François Minster, Scientific Director, Total
- Pascale Sourisse, Director General, International Development, Thales

### The Vice-President of the Strategic Research Council

- Pascal Colombani

Two representatives of the personnel, and their substitutes, elected for a period of three years by the ANR personnel

**In addition, the following attend the board meetings in an advisory capacity:**

- the Chairman of the board of governors of the public institution BPI-Groupe or his representative
- the Commissioner General for Investment or his representative
- the Deputy Director Generals
- the budget controller
- the accounting officer

Composition as at 01/06/16





## SCIENTIFIC ADVISORY BOARD

The Scientific Advisory Board (CPS) is a body of reflection for preparing and implementing the ANR annual work programme. Assisting the ANR President in the strategic management of the institution, the CPS is consulted with regard to:

- the preparation of ANR's annual work programme and its execution report,
- the implementation of the work to evaluate the research offering and measure its impact,
- the creation or suppression of the ANR's scientific departments, their designation and their scope of action,
- the appointing of heads of the scientific departments and the renewal of their mandates.

The CPS can also be consulted by the Governors Board or the ANR President for any question lying within the competence of the agency.

### COMPOSITION

In addition to the heads of the ANR's scientific departments, the Scientific Advisory Board comprises external personalities, including the Chair of the Panel, appointed by the ANR President for a renewable 2-year mandate.

Personalities external to ANR, some foreign, chosen for their scientific and technical competence in the agency's areas of activity:

- Sébastien Candé, Vice-President of the French Academy of Sciences
- Alice Dautry, Member of the Academy of Technologies, former Director-General of the Pasteur Institute
- Rick Rylance, Chief Executive of the Arts and Humanities Research Council (AHRC) of the United Kingdom
- Ernst-Ludwig Winnacker, Secretary-General of the Human Frontier Science Program (HFSP), former Chairman of the German Foundation for Research (DFG) and former Secretary-General of the European Research Council (ERC)

Personalities from the socio-economic world chosen for their competence in the functioning and the administration of national agencies funding research, development and innovation:

- Susan Fleet, Chairwoman & CEO of Britest Limited (Chair of the Scientific Advisory Panel)
- Ulrike Decoene, Director the Axa Research Fund

### FUNCTIONING

The Scientific Advisory Board meets at least three times a year when convened by the ANR President or at the written and substantiated request of two thirds of its members.

The composition of the panel, the methods of designating its members and its rules of functioning are set by ministerial order of 10<sup>th</sup> September 2015.



## RESULTS OF CALLS FOR PROPOSALS 2015 - PROJECTS FUNDED

	PROJECTS PEER REVIEWED IN PHASE 2 OR SINGLE PHASE	PROJECTS FUNDED	SUCCESS RATE WITH RESPECT TO NUMBER OF ELIGIBLE PROPOSALS (2 <sup>ND</sup> ASSESSMENT PHASE OR 1-PHASE CALL FOR PROJECTS)	OVERALL ANR FUNDING (€M)	% OF OVERALL ANR FUNDING
<b>Component 1: SOCIETAL CHALLENGES</b>	<b>1795</b>	<b>474</b>	<b>26,4%</b>	<b>191.6</b>	<b>49.2%</b>
Generic call (PRC, JCJC)	1659	437	26.3%	179.1	46%
ASTRID including ASTRID Maturation	112	34	30.4%	11.2	2.9%
Flash Drones	24	3	12.5%	1.4	0.4%
<b>Component 2: AT THE FRONTIERS OF RESEARCH</b>	<b>364</b>	<b>93</b>	<b>25.5%</b>	<b>32.7</b>	<b>8.4%</b>
Generic call: Other Knowledge Challenge (PRC, JCJC)	364	93	25.5%	32.7	8.4%
<b>Component 3: BUILDING THE ERA AND INTERNATIONAL ATTRACTIVENESS</b>	<b>2 085</b>	<b>302</b>	<b>14.5%</b>	<b>70.9</b>	<b>18.2%</b>
Generic call - PRCE	1 277	94		27.4	7%
MRSEI	36	36		1.1	0.3%
International calls	772	172	22.3%	42.4	10.9%
<b>Component 4: ECONOMIC IMPACT OF THE RESEARCH (excluding CARNOT: operation outside CFP)</b>	<b>609</b>	<b>172</b>	<b>28.2%</b>	<b>93.9</b>	<b>24.1%</b>
Generic call - PRCE	492	144	29.3%	83.3	21.4%
Labcom	112	25	22.3%	7.5	1.9%
Industrial chairs	5	3	60%	3.1	0.8%
<b>TOTAL</b>	<b>4 853</b>	<b>1 041</b>	<b>28.3%</b>	<b>389.2</b>	<b>100%</b>

Two projects funded outside  
CFP in Basic technological  
research (RTB)



## DISTRIBUTION OF APPROPRIATIONS ALLOCATED BY TYPE OF BENEFICIARY

	TOTAL COMMITMENTS (€)	CNRS	INSERM	INRIA	INRA	IRD	CEA	Other research organisations *	SUB-TOTAL RESEARCH ORGANISATIONS	UNIVERSITIES	OTHER HIGHER EDUCATION ESTABLISHMENTS	HOSPITALS HEALTH	MISC. PUBLIC	SUB-TOTAL PUBLIC
<b>Component 1: SOCIETAL CHALLENGES</b>	<b>192 640 652</b>	<b>16.7%</b>	<b>5.4%</b>	<b>0.7%</b>	<b>2.4%</b>	<b>0.5%</b>	<b>1.9%</b>	<b>0.8%</b>	<b>28.4%</b>	<b>11.4%</b>	<b>3.3%</b>	<b>0.8%</b>	<b>1.3%</b>	<b>45.2%</b>
PRC	150 311 800	13.3%	4.6%	0.6%	2.3%	0.3%	1.7%	0.4%	23.1%	8.5%	2.2%	0.7%	1.7%	36.2%
JCJC	29 774 913	2.8%	0.8%	0.1%	0.2%	0.2%		0.1%	4.2%	2.3%	0.8%	0.1%		7.4%
Flash drones in challenge 9	1 398 694							0.1%	0.1%					0.1%
ASTRID, including Maturation	11 155 245	0.6%					0.2%	0.3%	1.0%	0.6%	0.2%		0.2%	2.1%
<b>Component 2: AT THE FRONTIERS OF RESEARCH</b>	<b>32 744 384</b>	<b>4.6%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.6%</b>		<b>5.4%</b>	<b>2.2%</b>	<b>0.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>8.3%</b>
Other Knowledge Challenge PRC	26 892 678	3.8%	0.1%	0.1%			0.6%		4.5%	1.7%	0.5%			6.8%
Other Knowledge Challenge JCJC	5 851 706	0.9%							0.9%	0.5%	0.1%			1.5%
<b>Component 3: BUILDING THE ERA AND INTERNATIONAL ATTRACTIVENESS</b>	<b>70 872 931</b>	<b>4.3%</b>	<b>2.9%</b>	<b>0.4%</b>	<b>1.0%</b>	<b>0.2%</b>	<b>0.6%</b>	<b>0.6%</b>	<b>9.9%</b>	<b>4.6%</b>	<b>1.1%</b>	<b>0.2%</b>	<b>0.5%</b>	<b>16.3%</b>
PRCI	27 383 655	2.4%	0.8%	0.2%	0.1%	0.1%	0.4%	0.1%	4.1%	1.6%	0.6%	0.2%	0.2%	6.7%
ERANET, JPI, etc.	42 409 276	1.8%	2.1%	0.2%	0.9%	0.1%	0.2%	0.5%	5.7%	2.9%	0.5%	0.1%	0.3%	9.5%
MRSEI	1 080 000	0.1%							0.1%	0.1%				0.2%
<b>Component 4: ECONOMIC IMPACT OF THE RESEARCH</b>	<b>93 894 720</b>	<b>3.9%</b>	<b>0.8%</b>	<b>0.4%</b>	<b>0.6%</b>	<b>0.0%</b>	<b>1.3%</b>	<b>0.3%</b>	<b>7.3%</b>	<b>5.8%</b>	<b>3.6%</b>	<b>0.4%</b>	<b>0.9%</b>	<b>18.1%</b>
PRCE	83 272 811	3.4%	0.8%	0.4%	0.4%		1.3%	0.3%	6.6%	5.1%	2.8%	0.4%	0.9%	15.8%
Labcom	7 500 000	0.4%			0.2%		0.1%		0.6%	0.8%	0.5%			1.9%
Industrial chairs	3 121 909	0.2%							0.2%		0.2%			0.4%
<b>TOTAL IN CALLS FOR PROPOSALS (CFP)</b>	<b>390 152 687</b>	<b>29.5%</b>	<b>9.2%</b>	<b>1.7%</b>	<b>3.9%</b>	<b>0.7%</b>	<b>4.4%</b>	<b>1.8%</b>	<b>51.1%</b>	<b>24%</b>	<b>8.6%</b>	<b>1.4%</b>	<b>3.3%</b>	<b>88.4%</b>

## OUTSIDE CALLS FOR PROPOSALS (CFP)

Carnot Institutes (in component 4)	57 000 000													
RTB (Basic Technological Research)	3 800 000													
INCA	38 000 000													
Preciput	39 149 285	14.6%	5.4%	1.2%	4.6%	0.5%	4.4%	1%	31.7%	40.1%	17.7%	1.1%	3.5%	94.1%
<b>TOTAL outside CFP</b>	<b>137 949 285</b>													
<b>TOTAL ANR budget in commitment authorities</b>	<b>528 101 972</b>													

\* EPSI (Scientific or Technical Public Institution): IRSTEA, INED, IFSTTAR  
 MAIN EPICs (Industrial or Commercial Public Institution): IFPEN, CIRAD, ONERA, IFREMER, INERIS, BRGM

## DISTRIBUTION OF APPROPRIATIONS ALLOCATED BY TYPE OF BENEFICIARY (CONT'D)

	TOTAL COMMITMENTS (€)	FOUNDATIONS	ASSOCIATIONS	VSE	SME	ENTERPRISES OTHER THAN VSE/SME	MISC. PRIVATE	SUB-TOTAL PRIVATE
<b>Component 1: SOCIETAL CHALLENGES</b>	192 640 652	2.7%	0.4%	0.3%	0.3%	0.4%	0.0%	4.0%
PRC	150 311 800	2.5%	0.4%					2.9%
JCJC	29 774 913	0.2%						0.2%
Flash drones in challenge 9	1 398 694				0.1%	0.1%		0.2%
ASTRID, including Maturation	11 155 245		0.1%	0.3%	0.2%	0.2%		0.8%
<b>Component 2: AT THE FRONTIERS OF RESEARCH</b>	32 744 384							
Other Knowledge Challenge PRC	26 892 678							
Other Knowledge Challenge JCJC	5 851 706							
<b>Component 3: BUILDING THE ERA AND INTERNATIONAL ATTRACTIVENESS</b>	70 872 931	1%	0.2%		0.3%		0.2%	1.6%
PRCI	27 383 655	0.1%	0.1%				0.1%	0.3%
ERANET, JPI, etc.	42 409 276	0.8%	0.1%		0.3%		0.1%	1.3%
MRSEI	1 080 000							
<b>Component 4: ECONOMIC IMPACT OF THE RESEARCH</b>	93 894 720	0.4%	0.5%	1.2%	2.0%	1.6%	0.3%	5.9%
PRCE	83 272 811		0.5%	1.2%	2.0%	1.6%	0.3%	5.5%
Labcom	7 500 000							
Industrial chairs	3 121 909	0.4%						0.4%
<b>TOTAL IN CALLS FOR PROPOSALS (CFP)</b>	<b>390 152 687</b>	<b>4.1%</b>	<b>1.1%</b>	<b>1.4%</b>	<b>2.5%</b>	<b>2.0%</b>	<b>0.5%</b>	<b>11.6%</b>

## OUTSIDE CALLS FOR PROPOSALS (CFP)

Carnot Institutes (in component 4)	57 000 000							
RTB (Basic Technological Research)	3 800 000							
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Preciput	39 149 285	5.9%						5.9%
<b>TOTAL outside CFP</b>	<b>137 949 285</b>							
<b>TOTAL ANR budget in commitment authorities</b>	<b>528 101 972</b>							

\* EPSI (Scientific or Technical Public Institution): IRSTEA, INED, IFSTTAR  
 MAIN EPICs (Industrial or Commercial Public Institutions): IFPEN, CIRAD, ONERA, IFREMER, INERIS, BRGM



## SPECIFIC INTERNATIONAL CALLS FOR PROPOSALS 2015

	THEME	Commitments 2015 (€M)	NUMBER OF PROJECTS FUNDED
<b>Challenge 1 - Efficient resource management and adaptation to climate change</b>			
Multilateral call funded by the Belmont Forum	Mountains as sentinels of change	1.2	3
Multilateral call under the JPI OCEANS	Ecological aspects of microplastics in the marine environment	0.5	3
<b>Sub-total challenge 1</b>			
<b>Challenge 3 - Stimulating industrial renewal</b>			
Multilateral call under the M-ERA-NET ERANET	Materials	1.0	4
Bilateral Franco-Japanese call ANR-JST	Molecular technology	0.9	4
<b>Sub-total challenge 3</b>			
<b>Challenge 4 - Health and well-being</b>			
Multilateral call under the ERASynBio ERANET	Synthetic biology	1.5	4
Multilateral call under the JPI HDHL	Nutrition and cognitive functions	0.7	3
Multilateral call under the JPI HDHL	Intestinal microbiomics	0.6	3
Bilateral Franco-American call ANR-NSF-NIH	Computational neurosciences (jointly with challenge 7)	1.5	6
Multilateral call under the Infect-ERA ERANET	Infectious diseases	2.4	9
Multilateral call under the EuroNanoMed 2 ERANET	Nanomedicine	1.7	6
Multilateral call under the ANIHW ERANET	Animal Health and Welfare	1.5	8
Multilateral call with Germany and Canada ANR-BMBF-IRSC-FRQS	Epigenomics of complex diseases	2.1	4
Multilateral call under the COFUND E-Rare 3 ERANET	Rare diseases	3.5	15
Multilateral call under the COFUND Systems Medicine ERANET	Systems medicine	1.2	5
Multilateral call under the COFUND JPND ERANET	Neurodegenerative diseases: risk and protective factors, longitudinal cohorts and advanced experimental models	3.7	12
Multilateral call under the Neuron ERANET	Neurodevelopment disorders	1.8	7
Multilateral call under the JPI AMR	Antimicrobial resistance	1.0	3
<b>Sub-total Challenge 4</b>		<b>23.1</b>	<b>85</b>

## SPECIFIC INTERNATIONAL CALLS FOR PROPOSALS 2015

	THEME	Commitments 2015 (€M)	NUMBER OF PROJECTS FUNDED
<b>Challenge 5 - Food security and demographic challenges</b>			
Multilateral call funded by the COFASP ERANET	Fisheries, aquaculture and seafood processing	0.7	4
Multilateral call under the ERANETMED ERANET	Renewable energies, water resources and their connections for the Mediterranean region	2.0	13
Multilateral call under the ARIMNET 2 ERANET	Agriculture and agri-food sector in Mediterranean countries	1.4	7
Multilateral call under the COFUND FACCE-SURPLUS ERANET	Sustainable and resilient agriculture for food and non-food systems	1.2	7
<b>Sub-total challenge 5</b>			
<b>Challenge 7 - Information and communication society</b>			
Multilateral call under the CHIST-ERA 2 ERANET	Long-term challenges in information and communication sciences and technologies	1.8	7
Multilateral call SPPEXA with Germany and Japan	Big data and exascale computing	0.6	3
Multilateral call under the FLAG-ERA ERANET (Graphene and HBP)	Graphene and HBP Flagships	2.4	12
<b>Sub-total challenge 7</b>			
<b>Challenge 8 - Innovative, inclusive and adaptive societies</b>			
Bilateral Franco-German call ANR-DFG	Social sciences and humanities	2.5	10
Multilateral call under the JPI More Years, Better Lives	Extended working life and its consequences	0.3	1
Multilateral call under the ORA initiative with Germany, the Netherlands, the United Kingdom, the United States and Canada	Social sciences	1.9	7
Multilateral call under the Heritage + ERANET	Cultural heritage	0.3	3
<b>Sub-total challenge 8</b>		<b>5.1</b>	<b>21</b>
<b>Cutting across the challenges</b>			
Bilateral Franco-American call under the PIRE "Partnership for International Research and Education" programme	Energy, New Manufacturing Processes, Social Sciences	0.3	1
<b>TOTAL</b>		<b>42.4</b>	<b>174</b>

## ANR SUPPORT FOR PROJECTS LABELLED BY COMPETITIVENESS CLUSTERS

## UNDER ITS CALLS FOR PROPOSALS 2015

NAME OF CLUSTER	NUMBER OF PROJECTS FUNDED	ALLOCATED PROJECT FUNDING (€M)
Advancity, Ville et Mobilité Durables (Engineering / Services)	3	2.22
Aerospace Valley (Aeronautics / Space ICT)	5	2.58
Agri Sud-Ouest Innovation (Agriculture / Agri-food)	6	3.48
ALSACE ENERGIVIE	2	1.49
ASTECH (Aeronautics / Space)	5	3.36
Atlanpole Biotherapies (Biotechnologies / Health)	4	1.67
AVENIA	2	1.70
AXELERA (Chemistry Eco-technologies / Environment)	10	5.62
Cap Digital Paris-Région (ICT)	6	3.61
CAPENERGIES (Energy)	2	0.94
Céréales Vallée (Agriculture / Agri-food)	1	0.30
DREAM Eau & Milieux (Eco-technologies / Environment / Energy)	1	0.72
EAU (Eco-technologies / Environment)	1	0.48
ELASTOPOLE	3	1.33
ELOPSYS (ICT Optics / Photonics)	3	1.13
EMC2 (Materials Microtechnology / Mechanics)	3	1.44
Eurombiomed	11	5.75
Fibres (Bio-resources / Materials)	3	1.87
FINANCE INNOVATION	3	1.12
HYDREOS (Eco-technologies / Environment)	1	0.41
iDforCar (Transportation)	2	1.53
Images et Réseaux (ICT)	12	6.95
IMAGINOVE (ICT)	5	2.88
i-Trans (Transportation)	1	0.47
LUTB Transport & Mobility Systems (Transportation)	2	1.13
LYON BIPOLE (Biotechnologies / Health)	12	5.87
Materialia (Materials)	9	4.86
MATIKEM (Chemistry / Consumer goods / Materials)	2	0.91
Medicen (Biotechnologies / Health)	7	5.00
Mer Bretagne Atlantique (Energy / ICT / Transportation)	2	1.30
Mer Méditerranée (Energy / ICT / Transportation)	4	1.92

NAME OF CLUSTER	NUMBER OF PROJECTS FUNDED	ALLOCATED PROJECT FUNDING (€M)
MINALOGIC (ICT / Microtechnology / Mechanics)	7	4.06
MOV'EO	5	3.72
Nucléaire de Bourgogne (Nuclear components industry)	2	1.45
Nutrition Santé Longévité	2	1.24
OPTITEC	6	2.52
PASS (Bio-resources / Chemistry / Consumer Goods)	1	0.47
PEGASE (Aeronautics / Space)	3	1.82
PLASTIPOLIS (Materials)	2	1.08
Qualiméditerranée	1	0.21
Risques (Engineering / Services)	2	1.35
Route des Lasers (Optics / Photonics)	5	1.94
S2E2( Sciences and Systems of Electrical Energy)	5	3.51
SCS (Secured Communicating Solutions) (ICT)	3	2.07
SYSTEMATIC Paris région (ICT)	9	5.96
TEAM	1	0.75
TECHTERA (Technical & Functional Textiles) (Materials)	2	0.79
TENERRDIS (Energy)	4	2.82
TERRALIA	1	0.80
TRIMATEC	2	1.27
VALORIAL (Agriculture / Agri-food)	4	2.23
VEGEPOLYS (Agriculture / Agri-food)	5	2.42
VIAMECA (Microtechnology / Mechanics)	6	3.48
VITAGORA (Agriculture / Agri-food)	1	0.46
<b>TOTAL funding (without duplicate and triplicate)</b>	<b>165 projects</b>	<b>€90 M</b>

\* 40 projects were labelled by two, three or four clusters and are therefore counted in each of the clusters concerned



## INVESTMENTS FOR THE FUTURE

## STATE OF DISBURSEMENTS BY PROGRAMME AS AT 31/12/2015\*

NAME OF ACTION	NUMBER OF PROJECTS	TOTAL AUTHORISED (€)	TOTAL DISBURSED AS AT 31/12/2015 (€)	REMAINING TO BE DISBURSED (€)
Bio-informatics	12	17 130 082	14 502 258	2 627 824
Biotech - Bioresources	13	88 213 632	47 083 967	41 129 665
Cohorts	10	74 429 599	37 466 459	36 963 140
Thematic value-creation consortia	6	49 400 000	15 660 000	33 740 000
Demonstrators	4	77 993 735	51 208 832	26 784 903
Equipment of Excellence (EQUIPEX)	93	591 902 706	450 894 270	141 008 435
Infrastructure	23	496 637 699	331 394 152	165 243 547
Initiatives of Excellence (including Labex and Idefi in IDEX)	110	1 540 535 500	1 051 351 853	489 183 647
Initiative of Excellence in Innovative Training (excluding IDEX)	28	143 700 000	78 784 114	64 915 886
Carnot Institutes	46	124 208 542	32 794 550	91 413 992
Technological Research Institutes	8	919 954 822	228 607 917	691 346 905
Energy Transition Institutes (e.g. IEED)	12	367 325 393	95 249 388	272 076 005
University-Hospital Institutes (IHU)	6	349 329 163	222 498 252	126 830 911
University-Hospital Institutes B	6	35 000 000	28 488 334	6 511 666
Laboratories of Excellence (excluding IDEX)	82	730 779 880	338 441 765	392 338 115
Nanobiologies	8	18 842 530	14 601 045	4 241 485
Hospital University Oncology Research Cluster (PHUC)	2	20 000 000	14 840 523	5 159 477
Hospital University Research in Health	4	32 500 000	3 250 000	29 250 000
Technology Transfer Acceleration Companies (SATT)	14	856 800 000	383 160 064	473 639 936
Nuclear safety	21	49 550 000	11 309 698	38 240 302
<b>TOTAL</b>	<b>508</b>	<b>6 584 233 284</b>	<b>3 451 587 443</b>	<b>3 132 645 841</b>

\* Excluding campus and Saclay

## INVESTMENTS FOR THE FUTURE

## STATE OF DISBURSEMENTS BY REGION\*

MAIN REGION OF PROJECT	NUMBER OF PROJECTS	TOTAL AUTHORISED (€)	TOTAL DISBURSED AS AT 31/12/2015 (€)	REMAINING TO BE DISBURSED (€)
Alsace	21	357 586 819	254 756 856	102 829 962
Aquitaine	23	323 319 583	210 175 735	113 143 848
Auvergne	6	100 999 709	41 669 032	59 330 677
Basse-Normandie	5	39 286 087	22 394 106	16 891 980
Bourgogne	5	84 096 489	33 079 828	51 016 661
Bretagne	15	274 066 524	115 509 359	158 557 165
Centre	6	49 050 805	16 865 980	32 184 825
Franche-Comté	3	12 224 246	6 769 563	5 454 683
Haute-Normandie	3	19 630 952	12 744 549	6 886 403
Île-de-France	215	2 485 181 572	1 361 724 184	1 123 457 387
Languedoc-Roussillon	20	198 427 273	102 875 603	95 551 669
Limousin	1	7 500 000	3 704 906	3 795 094
Lorraine	9	165 890 858	94 923 599	70 967 259
Midi-Pyrénées	24	458 146 790	220 711 487	237 435 303
Nord-Pas-de-Calais	16	267 861 500	100 988 336	166 873 164
Pays de la Loire	9	154 777 300	62 384 321	92 392 979
Picardie	8	103 709 597	57 938 334	45 771 263
Poitou-Charentes	4	22 055 302	10 966 504	11 088 798
Provence-Alpes-Côte d'Azur	29	384 749 791	247 612 985	137 136 806
Rhône-Alpes	80	1 026 272 088	458 132 174	568 139 914
<b>TOTAL</b>	<b>502</b>	<b>6 534 833 284</b>	<b>3 435 927 443</b>	<b>3 098 905 841</b>

\* Excluding campus and Saclay



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